

**DRAFT
Environmental Assessment Screening
Construction of a New Sewage Lagoon
and Rehabilitation of Existing Lagoons
Hamlet of Igloolik, Nunavut**

**Conducted In Compliance with
The Canadian Environmental Assessment Act (CEAA)**

Prepared for:

**Government of Nunavut
Community Government and Services
Project Management Division – Baffin Region**



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Executive Summary

GLOBALTOX was retained by Trow Associates Inc. to prepare an Environmental Assessment (EA) Screening under the Canadian Environmental Assessment Act (CEAA) for Government of Nunavut (GN), Department of Community Government Services (CGS). The EA is carried out in order to complete the detailed planning design for the construction of a new sewage treatment facility and rehabilitation of the existing lagoons for the Hamlet of Igloolik, hereinafter referred to as the 'Site'.

The Hamlet of Igloolik is the proponent of the project and as such triggers the requirement for a screening level environmental assessment for the project under section 5(1)a of the Canadian Environmental Assessment Act (CEAA). Due to the size and location of the proposed project(s) (leaving a footprint $>25 \text{ m}^2$), it cannot be excluded under CEAA, and an environmental assessment as per CEAA must be completed prior to any physical work completed by the proponent. The Government of Nunavut is the Responsible Authority (RA).

Igloolik is a small, arctic community located on a small Island (Igloolik Island) in Foxe Basin, close to the Melville Peninsula in the Qikiqtaaluk (Qikiqtani/Baffin) Region of Nunavut. The annual snowfall in Arctic Bay is about 183 centimetres and the annual rainfall is about 10 centimetres. Temperatures in the summer range between -2°C and 11°C and in winter between -23°C and -32°C (EC, 2009). Permafrost is present in the soil, it recedes to approximately 1 m below the surface in the summer time.

The Hamlet's existing sewage lagoon system is located approximately 2 km to the west of the community. It is comprised of four lagoons and wetlands. The sewage treatment system is bordered to the east by the Hamlet's solid waste disposal site and to the south by the access road. The existing lagoons were constructed over a number of years. The lagoons are unlined earth lagoons with inadequate berms some of which have been failing or are on the verge of failing.

The reported capacity of the lagoons is approximately XXX m^3 and they were originally designed to hold sewage for 365 days with manual discharge.

The proposed new sewage lagoon will be constructed adjacent to Lagoon No 4 (the most northern lagoon, furthest from the Hamlet). The vegetated area between the new lagoon and Foxe Basin will be incorporated into the sewage treatment process.

The justification for the project is based on the need of the Hamlet of Igloolik to operate a new sewage lagoon that is structurally sound and has the necessary capacity to accommodate the projected growth of the community over the next 20 years. In addition, it is necessary to rehabilitate the existing sewage lagoons to stop and prevent berm failures.

Alternatives to the project include the option to do nothing or only rehabilitate the existing sewage lagoon system. The option to do nothing would most likely result in increased structural damage to the berms of the lagoon from permafrost and increased leaking of raw sewage into the surrounding natural environment. The option to only rehabilitate the existing lagoon would



not accommodate the growth of the Hamlet and increasing demand for storage capacity, resulting in insufficient treatment of the raw sewage before release.

The project will not have long term negative effects on the environment or wildlife. Most effects are related to construction activities and are short term and all effects can be mitigated by applying suitable mitigation measures.



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1.0 Project Identification

Project Title/Type	The Government of Nunavut, Community and Government Services, Project Management Division – Baffin Region Project Component 1: Design and construction of a Sewage Lagoon Project Component 2: Design and construction of a Filter Strip Wetland Project Component 3: Rehabilitation of existing Sewage Lagoon System		
Project Location:	Hamlet of Igloolik, Nunavut	Estimated Cost:	NA
EA Start Date:	September 21, 2009	NOC Posting Date	NA

NA= not applicable



2.0 Contacts

Government of Nunavut/Department of Community Government Services	STEVE TO ADD CONTACT INFO HERE	Tel: (867) XXX Fax: (867) XXX e-mail:
		Tel.: (867) XXX Fax: (867) XXX e-mail:
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Consultants:	Steven Burden, P.Eng Trow Associates Inc. 154 Colonnade Road South, Ottawa, Ontario	Tel.: (613) 225-9940 Fax: (613) 225-7337 e-mail: steven.burden@trow.com

Proponent:	Hamlet of Igloolik Representative: Brian Flemming, SAO Hamlet of Igloolik P.O. Box 30 Igloolik, Nunavut	Tel: (867) 360-6338 Fax: (867) 360-6369 igloolik@magma.ca
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3.0 CEAA Trigger

GN/CGS

- ☐ is the proponent of the project;
☒ proposes to fund all or part of a project;
☐ proposes to sell, lease or otherwise dispose of land for the project.
☐ proposes to issue a permit, approval or other authorization on the CEAA Law List Regulations

Federal departments notified in accordance with Federal Co-ordination Regulations:

Yes ☒ None identified ☐

Other Federal Involvement? Yes ☐ not applicable ☒



4.0 Project Description

GLOBALTOX was retained by Trow Associates Inc. to prepare an Environmental Assessment (EA) Screening under the Canadian Environmental Assessment Act (CEAA) for Government of Nunavut (GN), Department of Community Government Services (CGS). The EA is carried out in order to complete the detailed planning design for the construction of a new sewage treatment facility and rehabilitation of the existing lagoons for the Hamlet of Igloolik, hereinafter referred to as the 'Site'.

The Hamlet of Igloolik is the proponent of the project and as such triggers the requirement for a screening level environmental assessment for the project under section 5(1)a of the Canadian Environmental Assessment Act (CEAA). Due to the size and location of the proposed project(s) (leaving a footprint $>25 \text{ m}^2$), it cannot be excluded under CEAA, and an environmental assessment as per CEAA must be completed prior to any physical work completed by the proponent. The Government of Nunavut is the Responsible Authority (RA).

The Hamlet's existing sewage lagoon system is located approximately 2 km to the west of the community. It is comprised of four lagoons and wetlands, as shown in Figure 1. The sewage treatment system is bordered to the south east by the Hamlet's solid waste disposal site and to the south west by the access road. The existing lagoons were constructed over a number of years. The lagoons are unlined earth lagoons with inadequate berms some of which have been failing or are on the verge of failing.

The reported capacity of the lagoons is approximately XXX m^3 and they were originally designed to hold sewage for 365 days with manual discharge.

The proposed new sewage lagoon will be constructed adjacent to Lagoon No 4 (Figure 1, the most northern lagoon, furthest from the Hamlet). The vegetated area between the new lagoon and Foxe Basin will be incorporated into the sewage treatment process.

4.1 Project Scheduling

- Estimated Project Completion Date: 2011
- Estimated Project Start Date: 2009
- Estimated Transfer Date (if applicable): N/A



4.2 Project Justification – Need/Alternatives to the Project

The justification for the project is based on the need of the Hamlet of Igloodik to operate a new sewage lagoon that is structurally sound. With the existing four lagoons the new lagoon system will have the necessary capacity to accommodate the projected growth of the community over the next 20 years. In addition, it is necessary to rehabilitate the existing sewage lagoons which have inadequate and failing berms.

Alternatives to the project include the option to do nothing or rehabilitate the existing sewage lagoons only. The option to do nothing would most likely result in increased structural damage to the berms of the lagoon from permafrost and increased leaking of raw sewage into the existing wetland and surrounding natural environment. The option to rehabilitate the existing lagoons would not accommodate the growth of the Hamlet and increasing demand for storage capacity, resulting in insufficient treatment of the raw sewage before release.

The proposed project will not have long term negative effects on the environment or wildlife and there will be no risk to aquatic species. Most effects are related to construction activities and are short term and all effects can be mitigated by applying suitable mitigation measures.

5.0 Scope of Project

The project phases of construction, operation and modification and decommissioning and the relevant project components are shown in Table 1. A more detailed description of the project components and various activities associated with the three phases are shown in Table 2.



Table 1: Project Component Identification

Project Phase	Project Components	
	Core Project Components	Ancillary Works Other Projects and Activities
Construction	• Construction of new sewage lagoon • Construction of treatment wetland • Rehabilitation of existing lagoon system	• Re-location of honey-bag dump site • Construction of trench for constructed treatment wetland • Strengthening of berms on existing lagoons • May include installation of fence around sewage lagoon/s
Operation/ Modification	• Sewage trucks importing sewage from holding tanks • Effluent drainage from lagoons through constructed treatment wetland to Foxe Basin	
Decommissioning/ Abandonment	• Decommissioning of the existing sewage lagoon system and new lagoon	• Drain sewage lagoons • Bring in fill material to backfill existing and new lagoons

Table 2: Project Component Description

Project Components	Physical Works and Activities	Description
1. Construction of a new sewage lagoon	• Re-location of honey-bag dump site • Site preparation • Excavation and berm construction	• Obtain gravel • Cut, fill and re-grade • Build berms with gravel
2. Construction of a new treatment wetland	• Site Preparation • Trench construction	• Re- grade/remove existing access road into wetland • Re-grade/remove berms and channels within the wetland • Construct trench such that even distribution of pre-treated sewage in the wetland area occurs
3. Rehabilitation of existing lagoon system	• Repair existing berms	• Obtain gravel • Re-enforce existing berms with gravel • Fill and re-grade



6.0 Scope of Assessment

Natural environment components such as surface water, groundwater, soil, vegetation, wildlife, etc are included in the scope of assessment. Refer to Table 3.

There are no temporal or spatial boundaries that guide the assessment. All components will be installed within a relatively short time frame and the site itself is relatively small.



Table 3: Project-Environment Interaction Matrix

Component	Surface water	Ground water	Soils and sediments	Air Quality and Climate Change	Noise/ Vibration	Terrain and Topography	Vegetation and Wetlands	Fish and Fish Habitat	Wildlife/ Habitat	Migratory Birds	Species at Risk	Socio-Economic Conditions ¹	Heritage/ Archaeology ¹	Land Use ¹	Land use by First Nations	Human Health ¹	Transportation ¹ and Navigation
Construction Activities																	
Construction of sewage lagoon	M	M	M	M	M	M	+	+	M	o	o	+	o	+	+	M	o
Construction of wetland	M	M	M	M	M	M	+	+	M	o	o	+	o	+	+	M	o
Rehabilitation of existing lagoons	M	M	M	M	M	M	+	+	M	o	o	+	o	+	+	M	o
Operational Activities																	
Importing sewage	o	o	M	M	M	o	o	M	o	o	o	+	o	+	+	M	o
Effluent drainage	M	o	M	o	o	o	M	M	o	o	o	M	o	+	+	M	o
Decommissioning																	
Decommissioning of sewage lagoons	M	M	M	M	M	M	M	M	M	o	o	M	o	o	o	M	o

+ = positive effect M= negative effect which can be mitigated o = no interaction

¹ The indirect effects on these Environmental Components resulting from a project impact on the environment must be considered. Direct effects on these Environmental Components may also be considered at the discretion of the RA.



7.0 Description of Existing Environment

7.1 Socio-Economic and Cultural Environment

Igloolik is a small, arctic community located on an Island (Igloolik Island) in Foxe Basin, close to the Melville Peninsula in the Qikiqtaaluk (Qikiqtani/Baffin) Region of Nunavut. The coordinates are 69° 23'N latitude and 81° 40'W longitude.

The population of Igloolik is around 1600 with a growing trend. In the year 1961 133 people lived in Igloolik, in 2001 there were 1286 inhabitants and the 2006 census registered 1538 people. Approximately 94% of the population are Inuit. Employment rate in Igloolik is 50% with the majority of people employed in services and sales, trades and social services. Other occupations and activities include traditional hunting and fishing as well as stone, antler and ivory carving. There is a limited tourism industry in Igloolik with tours and boat rides for bird, walrus and whale watching.

Igloolik has an airport, two stores, the Igloolik Co-op and a Northern Store, a Government building, a Hamlet office, a medical centre, RCMP station, two hotels and three churches. There are two schools in Igloolik, an elementary school and a high school. The Arctic College has a small campus in the Hamlet. Other facilities include an arena, a library and a research centre. The Igloolik Research Centre is part of Natural resources Canada's Polar Continental Shelf Research Program. It also runs environmental monitoring programs, studies traditional Inuit technology and knowledge and provides facilities for visiting scientists. The Hunters and Trappers Association maintains an office in the Hamlet and a movie production company, Igloolik Isuma Productions is located in Igloolik.

The Hamlet is serviced by sealift twice a year and by air. First Air and Canadian North have scheduled flights to Igloolik.

According to the Nunavut Planning Commission, there are mineral claims for base metals on the island, however, there are no mines or oil/gas production listed in the area (NPC, 2009).

7.2 Climate

The annual snowfall in Igloolik is about 183 centimetres and the annual rainfall is about 10 centimetres. Temperatures in the summer range between -2 °C and 11°C and in winter between -23°C and -32°C (EC, 2009). Igloolik is located within a zone of continuous permafrost.



7.3 Geophysical Description

Igloolik Island is at a very low elevation with numerous small and medium sized ponds and an extensive tidal foreshore.

The island is composed of a dolomitic conglomerate with sandstone, dolostone and siltstone. Permafrost is present in the soil, it recedes to approximately 1 m below the surface in the summer time.

The Hamlet's existing sewage lagoon system is located approximately 2 km to the west of the community. It is comprised of four lagoons and wetlands, as shown in Figure 1. The sewage treatment system is bordered to the east by the Hamlet's solid waste disposal site and to the south by the access road. The existing lagoons were constructed over a number of years. The lagoons are unlined earth lagoons with inadequate berms some of which have been failing or are on the verge of failing. The reported capacity of the lagoons is approximately XXX m³ and they were originally designed to hold sewage for 365 days with manual discharge.

The proposed new sewage lagoon will be constructed adjacent to Lagoon No 4 (the most northern lagoon, furthest from the Hamlet). The vegetated area between the new lagoon and Foxe Basin will be incorporated into the sewage treatment process.

7.4 Wildlife

The wildlife officer of Igloolik, Theo Ikummaq was consulted on the occurrence, distribution and hunting of local wildlife. In addition, the Committee on the Status of Endangered Wildlife in Canada listing (COSEWIC, 2009) was reviewed on general occurrence and status of wildlife species in Nunavut (Table 4).

Table 4: Wildlife and Plant Species recorded in Nunavut

Scientific Name	Common Name	COSEWIC Status
<i>Rangifer tarandus pearyi</i>	peary caribou	END
<i>Rangifer tarandus groenlandicus</i>	barren-ground caribou	SC
<i>Ursus arctos</i>	grizzly bear (North western population)	SC
<i>Ursus maritimus*</i>	polar bear	SC
<i>Ursus americanus</i>	American black bear	NAR
<i>Gulo gulo</i>	wolverine	SC
<i>Lynx canadensis</i>	Canada lynx	NAR
<i>Canis lupus occidentalis</i>	Northern grey wolf	NAR
<i>Canis lupus arctos</i>	Arctic grey wolf	DD



Scientific Name	Common Name	COSEWIC Status
<i>Lepus americanus</i>	snowshoe hare	Not Ranked
<i>Lepus arcticus</i>	Arctic hare	Not Ranked
<i>Delphinapterus leucas</i>	Beluga whale (Eastern Hudson Bay population)	END
<i>Delphinapterus leucas</i>	Beluga whale (Eastern High Arctic – Baffin Bay population)	SC
<i>Delphinapterus leucas</i>	Beluga whale (Western Hudson Bay population)	SC
<i>Delphinapterus leucas</i>	Beluga whale (Cumberland Sound population)	THR
<i>Monodon monoceros</i>	narwhal	SC
<i>Balaena mysticus</i>	bowhead whale	SC
<i>Hyperoodon ampullatus</i>	Northern bottlenose whale	NAR
<i>Orcus orca</i>	killer whale (Eastern Arctic population)	SC
<i>Odobenus rosmarus rosmarus</i>	Atlantic walrus	SC
<i>Phoca vitulina concolor</i>	harbour seal (Atlantic and Eastern Arctic subspecies)	NAR
<i>Erignathus barbatus</i>	bearded seal	DD
<i>Pusa hispida</i>	ring seal	NAR
<i>Cystophora cristata</i>	hooded seal	NAR
<i>Pagophilus groenlandicus</i>	harp seal	Not Ranked
<i>Numenius borealis</i>	Eskimo curlew	END
<i>Pagophila eburnea</i>	ivory gull	END
<i>Calidris canutus rufa</i>	red knot (<i>rufa</i> subspecies)	END
<i>Calidris canutus islandica</i>	red knot (<i>islandica</i> subspecies)	SC
<i>Rhodostethia rosea</i>	Ross's gull	THR
<i>Euphagus carolinus</i>	rusty blackbird	SC
<i>Histrionicus histrionicus</i>	harlequin duck (Eastern population)	SC
<i>Falco peregrinus anatum/tundrius</i>	Peregrine falcon	SC
<i>Asio flammeus</i>	short-eared owl	SC
<i>Fulica americana</i>	American coot	NAR



<i>Haliaeetus leucocephalus</i>	bald eagle	NAR
Scientific Name	Common Name	COSEWIC Status
<i>Aquila chrysaetos</i>	golden eagle	NAR
<i>Accipiter gentilis atricapillus</i>	Northern goshawk (<i>atricapillus</i> subspecies)	NAR
<i>Podiceps grisegena</i>	red-necked grebe	NAR
<i>Podiceps auritus</i>	horned grebe	SC
<i>Falco rusticolus</i>	gyrfalcon	NAR
<i>Falco columbarius</i>	merlin	NAR
<i>Circus cyaneus</i>	Northern harrier	NAR
<i>Buteo jamaicensis</i>	red-tailed hawk	NAR
<i>Buteo lagopus</i>	rough-legged hawk	NAR
<i>Accipiter striatus</i>	sharp-shinned hawk	NAR
<i>Gavia immer</i>	common loon	NAR
<i>Gavia adamsii</i>	yellow-billed loon	NAR
<i>Aegolius funereus</i>	boreal owl	NAR
<i>Bubo scandiaca</i>	snowy owl	NAR
<i>Myoxocephalus quadricornis</i>	fourhorn sculpin (freshwater form)	DD
<i>Hippoglossoides platessoides</i>	American plaice	DD
<i>Gadus morhua</i>	Atlantic cod	SC
<i>Coryphaenoides rupestris</i>	roundnose grenadier	END
<i>Anarhichas minor</i>	spotted wolffish	THR
<i>Anarhichas denticulatus</i>	Northern wolffish	THR
<i>Salix silicicola</i>	felt-leaf willow	SC
<i>Salix tyrrellii</i>	Tyrrell's willow	NAR
<i>Mielichhoferia macrocarpa</i>	Porsild's bryum	THR

Legend:

COSEWIC – Committee on the Status of Endangered Wildlife in Canada

DD – Data Deficient

END – Endangered

THR – Threatened

EXP – Extirpated

END-R – Endangered (Regulated)

SC – Special Concern

NAR – Not At Risk



There were no rare, threatened or endangered species encountered during the site visit in September 2009.

According to the wildlife officer, polar bears or their tracks are sighted regularly on Igloodik Island. The Foxe Baisin population of polar bears is an estimated 2300 individuals (Nunami JWL, 2008). Other wildlife species in and around Igloodik include wolf and wolverine, Arctic hare (last known sighting 6 years ago near the landfill site), fox, walrus and migratory seals such as harp seal, ring seal, bearded seal, hooded seal (*Cystophora cristata*). Whale species include narwhal, bowhead whale and beluga whale. Caribou are not present on Igloodik Island, they are found approximately 200 km to the south.

Bird species seen on Igloodik Island include snow goose (*Chen caerulescens*), Canada goose (*Branta canadensis*), brant goose (*Branta bernicla*), ptarmigan (*Lagopus mutus*), snowy owl, loon, tundra swan (*Cygnus columbianus*), eider duck (*Somateria* spp.), snow bunting (*Plectrophenax nivalis*), gull (*Larus* spp.), Lapland longspur (*Calcarius pictus*), horned lark (*Eremophila alpestris*), raven (*Corvus corax*) and Arctic tern (*Sterna paradisaea*). In recent years more southerly species such as waxwing (*Bombycilla* spp.), redpoll (*Carduelis* spp.), finch (unnamed species) and robin (*Turdus migratorius*) have been observed in the area according to the wildlife officer.

Fish species of local significance are Arctic char (*Salvelinus alpinus*), lake trout (*S. namaycush*) and cod (*Arctogadus glacialis*). Igloodik Island is in an Arctic char area of abundance (Nunami JWL, 2008). Large populations of tomcod (*Microgadus tomcod*) are found in the area which lay eggs close to shore. However, tomcod is not being fished or eaten by local people. Other aquatic species found in the waters around Igloodik Island include mussel, whelk, clam, hermit crab, snow crab and lobster. None of these species are part of the diet of locals.

There are no Wildlife Sanctuaries, Special Management Areas or areas of importance to wildlife located on Igloodik Island (NPC, 2009). A Canada Wildlife Service (CWS) Key Marine Habitat Site is located north of Igloodik Island.

7.5 Vegetation Community

The area between the existing lagoons and the shoreline of Foxe Baisin is vegetated with arctic tundra and arctic wetland vegetation. The filterstrip wetland area is XX hectare, XX acres in size (approximately XX m long and between XX and XX m wide) with a slope of that varies between X to X %.

A vegetation survey was carried out during the site visit in September 2009 to assess the suitability of the species present for the treatment of pre-treated sewage from the lagoon. The plant species list is shown in Table 5. It should be noted that this list is not complete as it reflects a fall season survey and parts of the tundra wetland were snow covered at the time of the site visit.



Table 5: Plant Species-Proposed Filter Strip Wetland Location

Scientific Name	Common Name
	Lichen
<i>Allantoparmelia alpicola</i>	lichen
<i>Aspicilia caesiocinerea</i>	lichen
<i>Aspicilia</i> sp.	lichen
<i>Bellemeria alpina</i>	lichen
<i>Caloplaca</i> sp.	lichen
<i>Caloplaca biatorina</i>	lichen
<i>Caloplaca ignea</i>	lichen
<i>Cladonia</i> sp.	lichen
<i>Melanelia commixta</i>	lichen
<i>Rhizocarpon geographicum</i>	map lichen
<i>Umbilicaria</i> sp.	rock tripe
<i>Xanthoria</i> sp.	jewel lichen
	Mosses
<i>Lycopodium annotium</i>	club moss
<i>Sphagnum</i> sp.	moss
Graminae	Grasses
<i>Calamagrostis stricta</i>	narrow leaved reed grass
<i>Dupontia fisheri</i>	Fisher's tundra grass
<i>Festuca baffenensis</i>	Baffin fescue
<i>Festuca brachyophylla</i>	Alpine fescue
<i>Poa</i> sp.	Blue grass
<i>Poa alpina</i>	Alpine blue grass
<i>Poa abbreviata</i>	Patterson's bluegrass



<i>Poa arctica</i>	Arctic bluegrass
<i>Poa</i> spp.	grasses
<i>Puccinellia langeana</i>	goose grass
<i>Trisetum spicatum</i>	spiked trisetum
Cyperaceae	Sedge Family
<i>Eriophorum</i> spp.	Arctic cotton
<i>Carex atrofusca</i>	dark brown sedge
<i>Carex aquatilis</i>	water sedge
<i>Carex fuliginosa</i>	shortleaf sedge
<i>Carex lachenalii</i>	two tipped sedge
<i>Carex rupestris</i>	curly sedge
<i>Carex saxatilis</i>	rock sedge
<i>Carex scirpoidea</i>	bulrush sedge
<i>Carex</i> spp.	sedges
Salicaceae	Willow Family
<i>Salix reticulata</i>	net-veined willow
<i>Salix</i> sp.	willow
Betulaceae	Birch Family
<i>Betula glandulosa</i>	dwarf birch
Polygonaceae	Buckwheat Family
<i>Oxyria digyna</i>	mountain sorrel
Caryophyllaceae	Pink Family
<i>Cerastium</i> sp.	mouse-ear chickweed
<i>Melandrium apetalum</i>	purple bladder-campion
<i>Silene acaulis</i>	moss-campion
<i>Stellaria</i> spp.	starwort



The native vegetation is highly adapted to the extreme conditions of the high arctic region. The composition of the vegetation community was found to be suitable for the proposed filter strip wetland treatment process.

8.0 Environmental Effects and Mitigation

The effects of the proposed project components on Valued Ecosystem Components is shown in Tables 6 to 10.



Table 6: Effects of Project on VECs during Construction

Effect	Component	Recommended Mitigation	Likelihood of Residual Effect	Significance of Residual Effect
Construction of the new sewage lagoon and wetland and rehabilitation of existing lagoons may affect the water quality through fuel/sewage spills and run off	Surface Water	Ensure that no run off from construction/rehabilitation activities enters the wetland area or Foxe Basin; a spill response kit to be on site in the event of a spill; immediately contain and clean up any spills in accordance with regulatory requirements. All equipment fuelling and maintenance has to be carried out at a safe distance from wetland area and ocean to ensure that no deleterious substances enter the surface water bodies.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Construction of the new sewage lagoon and wetland and rehabilitation of existing lagoons may affect the groundwater quality through fuel/sewage spills and run off	Ground Water	Ensure that no run off from construction/rehabilitation activities enters the wetland area or Foxe Basin; a spill response kit to be on site in the event of a spill; immediately contain and clean up any spills in accordance with regulatory requirements to protect groundwater. All equipment fuelling and maintenance has to be carried out at a safe distance from wetland area and ocean to ensure that no deleterious substances enter the surface water bodies.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Impact of excavating and grading activities on soil through fuel/sewage spills and run off.	Soils and Sediments	All equipment fuelling and maintenance has to be carried out in designated locations; emergency clean-up protocols will be developed and implemented in the event of an accidental spill; fuels, oils and other hazardous substances have to be stored in designated, secure locations.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Release of emissions from engines and equipment during construction of the lagoon and the wetland and rehabilitation of existing lagoons	Air Quality and Climate Change	Vehicles, machinery and equipment should be in good repair, equipped with emission controls, as applicable. All work shall be carried out in compliance with all applicable air-emissions regulations and by laws.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Noise/vibration from engines and equipment during construction and rehabilitation activities.	Noise and/or Vibration	Vehicles, machinery and equipment should be in good repair. All work shall be carried out in compliance with all applicable noise regulations and by laws.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Construction of the new sewage lagoon and wetland will include the construction	Terrain and Topography	Ensure proper monitoring of function of sewage lagoon and filter strip wetland.	Minimal potential due to the small magnitude, limited geographical	Not significant



of berms which may influence the terrain and topography in regards to natural overland flow.				extent and duration of project activities.	
Construction/ rehabilitation activities can change present wildlife/habitat conditions.	Wildlife and/or Habitat	Ensure proper monitoring of function of sewage lagoon and filter strip wetland.		Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Release of emissions and noise from engines and heavy equipment during lagoon and wetland construction and rehabilitation of existing lagoons.	Human Health	Follow all applicable health and safety guidelines and proper use of personal safety devices (i.e. hard hats, steel toed boots, safety glasses etc).		Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant

Table 7: Effects of Project on VECs during Operation and Maintenance

Effect	Component	Recommended Mitigation	Likelihood of Residual Effect	Significance of Residual Effect
Importing raw sewage in trucks to the lagoons may affect the water quality through fuel and sewage spills.	Surface Water	Ensure that no run off from operational activities enters wetland area or Foxe Basin; a spill response kit to be on site in the event of a spill; immediately contain and clean up any spills in accordance with regulatory requirements. All equipment fuelling and maintenance has to be carried out at a safe distance from wetland area and ocean to ensure that no deleterious substances enter the surface water bodies.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Drainage from the sewage lagoon overland to Foxe Basin.		Ensure proper function of sewage lagoon and filter strip treatment wetland through monitoring program.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Importing raw sewage or effluent drainage/ overland flow may affect	Soils and Sediments	All equipment fuelling and maintenance has to be carried out in designated locations; emergency clean-up protocols will be developed and implemented in the event of an accidental spill;	Minimal potential due to the small magnitude, limited geographical	Not significant



the soils and sediments through equipment fuel/sewage spills		fuels, oils and other hazardous substances have to be stored in designated, secure locations.	extent and duration of project activities.	
Release of emissions from engines and heavy equipment during importing of sewage.	Air Quality and Climate Change	Vehicles, machinery and equipment should be in good repair, equipped with emission controls, as applicable. All work shall be carried out in compliance with all applicable air-emissions regulations and by laws.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Noise from engines and heavy equipment during importing of sewage.	Noise and/or Vibration	Vehicles, machinery and equipment should be in good repair. All work shall be carried out in compliance with all applicable noise regulations and by laws.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Effluent that does not meet criteria can negatively impact vegetation and wetlands.	Vegetation and Wetlands	Ensure proper function of lagoons through monitoring program.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Importing raw sewage in trucks to the lagoons may affect the water quality through fuel and sewage spills which can negatively impact fish and fish habitat.	Fish and Fish Habitat	Ensure that no run off from operational activities enters wetland area or Foxe Basin; a spill response kit to be on site in the event of a spill; immediately contain and clean up any spills in accordance with regulatory requirements. All equipment fuelling and maintenance has to be carried out at a safe distance from wetland area and ocean to ensure that no deleterious substances enter the surface water bodies.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Effluent that does not meet criteria can negatively impact fish and fish habitat.		Ensure proper function of lagoons and filter strip treatment wetland through monitoring program.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Effluent that does not meet criteria can negatively impact socio-economic conditions.	Socio-Economic Conditions	Ensure proper function of lagoons through monitoring program.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Release of emissions and noise from engines and heavy equipment during	Human Health	Follow all applicable health and safety guidelines and proper use of personal safety devices (i.e. hard hats, steel toed boots, safety glasses etc).	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant



lagoon and wetland construction and rehabilitation of lagoons.		extent and duration of project activities.	
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Table 8: Effects of Project on VECs during Decommissioning and Abandonment

Effect	Component	Recommended Mitigation	Likelihood of Residual Effect	Significance of Residual Effect
Decommissioning of the sewage lagoons may affect the water quality through fuel/sewage spills and run off during drainage of the lagoons or backfilling/re-grading.	Surface Water	Ensure that no run off from decommissioning activities enters wetland area or Foxe Basin; a spill response kit to be on site in the event of a spill; immediately contain and clean up any spills in accordance with regulatory requirements. All equipment fuelling and maintenance has to be carried out at a safe distance from wetland area and ocean to ensure that no deleterious substances enter the surface water bodies.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Decommissioning of the sewage lagoons may affect the water quality through fuel/sewage spills and run off during drainage of the lagoons or backfilling/re-grading.	Ground Water	Ensure that no run off from decommissioning activities enters wetland area or Foxe Basin; a spill response kit to be on site in the event of a spill; immediately contain and clean up any spills in accordance with regulatory requirements. All equipment fuelling and maintenance has to be carried out at a safe distance from wetland area and ocean to ensure that no deleterious substances enter the surface water bodies.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Decommissioning of the sewage lagoons may affect the soils and sediments through fuel/sewage spills and run off during drainage of the lagoon or backfilling/re-grading.	Soils and Sediments	All equipment fuelling and maintenance has to be carried out in designated locations away from wetland area and Foxe Basin; emergency clean-up protocols will be developed and implemented in the event of an accidental spill; fuels, oils and other hazardous substances have to be stored in designated, secure locations.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Release of emissions from engines and equipment during decommissioning of sewage lagoons.	Air Quality and Climate Change	Vehicles, machinery and equipment should be in good repair, equipped with emission controls, as applicable. All work shall be carried out in compliance with all applicable air-emissions regulations and by laws.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Noise/vibration from	Noise and/or	Vehicles, machinery and equipment should be in good repair. All	Minimal potential due to	Not significant



engines and equipment during decommissioning activities.	Vibration	work shall be carried out in compliance with all applicable noise regulations and by laws.	the small magnitude, limited geographical extent and duration of project activities.	
Decommissioning of the sewage lagoons may influence the terrain and topography in regards to natural overland flow by removal of berms and backfilling of the lagoons.	Terrain and Topography	Ensure proper monitoring of function of sewage lagoons and filter strip wetland.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Decommissioning of the sewage lagoons will remove the vegetation that is associated with the current conditions.	Vegetation and Wetlands	Once re-graded plant native vegetation.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Removal of the sewage in the lagoons may affect the water quality through fuel and sewage spills which can negatively impact fish and fish habitat.	Fish and Fish Habitat	Ensure that no run off from decommissioning activities enters wetland area or Foxe Basin; a spill response kit to be on site in the event of a spill; immediately contain and clean up any spills in accordance with regulatory requirements. All equipment fuelling and maintenance has to be carried out at a safe distance from wetland area and ocean to ensure that no deleterious substances enter the surface water bodies.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Re-grading/backfilling of the lagoons may affect water quality through run off which can negatively impact fish and fish habitat.			Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Decommissioning activities can interrupt wildlife/habitat conditions that were created by the presence of the sewage lagoons/wetland.	Wildlife and/or Habitat	The construction of the new sewage lagoons as replacement would counteract any negative effects.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Removal of the sewage lagoons would negatively affect socio-economic	Socio-Economic Conditions	The construction of new sewage lagoons as replacement would counteract any negative effects.	Minimal potential due to the small magnitude, limited geographical	Not significant



conditions.			extent and duration of project activities.	
Release of emissions and noise from engines and equipment during decommissioning activities and use of heavy equipment.	Human Health	Follow all applicable health and safety guidelines and proper use of personal safety devices (i.e. hard hats, steel toed boots, safety glasses etc).	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant

Table 9: Accidents and Malfunctions

Effect	Component	Recommended Mitigation	Likelihood of Residual Effect	Significance of Residual Effect
Spills can affect surface and groundwater water quality as well as fish and fish habitat, soil and sediment.	Fuel/Oil/Other Hazardous Substance Spills	All equipment fuelling and maintenance has to be carried out in designated locations away from the wetland area and ocean; emergency clean-up protocols will be developed and implemented in the event of an accidental spill; fuels, oils and other hazardous substances have to be stored in designated, secure locations.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not Significant

Table 10: Effects of the Environment on the Project

Effect	Component	Recommended Mitigation	Likelihood of Residual Effect	Significance of Residual Effect
Extended periods of permafrost/freezing conditions may influence infiltration rates, reducing filtering time for effluent or impact retention times, thus increasing amount of untreated overflow.	Permafrost, freezing weather	Ensure that retention times are long enough to prevent untreated/under treated effluent from entering filter strip wetland.	Minimal potential due to the small magnitude and limited geographical extent.	Not Significant
Snow drifting- There may be areas along the access road that are	Snow/Wind	Installation of snow fencing along access road to minimize snow drifting. Effects of snow drifts and wind on the functioning of the sewage	None	None



subject to snow drifts. Effect of snow drifts on sewage lagoon and filter strip wetland.		lagoon and wetland are most likely negligible.		
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8.1 Cumulative Effects

Cumulative effects resulting from this project are not expected.

8.2 Any Other Matter

No other matter was identified during the screening.

9.0 Environmental Effects Summary Checklist

Table 11 shows a summary of the potential environmental effects, potential mitigation and residual effects.

Table 11: Environmental Effects Checklist

Environmental Component	Potential Project Effects						Residual Effects	
	Potential Adverse Effect?			Can Be It Be Mitigated?			Significant?	
	Yes	No	Uncertain	Yes	No	Uncertain	Yes	No
Topography	X			X				X
Species/Habitat of Special Status		X						
Vegetation	X			X				X
Wildlife / Habitat	X			X				X
Fish and Fish Habitat	X			X				X
Marine Resources	X			X				X
Soils	X			X				X
Drinking Water		X						
Groundwater	X			X				X
Surface Water / Hydrology	X			X				X
Wetlands	X			X				X
Sediments	X			X				X
Climate and Air Quality	X			X				X
Noise	X			X				X
Vibration	X			X				X



Environmental Component	Potential Project Effects						Residual Effects	
	Potential Adverse Effect?			Can Be It Be Mitigated?			Significant?	
	Yes	No	Uncertain	Yes	No	Uncertain	Yes	No
Transportation and Navigation		X						
Land Use		X						
Human Health ¹	X			X				X
Socio-economic Conditions ¹	X			X				X
Physical/Cultural Heritage		X						
Aboriginal Use of Traditional Lands/Resources		X						
Structures/Sites of Significance		X						
Other		X						

Other Factors

Accidents and Malfunctions	X			X				X
Effects of Environment on the Project	X			X				X

Cumulative Effects

Project Component 1		X						
Project Component 2		X						
Project Component 3								

Mitigation measures that are required as result of the environmental assessment are summarized in Table 12.



Table 12: Mitigation Table

Environmental Component Potentially Affected	Proposed Mitigation	Responsible to Ensure Implementation
Surface Water	Ensure that no run off enters the wetland area or Foxe Basin; a spill response kit to be on site in the event of a spill; immediately contain and clean up any spills in accordance with regulatory requirements. All equipment fuelling and maintenance has to be carried out at a safe distance from wetland and ocean to ensure that no deleterious substances enter the surface water bodies. Ensure proper function of lagoons through monitoring program.	Government of Nunavut
Ground Water	Ensure that no run off from decommissioning activities enters the wetland area or Foxe Basin; a spill response kit to be on site in the event of a spill; immediately contain and clean up any spills in accordance with regulatory requirements. All equipment fuelling and maintenance has to be carried out at a safe distance from wetland and ocean to ensure that no deleterious substances enter the surface water bodies. Ensure proper function of lagoons through monitoring program.	Government of Nunavut
Soils and Sediments	All equipment fuelling and maintenance has to be carried out in designated locations away from the wetland area or Foxe Basin; Emergency clean-up protocols will be developed and implemented in the event of an accidental spill; fuels, oils and other hazardous substances have to be stored in designated, secure locations.	Government of Nunavut
Noise/Vibration	Vehicles, machinery and equipment should be in good repair and operated within regulatory noise requirements.	Government of Nunavut
Air Quality and Climate Change	Vehicles, machinery and equipment should be in good repair, equipped with emission controls, as applicable. All work shall be carried out in compliance with all applicable air-emissions regulations and by laws.	Government of Nunavut
Terrain and Topography	Ensure that grading takes place according to design specifications.	Government of Nunavut



Environmental Component Potentially Affected	Proposed Mitigation	Responsible to Ensure Implementation
Vegetation and Wetlands	Ensure that no run off enters wetland area or Foxe Basin; a spill response kit to be on site in the event of a spill; immediately contain and clean up any spills in accordance with regulatory requirements. All equipment fuelling and maintenance has to be carried out at a safe distance from wetland and ocean to ensure that no deleterious substances enter the surface water bodies. Ensure proper function of lagoons and filter strip wetland through monitoring program.	Government of Nunavut
Fish and Fish Habitat	Ensure that no run off enters wetland area or Foxe Basin; a spill response kit to be on site in the event of a spill; immediately contain and clean up any spills in accordance with regulatory requirements. All equipment fuelling and maintenance has to be carried out at a safe distance from wetland and ocean to ensure that no deleterious substances enter the surface water bodies. Ensure proper function of lagoons and filter strip wetland through monitoring program.	Government of Nunavut
Wildlife and Habitat	Ensure that grading takes place according to design specifications. Ensure spill prevention measures are in place. Ensure proper monitoring of function of sewage lagoon and filter strip wetland.	Government of Nunavut
Socio-economic	Ensure proper function of lagoon through monitoring program.	Government of Nunavut
Human Health	Follow all applicable health and safety guidelines and proper use of personal safety devices (i.e. hard hats, steel toed boots, safety glasses etc).	Government of Nunavut
Accidents and Malfunctions	All equipment fuelling and maintenance has to be carried out in designated locations away from wetland area and Foxe Basin; emergency clean-up protocols will be developed and implemented in the event of an accidental spill; fuels, oils and other hazardous substances have to be stored in designated, secure locations.	Government of Nunavut
Water Level Fluctuations	Silt fencing to prevent loose soils, sediments and debris from entering surface water bodies.	Government of Nunavut



10.0 Consultation

10.1 Public Participation under Subsection 18(3)

Is the public participation deemed necessary under Subsection 18(3): Yes ☐ No ☒

Scope of factors posted on the CEAR: Yes ☐ Not applicable ☒

Notice of public input posted on the CEAR: Yes ☐ Not applicable ☒

Public participation was not considered because the project has no negative effect on the public and is confined to the site.

10.2 Consultation with the Public/Aboriginal People

Public consultation or public open houses took place in August 2009.

10.3 Consultation with other Federal Departments or Agencies

A request for information was sent to Fisheries and Oceans of Canada (DFO) and Indian and Northern Affairs Canada (INAC). Upon receipt of any relevant material from DFO and INAC an addendum will be issued.

10.4 Consultation with other Jurisdictions

Consultation with other jurisdictions was not undertaken.

11.0 Summary

Construction of the new sewage lagoon with filter strip treatment wetland and rehabilitation of the existing lagoons will have positive effects on the Community of Igloolik. The project will not have long term negative effects on the environment or wildlife. Most effects are related to construction activities and are short term and all effects can be mitigated by applying suitable mitigation measures.

GLOBAL TOX INTERNATIONAL CONSULTANTS INC.

Barbara Hard, Ph.D.
Senior Risk Assessment Specialist



12.0 References

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COSEWIC (2009) Species database search. Committee on the Status of Endangered Wildlife in Canada. <http://www.cosewic.gc.ca>

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NPC (2009) Nunavut Planning Commission. <http://www.nunavut.ca>



APPENDIX A:

Figures

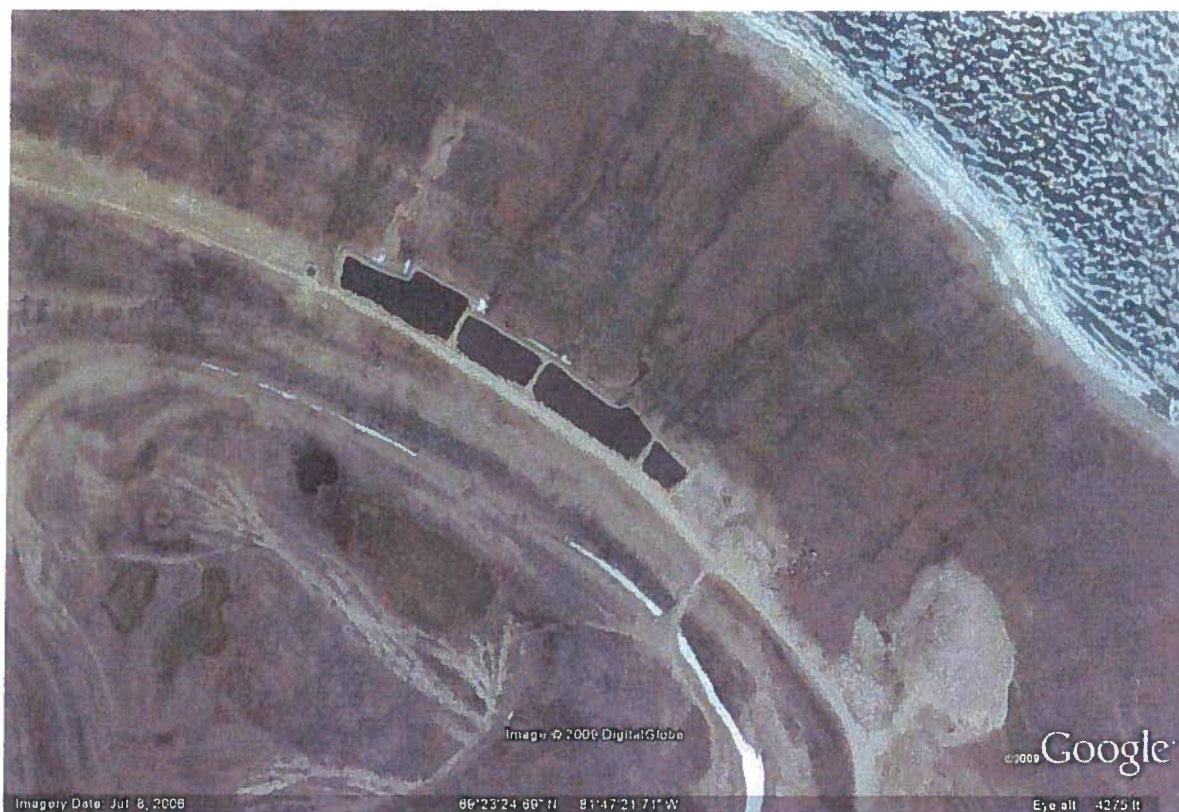


Figure 1: Aerial of existing four lagoon system, solid waste dump and landfill. Note the ponding and drainage channels which originate at the sewage lagoons and end at Fox Basin shore line.



APPENDIX B:

Photographs



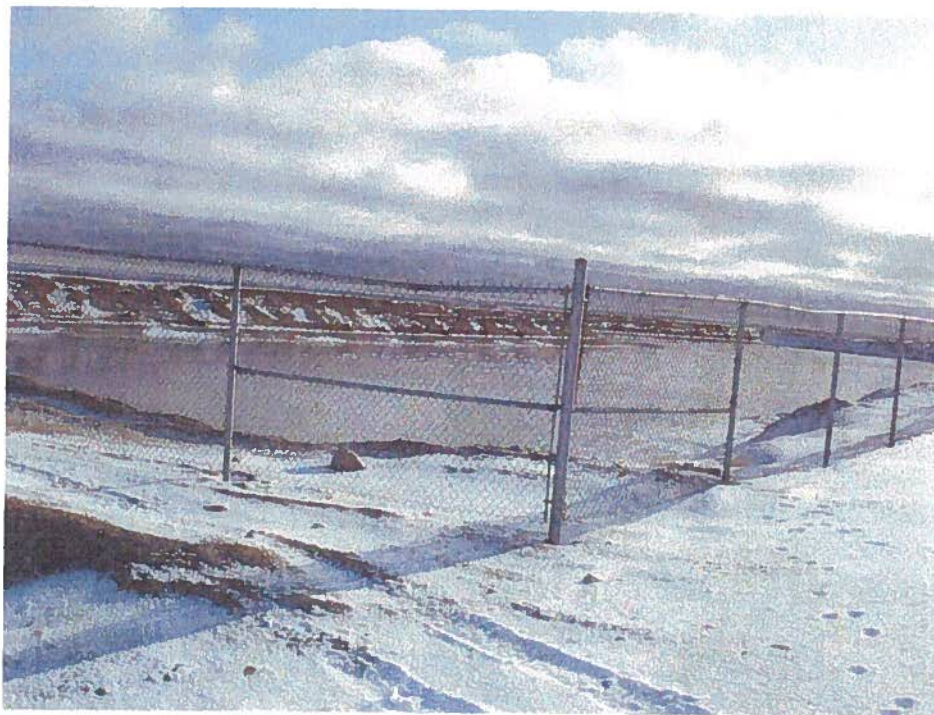
Photograph 1: Lagoon No. 1: Looking east towards Solid Waste Dump.



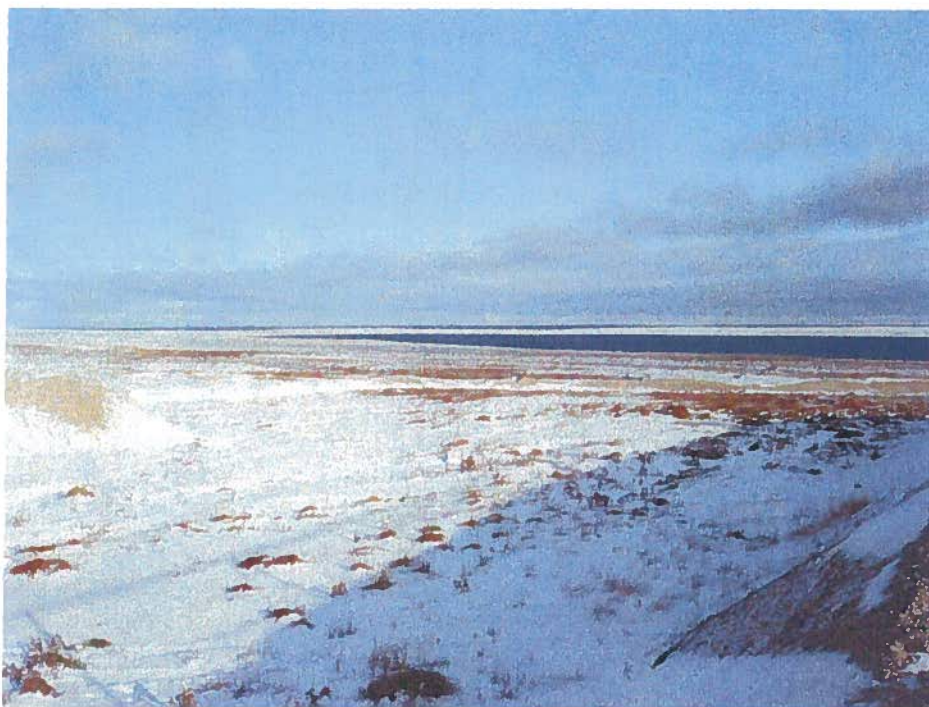
Photograph 2: Lagoon No. 2 berm, overlooking wetland



Photograph 3: Lagoon No. 3, looking west towards Lagoon No. 4



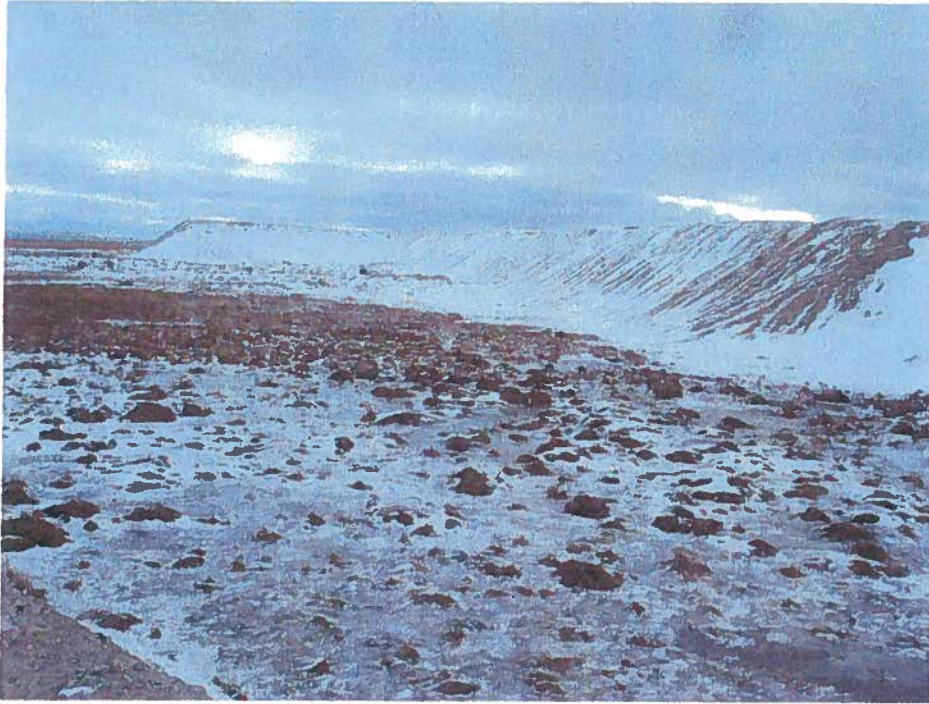
Photograph 4: Lagoon No. 4, looking east



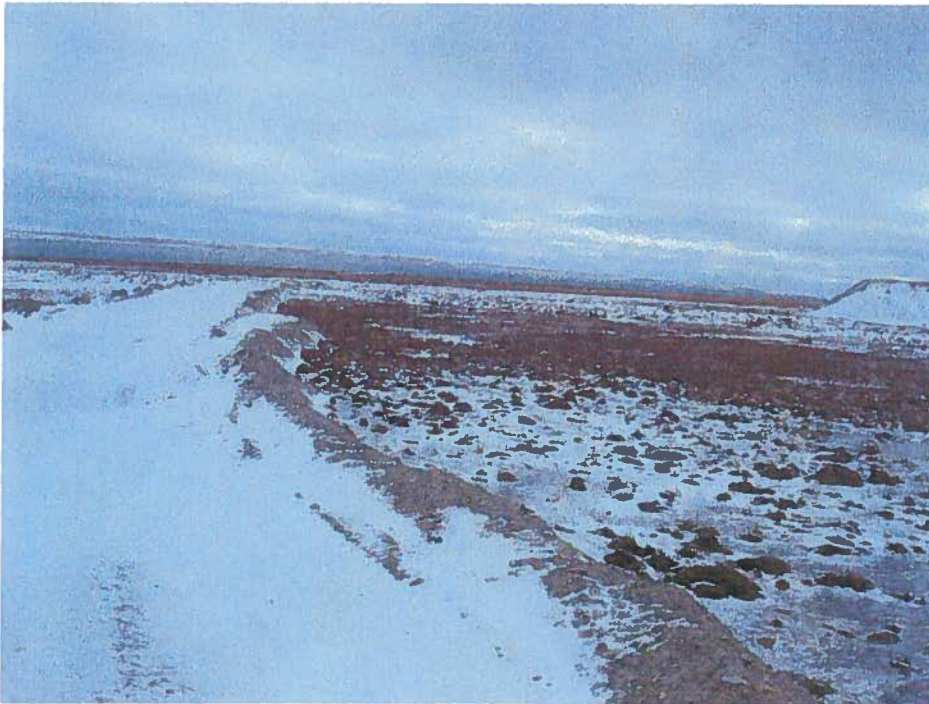
Photograph 5: Location of proposed Lagoon No. 5, between Lagoon No. 4 and Honeybag Dump, overlooking wetland area



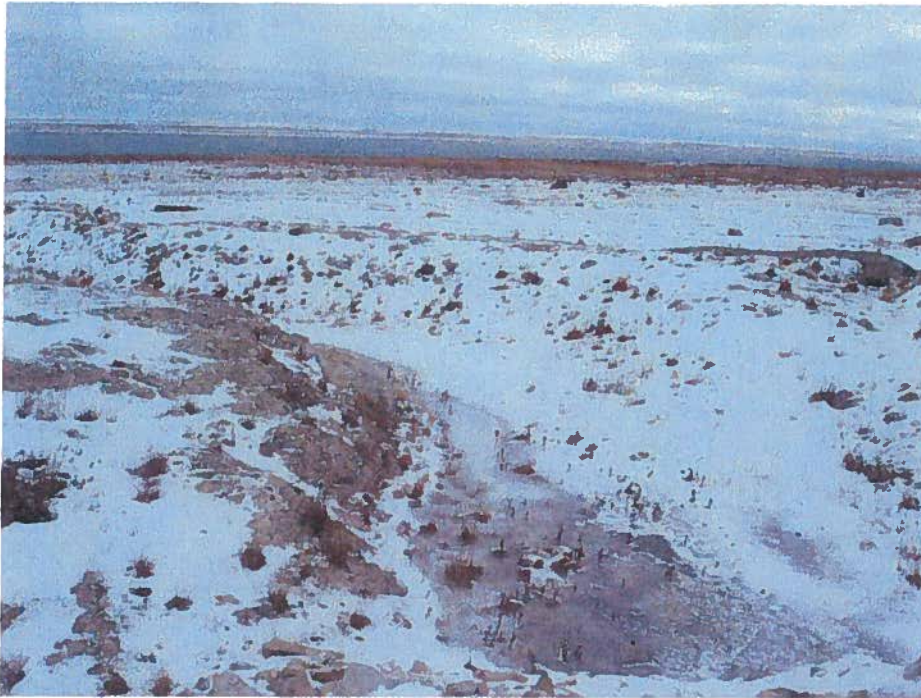
Photograph 6: Pooling and flooding in wetland area behind existing lagoon system



Photograph 7: Pooling and flooding in wetland area at Lagoon No. 4



Photograph 8: Access road in wetland area in vicinity of Lagoon No. 4, looking east



Photograph 9: Drainage ditch in wetland area behind lagoon system



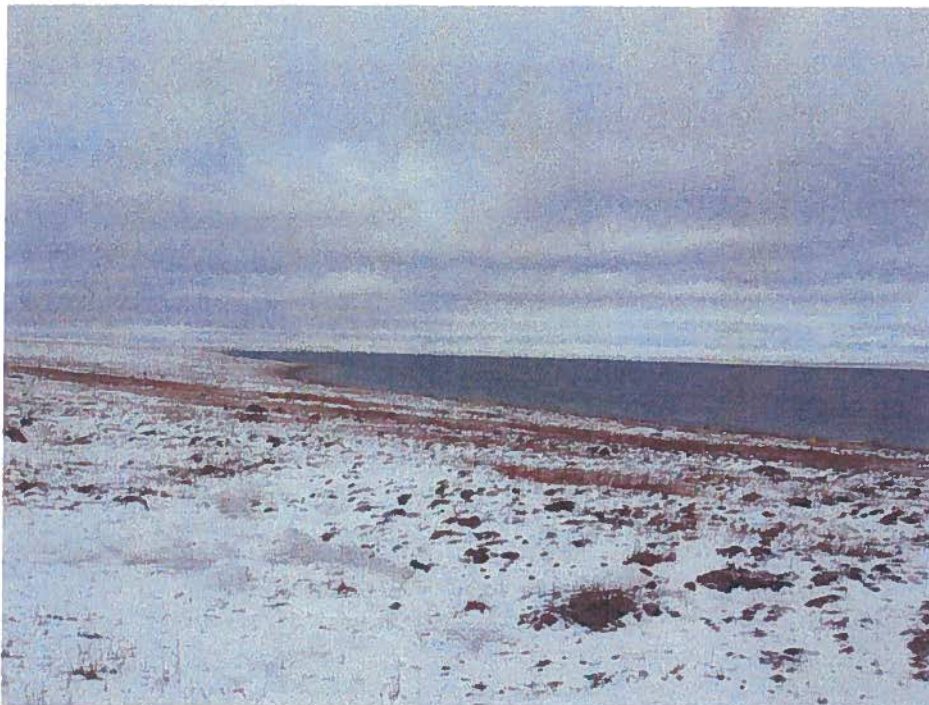
Photograph 10: Wetland area flooded with sewage



Photograph 11: Drainage channel in wetland area looking downstream (north) to Foxe Basin



Photograph 12: Sewage pool in wetland area



Photograph 13: Proposed wetland area of new sewage lagoon, close to shoreline



Photograph 14: Shoreline of Fox Basin in vicinity of sewage lagoon system