

**Environmental Assessment Screening
New Sewage Lagoon for the
Hamlet of Arctic Bay**

**Conducted in Compliance with the
Canadian Environmental Assessment Act**



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

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Executive Summary

Trow Associates Inc. was retained by the Government of Nunavut (GN), Department of Community and Government Services (CGS) to prepare an Environmental Assessment Screening under the Canadian Environmental Assessment Act in order to complete the detailed planning design for the construction of a new sewage treatment facility for the Hamlet of Arctic Bay, hereinafter referred to as the 'Site'.

The Hamlet of Arctic Bay 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 Hamlet of Arctic Bay is the Responsible Authority (RA).

Arctic Bay is a small, arctic community located on a low gravel beach near the water on the northern shore of Adams Sound on the Borden Peninsula, an uneven, undulating plateau dissected by numerous river valleys. The annual snowfall in Arctic Bay is about 72 centimetres and the annual rainfall is about 5 centimetres. Temperatures in the summer range between 2 and 10°C and in winter between -24°C and -36°C. (NRC, 2008) 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 is located approximately 2 km to the east of the community. It is comprised of a single cell lagoon, ice pack storage area and wetlands, as shown in Figure 1. The sewage treatment system is bordered to the north by the Hamlet's solid waste disposal site and to the south by the Road to the Nanisivik airport. The existing lagoon was constructed in 1976. It is an unlined earth lagoon with a reported capacity of approximately 21,000 m³ and was designed to hold sewage for 365 days with manual discharge. In 2003 the sewage system was expanded to include an ice pack area and modifications to improve the efficiency of the wetlands. Works were based on a project plan prepared by Dillon Consulting Ltd. and presented in the reported entitled *Arctic Bay – Wetlands Treatment Facility: Proposed Project Plan* dated 2002.

The proposed sewage lagoon will be constructed on top of the mountain overlooking the existing lagoons and Admiralty Inlet to the south and Victor Bay to the north. The vegetated area between the new lagoon and Victor Bay will be incorporated into the sewage treatment process. A new access road will be constructed from the existing sewage lagoons to the new lagoon.

The justification for the project is based on the need of the Hamlet of Arctic Bay 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 decommission the existing sewage lagoons the berms of which are failing.

Alternatives to the project include the option to do nothing or 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 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 access road Project Component 2: Design and construction of sewage lagoon Project Component 3: Construction of Filter Strip Wetland Project Component 4: Decommissioning of existing sewage lagoon system		
Project Location:	Hamlet of Arctic Bay, Nunavut	Estimated Cost:	NA
EA Start Date:	August 1, 2007	NOC Posting Date	NA

NA= not applicable

2.0 Contacts

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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

Trow Associates Inc. was retained by the Government of Nunavut (GN), Department of Community and Government Services (CGS) to prepare an Environmental Assessment Screening under the Canadian Environmental Assessment Act in order to complete the detailed planning design for the construction of a new sewage treatment facility for the Hamlet of Arctic Bay, hereinafter referred to as the 'Site'.

The Hamlet of Arctic Bay 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 Hamlet of Arctic Bay is the Responsible Authority (RA).

The Hamlet's existing sewage lagoon system is located approximately 2 km to the east of the community. It is comprised of a single cell lagoon, ice pack storage area and wetlands, as shown in Figure 1.

The existing sewage lagoon is located approximately 2 km east of the Arctic Bay community on the road between Arctic Bay and Nanisivik. The proposed sewage lagoon will be constructed on top of the mountain overlooking the existing lagoons and Admiralty Inlet to the south and Victor Bay to the north. The vegetated area between the new lagoon and Victor Bay will be incorporated into the sewage treatment process. A new access road will be constructed from the existing sewage lagoons to the new lagoon.

Construction of a new sewage lagoon is necessary because the two existing lagoons are too small for the Hamlet and the berms are failing. Trow is designing a new sewage treatment lagoon with a larger capacity which takes growth of the population of Arctic Bay over the next 20 years into consideration. It incorporates a vegetated filter strip wetland as additional polishing step using existing, native vegetation.

Stakeholders are the Hamlet of Arctic Bay, the Government of Nunavut and the Nunavut Water Board.

4.1 Project Scheduling

- Estimated Project Completion Date: 2009
- Estimated Project Start Date: 2008
- 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 Arctic Bay 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 decommission the existing sewage lagoon which does not have the required capacity and the berms of which are failing.

Alternatives to the project include the option to do nothing or rehabilitate the existing sewage lagoon 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 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 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	
	<i>Core Project Components</i>	<i>Ancillary Works Other Projects and Activities</i>
Design/Licensing		
Construction	- Construction of access road - Construction of new sewage lagoon - Construction of treatment wetland	- Construction of culvert crossings over existing water course for access road - Construction of trench for constructed treatment wetland - May include installation of fence around sewage lagoon
Operation/ Modification	- Sewage trucks importing sewage from holding tanks - Effluent drainage from lagoon through constructed treatment wetland to Victor Bay	
Decommissioning/ Abandonment	Decommissioning of the existing sewage lagoon system	Bring in fill material to backfill existing lagoon

Table 2: Project Component Description

Project Components	Physical Works and Activities	Description
1. Construction of access road	- Site preparation - Installation of culverts over watercourse	- Obtain gravel - Cut, fill and re-grade - Culverts needed because terrain is very steep
2. Construction of a new sewage lagoon	- Site Preparation - Excavation and berm construction	- Excavate and grade - Build berms with gravel
3. Construction of a new treatment wetland	Trench construction	Construct trench such that even distribution of pre-treated sewage in the wetland area occurs
4. Decommissioning the existing sewage lagoon	- Drainage of the existing lagoon - Backfill the emptied sewage lagoon	- Pump out contents of the existing sewage lagoon - Backfill empty sewage lagoon with local material

5.1 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 access road	M	M	M	M	M	M	+	M	M	o	o	+	o	+	+	M	o
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
Operational Activities																	
Importing sewage (truck capacity of 3000 – 4000 litres)	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 existing sewage lagoon	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.

6.0 Description of Existing Environment

6.1 Description of Biophysical Environment

Arctic Bay is a small, arctic community located on a low gravel beach near the water on the northern shore of Adams Sound on the Borden Peninsula, an uneven, undulating plateau dissected by numerous river valleys. The annual snowfall in Arctic Bay is about 72 centimetres and the annual rainfall is about 5 centimetres. Temperatures in the summer range between 2 and 10°C and in winter between -24°C and -36°C. (NRC 2008) Permafrost is present in the soil, it recedes to approximately 1 m below the surface in the summer time.

The subsurface stratigraphy at the Site is within the continuous permafrost zone and is comprised of glacial till with lacustrine deposits of unconsolidated sand and gravel.

The existing sewage lagoons are located approximately 2 km east of the Arctic Bay community on the road between Arctic Bay and Nanisivik. The proposed sewage lagoon will be constructed on top of the mountain overlooking the existing lagoons and Admiralty Inlet to the south and Victor Bay to the north. The vegetated area between the new lagoon and Victor Bay will be incorporated into the sewage treatment process. A new access road will be constructed from the existing sewage lagoons to the new lagoon.

6.1.1 Vegetation Community

The area between the lagoon and Victor Bay is vegetated with arctic tundra and arctic wetland vegetation. The filterstrip wetland area is 11.2 hectare, 27.7 acres in size (approximately 700 m long and between 86 and 202 m wide) with a slope that varies between 6 to 13 %.

A vegetation survey was carried out during the site visit in August 2007 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 4. It should be noted that this list is not complete as it reflects only a summer season survey.

Table 4: Plant Species-Proposed Filter Strip Wetland Location

Scientific Name	Common Name
	Lichen
<i>Caloplaca sp.</i>	lichen
<i>Cladonia sp.</i>	lichen
<i>Masonhalea richardsonii</i>	antler lichen
<i>Rhizocarpon geographicum</i>	map lichen
<i>Thamnolia subuliformis</i>	worm lichen
<i>Umbilicaria sp.</i>	rock tripe
<i>Xanthoria sp.</i>	jewel lichen
	Mosses
<i>Lycopodium annotium</i>	club moss
<i>Sphagnum sp.</i>	moss
Graminae	Grasses
<i>Poa sp.</i>	blue grass
<i>Poa spp.</i>	grasses
Cyperaceae	Sedge Family
<i>Eriophorum spp.</i>	Arctic cotton
<i>Carex spp.</i>	sedges
Salicaceae	Willow Family
<i>Salix reticulata</i>	net-veined willow
<i>Salix sp.</i>	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
Ranunculaceae	Buttercup Family
<i>Anemone richardsonii</i>	Richardson's anemone
<i>Ranunculus</i> sp.	buttercup
<i>Anemone</i> sp.	anemone
Papaveraceae	Poppy Family
<i>Papaver radicum</i>	Arctic poppy
Rosaceae	Rose Family
<i>Dryas integrifolia</i>	mountain avens
Saxifragaceae	Saxifrage Family
<i>Saxifraga nivalis</i>	Alpine saxifrage
<i>Saxifraga oppositifolia</i>	purple mountain saxifrage
<i>Saxifraga</i> sp.	saxifrage
Empetraceae	Crowberry Family
<i>Empetrum nigrum</i>	crowberry
Ericaceae	Heath Family
<i>Cassiope tetragona</i>	white arctic heather
<i>Vaccinium uliginosum</i>	blueberry

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.

6.1.2 Wildlife

The wildlife officer of Arctic Bay, Teema Palluq was consulted on local wildlife. In addition, the Committee on the Status of Endangered Wildlife in Canada listing (COSEWIC, 2008) was reviewed on general occurrence and status of wildlife species in Nunavut (Table 5).

Table 5: Wildlife 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	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
<i>Lepus americanus</i>	snowshoe hare	NAR
<i>Lepus arcticus</i>	Arctic hare	NAR
<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>Monodon monoceros</i>	narwhale	SC
<i>Balaena mysticus</i>	bowhead whale	THR
<i>Odobenus rosmarus rosmarus</i>	Atlantic walrus	SC
<i>Phoca vitulina concolor</i>	harbour seal (Atlantic subspecies)	DD
<i>Erignathus barbatus</i>	bearded seal	DD
<i>Pusa hispida</i>	ring seal	NAR
<i>Pagophilus groenlandicus</i>	harp seal	NAR
<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	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
<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>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	DD
The following plants species are also listed by COSEWIC:		
<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

*According to the wildlife officer, polar bears have not been sighted in Arctic Bay in many years.

A small, shallow pond is located in a depressed part of the area that is proposed for the lagoon location. The pond is self contained and during the site visit fish were not present. Small numbers of fairy shrimp (*Chirocephalus diaphanous*) and tadpole shrimp (*Lepidurus arcticus*) were observed. According to the wildlife officer, this pond is one of many self contained ponds in the area and there is no concern regarding removal of this pond.

There were no rare, threatened or endangered species encountered during Trow's site visit.

6.2 Description of Socio-Economic and Cultural Environment

Arctic Bay is a small Hamlet with a population of approximately 855 people in 2007. The community has a school, nurses station, churches, a Post office, RCMP station, 2 stores, a visitor centre, a radio station, a Hamlet office and an gravel airstrip under construction. The people in the Hamlet live on hunting, fishing, trapping, carving and tourism or are employed by the stores, the Government or the Hamlet.

Access to the Hamlet is by road from Nanisivik, plane and sealift in the summer and snowmobile from other communities in the winter. Presently, the airstrip in Nanisivik services Arctic Bay until the airstrip construction is complete.

7.0 Environmental Effects and Mitigation

The effects of the proposed project components on Valued Ecosystem Components is shown in Sections 7.1 to 7.5.

7.1 Construction

Effect	Component	Recommended Mitigation	Likelihood of Residual Effect	Significance of Residual Effect
Construction of the new sewage lagoon and wetland and/or construction of the access road may affect the water quality through fuel/sewage spills and run off	Surface Water	Ensure that no run off from construction/rehabilitation activities enters water courses or Victor Bay; 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 water courses 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/or construction of the access road may affect the water quality through fuel/sewage spills and run off	Ground Water	Ensure that no run off from construction/rehabilitation activities enters water courses or Victor Bay; 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 water courses 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 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 and/or construction of the access road/wetland.	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 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 of berms and construction of the access road which may influence the terrain and topography in regards to natural overland flow.	Terrain and Topography	Ensure proper monitoring of function of sewage lagoon and filter strip wetland. Include stormwater management in design of access road.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Construction activities can interrupt 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/wetland/access road construction.	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

7.2 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 water courses or Victor Bay; 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 water courses 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 Victor Bay.		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 the soils and sediments through equipment fuel/sewage spills	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 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 lagoon 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 water courses or Victor Bay; 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 water courses 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 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
Effluent that does not meet criteria can negatively impact socio-economic conditions.	Socio-Economic Conditions	Ensure proper function of lagoon 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 lagoon/wetland/access road construction.	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

7.3 Decommissioning and Abandonment

Effect	Component	Recommended Mitigation	Likelihood of Residual Effect	Significance of Residual Effect
Decommissioning of the existing sewage lagoon may affect the water quality through fuel/sewage spills and run off during drainage of the lagoon or backfilling/re-grading.	Surface Water	Ensure that no run off from decommissioning activities enters water courses or Arctic Bay; 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 water courses 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 existing sewage lagoon may affect the water quality through fuel/sewage spills and run off during drainage of the lagoon or backfilling/re-grading.	Ground Water	Ensure that no run off from decommissioning activities enters water courses or Arctic Bay; 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 water courses 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 existing sewage lagoon 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 open drainage systems and surface water; 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 lagoon.	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	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	Minimal potential due to the small magnitude,	Not significant

during decommissioning activities.		regulations and by laws.	limited geographical extent and duration of project activities.	
Decommissioning of the existing sewage lagoon may influence the terrain and topography in regards to natural overland flow by removal of berms and backfilling of the lagoon.	Terrain and Topography	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
Decommissioning of the existing sewage lagoon 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 existing lagoon 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 water courses or Arctic Bay; 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 water courses 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 existing lagoon may affect water quality through run off which can negatively impact fish and fish habitat.		Ensure that no run off from decommissioning activities enters water courses or Arctic Bay; 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 water courses 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 activities can interrupt wildlife/habitat conditions that were created by the presence of	Wildlife and/or Habitat	The construction of the new sewage lagoon and filter strip wetland should counteract any negative effects.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant

the existing sewage lagoon/wetland.				
Removal of the sewage lagoon would negatively affect socio-economic conditions.	Socio-Economic Conditions	The construction of the new sewage lagoon should counteract any negative effects.	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 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

7.4 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 and soil and sediment.	Fuel/Oil/Other Hazardous Substance Spills	All equipment fuelling and maintenance has to be carried out in designated locations away from open drainage systems and surface water; 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

7.5 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 route of the access road that are subject to snow drifts. Effect of snow drifts on sewage lagoon and filter strip wetland.	Snow/Wind	Possible snow fencing or re-alignment of the access road in consultation with the Hamlet's Foreman and the wind and snow modeling consultant, RWDI (RWDI, 2008). The snow and wind study shows that there is probably no negative effect on the operation and maintenance of the lagoon and filter strip wetland.	None	None

7.6 Cumulative Effects

Cumulative effects resulting from this project are not expected.

7.7 Any Other Matter

No other matter was identified during the screening.

8.0 Environmental Effects Summary Checklist

Table 6 shows a summary of the potential environmental effects, potential mitigation and residual effects.

Table 6: Environmental Effects Checklist

Environmental Component	Potential Project Effects						Residual Effects	
	Potential Adverse Effect?			Can It Be Mitigated?			Is it Significant?	
	<i>Yes</i>	<i>No</i>	<i>Uncertain</i>	<i>Yes</i>	<i>No</i>	<i>Uncertain</i>	<i>Yes</i>	<i>No</i>
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

Environmental Component	Potential Project Effects						Residual Effects	
	Potential Adverse Effect?			Can It Be Mitigated?			Is it Significant?	
	<i>Yes</i>	<i>No</i>	<i>Uncertain</i>	<i>Yes</i>	<i>No</i>	<i>Uncertain</i>	<i>Yes</i>	<i>No</i>
Vibration	X			X				X
Transportation and Navigation		X						
Land Use		X						
Human Health	X			X				X
Socio-economic Conditions	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								
Project Component 4		X						

Other

Other		N/A						
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Mitigation measures that are required as result of the environmental assessment are summarized in Table 7.

Table 7: Mitigation Table

Environmental Component Potentially Affected	Proposed Mitigation	Responsible to ensure implementation
Surface Water	• Ensure that no run off enters water courses, Victor Bay or Arctic Bay; 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 water courses and ocean to ensure that no deleterious substances enter the surface water bodies. • Ensure proper function of lagoon through monitoring program.	Consultants Design and the Hamlet of Arctic Bay
Ground Water	• Ensure that no run off from decommissioning activities enters water courses or Arctic Bay; 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 water courses and ocean to ensure that no deleterious substances enter the surface water bodies. • Ensure proper function of lagoon through monitoring program.	Consultants Design and the Hamlet of Arctic Bay

Environmental Component Potentially Affected	Proposed Mitigation	Responsible to ensure implementation
Soils and Sediments	All equipment fuelling and maintenance has to be carried out in designated locations away from open drainage systems and surface water; 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.	Consultants Design and the Hamlet of Arctic Bay
Noise/Vibration	Vehicles, machinery and equipment should be in good repair and operated within regulatory noise requirements.	Consultants Design and the Hamlet of Arctic Bay
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.	Consultants Design and the Hamlet of Arctic Bay
Terrain and Topography	Ensure that grading takes place according to design specifications.	Consultants Design and the Hamlet of Arctic Bay
Vegetation and Wetlands	Ensure that no run off enters water courses, Arctic Bay or Victor Bay; 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 water courses and ocean to ensure that no deleterious substances enter the surface water bodies. Ensure proper function of lagoon and filter strip wetland through monitoring program.	Consultants Design and the Hamlet of Arctic Bay

Fish and Fish Habitat	Ensure that no run off enters water courses, Arctic Bay or Victor Bay; 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 water courses and ocean to ensure that no deleterious substances enter the surface water bodies. Ensure proper function of lagoon and filter strip wetland through monitoring program.	Consultants Design and the Hamlet of Arctic Bay
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.	Consultants Design and the Hamlet of Arctic Bay
Socio-economic	Ensure proper function of lagoon through monitoring program.	Consultants Design and the Hamlet of Arctic Bay
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).	Consultants Design and the Hamlet of Arctic Bay
Accidents and Malfunctions	All equipment fuelling and maintenance has to be carried out in designated locations away from open drainage systems and surface water; 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.	Consultants Design and the Hamlet of Arctic Bay
Water Level Fluctuations	Silt fencing to prevent loose soils, sediments and debris from entering surface water bodies.	Consultants Design and the Hamlet of Arctic Bay

9.0 Consultation

9.1 Public Participation under Subsection 18(3) of the Canadian Environmental Assessment Registry (CEAR)

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.

9.2 Consultation with the Public/Inuit People

Public consultation or public open houses took place in November 2007.

9.3 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.

9.4 Consultation with other Jurisdictions

Consultation with other jurisdictions was not undertaken.

10.0 Summary

Construction of the new sewage lagoon with filter strip treatment wetland and access road will have positive effects on the Community. 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.

Trow Associates Inc.



Kim Logan
Environmental Technician
Environmental Division



Barbara Hard, Ph.D.
Senior Environmental Specialist
Environmental Division

11.0 References

CEAA (2004) Screenings under the Canadian Environmental Assessment Act. Manual. Canadian Environmental Assessment Agency.

COSEWIC (2008) Species database search. Committee on the Status of Endangered Wildlife in Canada. <http://www.cosewic.gc.ca>

Dillon ((2002) Arctic Bay wetland sewage treatment facility: proposed project plan. Dillon Consulting Limited

NRC (2008) The Atlas of Canada. Arctic Bay, Nunavut. Natural Resources Canada http://atlas.nrcan.gc.ca/site/english/learningresources/facts/nunavut_communities/arcbay.html

RWDI (2008) Snowdrift assessment proposed wastewater lagoon Arctic Bay, Nunavut. Rowan Williams Davies and Irwin Inc., February 2008.

Trow (2008) Design brief new sewage lagoon for the Hamlet of Arctic Bay. Trow Associates Inc. Report No. OTCD00019054A, February 2008.

Appendix A Figures



DATE	APRIL 2008
SCALE	AS SHOWN
DESIGN	SAD
CHECKED	SAD
DRAWN	RG
JOB N°	HAEN00286314A

FIG 1

VICTOR BAY



±8% SLOPE
±360m

LIMIT OF EXISTING WETLANDS
AS MEASURED IN FIELD

EXISTING WETLAND
AREA= ±11.2ha

±10% SLOPE
±900m

PROPOSED NORTH
BERM

PROPOSED SEPTIC
LAGOON



Trow

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154 Colonnade Road South,
Ottawa, Ontario K2E 7J5

Tel: (613) 225-9940
Fax: (613) 225-7337

DATE:

5/03/08

CLIENT:

GOVERNMENT OF NUNAVUT

JOB NO.

HAEN00286314A

DESIGN
SAD

CHECKED
SLB

SCALE

1:7500

DRAWN:

MEB

TITLE:

EXISTING WETLANDS

FIG.2