Government of Nunavut

Screening Level Environmental Assessment

Sewage Facility Upgrade, Hamlet of Repulse Bay, NU

Type of Document
Draft

Project Name
Screening Level Environmental Assessment (SLEA)

Project Number
OTT-00207086-A0

Prepared By:
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Canada

Date Submitted
October 18, 2012

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Government of Nunavut

Screening Level Environmental Assessment (SLEA) under CEAA

Sewage Facility Upgrade for the Hamlet of Repulse Bay, Nunavut

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Executive Summary

The Government of Nunavut (GN), Department of Community and Government Services (CGS) retained **exp Services Inc.** (exp), (the new identity of Trow Associates Inc.)., to prepare a Screening Level Environmental Assessment (SLEA) under the *Canadian Environmental Assessment Act* in order to complete the detailed planning design for the sewage lagoon upgrade for the Hamlet of Repulse, Kivalliq Region, Nunavut, hereinafter referred to as the 'Site'.

The objective of the SLEA is to identify and document the environmental effects of the proposed project components, and to determine the need to mitigate the adverse effects and modify the project plan, or recommend further assessment by a review panel. The SLEA will be completed in general accordance with the *Canadian Environmental Assessment Act*.

The justification for the project is based on the need of the Hamlet of Repulse Bay to operate an upgraded sewage treatment system that is structurally sound, and has the necessary capacity to accommodate the projected growth of the community. Construction of an impervious sewage lagoon cell is necessary since there is no existing sewage lagoon cell, and the existing wetlands are not capable of treating sewage in the long-term. **Exp** intends to construct a sewage lagoon and any berms, as required, to withstand a large capacity over the long term; and, to construct a new roadway to access the sewage lagoon. The existing down gradient wetlands will be assessed for efficacy over time and increased capacity.

All of the vegetation observed at the Site or expected to be present at the Site, are highly adapted to the extreme conditions of the Arctic region. Various species are also adapted to disturbed Sites. As such, the composition of the vegetation community observed to be present at the Site is considered suitable for the proposed upgrade and expansion of the existing long term sewage treatment system for the Hamlet of Repulse Bay.

In general, the extent of existing disturbance at the Site is considered moderate. There is heavy, widespread evidence of grazing by wildlife throughout the entire Site, suggesting that this location is frequented by migrating birds. There is also light, widespread evidence of dumping or rubbish and evidence of colonizing species at the Site, predominantly near the sewage inlet. The rubbish is likely originating from the north adjacent landfill. As such, given the moderate evidence of disturbance at the Site, the proposed upgrade and expansion of the existing long term sewage treatment system is not expected to significantly alter the existing environment.

All of the wildlife observed at the Site or expected to be present at the Site, are highly adapted to the extreme conditions of the Arctic region. Various species are also adapted to disturbed Sites, including Arctic ground squirrels and ravens. As such, the composition of the wildlife community observed to be present at the Site is considered suitable for the proposed upgrade and expansion of the existing long term sewage treatment system for the Hamlet of Repulse Bay.

The SLEA revealed that the proposed upgrades and expansion of the existing long term sewage treatment system for the Hamlet of Repulse Bay will have net positive effects on the community. This project will not have significant long term negative effects on the environment or local wildlife. Most effects are related to the construction activities, and are short term. All potential effects can be managed by applying suitable mitigation measures. This management of potential effects will reduce or remediate the expected disturbance due to this project.

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Chapter 1 –
Project Identification

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1 Project Identification

Table 1-1: Project Identification

Project Title/Type	The Government of Nunavut, Community and Government Services, Project Management Division – Kivalliq Region Project Component 1: Construction of a sewage lagoon Project Component 2: Construction of a roadway to the proposed sewage lagoon location
Project Location	Hamlet of Repulse Bay, Nunavut
Estimated Cost	Not applicable
EA Start Date	September 6, 2012
NOC Posting Date	Not applicable

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Chapter 2 – Contacts

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2 Contacts

Table 2-1: Project Contacts

Government of Nunavut, Department of Community and Government Services	Jason Tologanak Regional Director, Kivalliq Region	Phone: (867) 645-8150
	Wayne Thistle Kivalliq Projects Manager	Phone: (867) 645-8178
Consultants	Steven Burden, P.Eng. Project Manager, exp Services Inc. 100-2650 Queensview Drive, Ottawa, ON K2B 8H6	Phone: (613) 688-1899 Fax: (613) 225-7337 Email: steven.burden@exp.com
Proponent	Representatives of the Hamlet of Repulse Bay, NU Steven Kopak Repulse Bay Economic Development Officer, Hamlet of Repulse Bay P.O. Box 10 Repulse Bay, NU X0C 0H0	Phone: (867) 462-4101 Fax: (867) 462-4144 Email: repulsebay_20051@qiniq.com

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Chapter 3 – Canadian Environmental Assessment Act (CEAA) Trigger

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3 Canadian Environmental Assessment Act (CEAA) Trigger

Government of Nunavut, Community and Government Services

☐ is the proponent of the project;

☒ proposes to fund all or part of the project;

☐ proposes to sell, lease or otherwise dispose of land for the project; and/or,

☐ proposes to issue a permit, approval or other authorization on the CEAA Law List Regulations.

Federal departments notified in accordance with Federal Coordination Regulations:

Yes ☒ None identified ☐

Other federal involvement?

Yes ☐ None identified ☒

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Chapter 4 –
Project Description

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4 Project Description

The Government of Nunavut (GN), Department of Community and Government Services (CGS) retained **exp** Services Inc. (**exp**) to prepare a Screening Level Environmental Assessment (SLEA) under the *Canadian Environmental Assessment Act* (CEAA) in order to complete the detailed planning design for the sewage system upgrade for the Hamlet of Repulse Bay, Kivalliq Region, Nunavut, hereinafter referred to as the 'Site'.

The Hamlet of Repulse Bay (Hamlet) is the proponent and Responsible Authority (RA) 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*. Due to the size and location of the proposed project(s) (i.e. leaving a footprint >25 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 Stakeholders for this project are the Hamlet of Repulse Bay, the Government of Nunavut and the Nunavut Water Board.

The Hamlet utilizes a sewage disposal facility located approximately 400 m to the northeast of the edge of the community. The sewage disposal facility is located at the solid waste disposal facility, and consists of a simple truck offload discharge area, which is directed to a natural wetlands area. The effluent at this wetlands area proceeds downstream along a 1,400 m flow path through a series of wetlands and surface water bodies, situated within a valley, until finally discharging to the marine environment entering Hudson Bay. The total area of the natural wetlands area is approximately 64,000 m^2. Refer to Figure 1 in Appendix A for the Site Location Plan.

4.1 Objectives

The objective of the SLEA is to identify and document the environmental effects of the proposed project components, and to determine the need to mitigate the adverse effects and modify the project plan or recommend further assessment by a review panel. The SLEA will be completed in general accordance with the *Canadian Environmental Assessment Act*.

The project components of the SLEA include the assessment of the current sewage treatment facility; the construction of an impervious sewage lagoon cell with berms, as required; the construction of a new roadway to access the sewage lagoon; and, increasing the capacity of the sewage system to meet the long term needs of the Hamlet.

Construction of an impervious sewage lagoon cell is necessary since there is no existing sewage lagoon cell, and the existing wetlands are not capable of treating sewage in the long-term. **Exp** intends to construct a sewage lagoon and any berms, as required, to withstand a large capacity over the long term; and, to construct a new roadway to access the sewage lagoon. The existing down gradient wetlands will be assessed for efficacy over time and increased capacity.

4.2 Project Scheduling

- Estimated Project Start Date : March 2013
- Estimated Project Completion Date : September 2013
- Estimated Transfer Date (if applicable) : Not applicable

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4.3 Project Justification

The justification for the project is based on the need of the Hamlet of Repulse Bay to operate an upgraded sewage treatment system that is structurally sound, and has the necessary capacity to accommodate the projected growth of the community.

Alternatives to the project include a) the option to do nothing; and, b) to decommission the existing sewage treatment system and create a new facility at another location. The option to do nothing would most likely result in increased degradation of the existing wetlands and surrounding environments. The option to decommission the existing system and create a new facility would significantly increase the cost of the project; and, to date, suitable alternate locations have not been identified.

The long term negative effects on the environment or wildlife from the proposed project are minimal, if any; and, the potential risk posed to aquatic species are also minimal, if any. Most effects are associated with the short term construction activities; and, all effects can be mitigated by applying the suitable mitigation measures.

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Chapter 5 –
Scope of Project

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5 Scope of Project

The project phases of construction, operation and modification as well as the project components are provided in Table 5-1. A more detailed description of the project components and various Site activities are presented in Table 5-2.

Table 5-1: Project Component Identification

Project Phase	Project Components
Construction	- Building a sewage lagoon cell and associated berms, as required, east of the existing truck discharge point - Building a new roadway to access the lagoon, to the north and east of the existing truck discharge point

Table 5-2: Project Component Description

Project Components	Physical Works and Activities	Description
1. Building a sewage lagoon cell and associated berms, as required, east of the existing truck discharge point	- Excavation and lagoon construction	- Excavate and grade - Build berm(s) with clay material - Line berm(s) and lagoon with geotextile fabric
2. Building a new roadway to access the lagoon, to the north and east of the existing truck discharge point	- Roadway construction	- Excavate and grade

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 5-3.

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Table 5-3: Project-Environment Interaction Matrix

Component	Surface water	Groundwater	Soils and sediments	Air quality and climate change	Noise/vibration	Terrain and topography	Vegetation and wetlands	Fish and fish habitat	Wildlife and 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 and navigation(1)
Construction of lagoon	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**o**	**+**	**o**	**+**	**+**	**M**	**o**
Construction of roadway	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**o**	**+**	**o**	**+**	**+**	**M**	**+**

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

(1) The indirect effects on the 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.

All components will be installed within a relatively short time frame; and, the Site itself is relatively small.

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Chapter 6 –
Description of Existing Environment

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6 Description of Existing Environment

6.1 Description of Biophysical Environment

Repulse Bay is a hamlet located at the shore of Hudson Bay, Kivalliq Region. The total area is approximately 425 km^2 (GN, 2009), with an estimated population of 999 in 2011 (95% Inuit, 5% non-Inuit) (RB, 2011).

Repulse Bay lies directly on top of the Arctic Circle in central Nunavut (RB, 2011). The Inuktitut name for Repulse Bay is Naujaat, which translates to "nesting place for seagulls". The name comes from the actual nesting grounds located on cliffs approximately 5 km north of the Hamlet; and, every June, thousands of seagulls occupy the area, as well as snow birds, loons, eider ducks, longtail ducks and jaegers (RB, 2011).

Repulse Bay is situated in the Northern Arctic Terrestrial Ecozone, and is characterized by continuous permafrost 90 to 100 % of the year. The Hamlet receives an average of approximately 150 mm of rainfall, approximately 130 cm of snowfall, and in excess of 280 mm of precipitation, per year. Average daily temperatures range from a low of approximately -30°C in January and February to a high of approximately 9.3^{o}C in July.

The Hamlet utilizes a sewage disposal facility located approximately 400 m to the northeast of the edge of the community. The sewage disposal facility is located at the solid waste disposal facility, and consists of a simple truck offload discharge area, which is directed to a natural wetlands area. The effluent at this wetlands area proceeds downstream along a 1,400 m flow path through a series of wetlands and surface water bodies, situated within a valley, until finally discharging to the marine environment entering Hudson Bay. The total area of the natural wetlands area is approximately 64,000 m^2. Refer to Figure 1 in Appendix A for the Site Location Plan.

6.1.1 Site Visit

A Site visit was undertaken by **exp** staff from September 7th through 8th, 2012. All areas of the Site were accessible during the Site visit. The weather on September 7th was sunny with occasional cloud cover and intermittent wind gusts. The mean temperature was 0°C, average humidity was 91%, and the average wind speed was 22 km/h. The weather on September 8th was overcast with occasional rain and fog. The mean temperature was 2°C, average humidity was 93%, and the average wind speed was 11 km/h.

6.1.2 Northern Arctic Vegetation Community

The Northern Arctic is characterized by long cold winters and short cool summers. Winter nights can last for days or even months. The climate is very dry and cold. The annual precipitation ranges from 100 mm to 200 mm; with mean daily temperatures ranging from -30 to -35ºC in the winter, and from 5 and 10ºC in the summer.

Herb- and lichen-dominated communities constitute the main vegetation cover in this ecozone. July and August make up the only two (2) months of the year where snow does not cover the ground. Permafrost is continuous and present everywhere in this ecozone, whereby only a thin layer at the surface thaws during the summer months.

Due to the fact that the northern Arctic lies above the tree line, no full sized trees are located in this region. Dwarf trees and shrubs make up the woody vegetation, whereas mosses, lichens and other northern-adapted herbaceous plants are the major vegetation types.

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6.1.3 Climate

Available climate summaries for precipitation and temperature were available from Coral Harbour A, Nunavut, located 291 km south east of Repulse Bay for the 1971 to 2000 monitoring period (EC, 2012), as presented in Table 6-1. For this period, the annual daily average temperature was -11.6 °C; the extreme maximum temperature was observed on July 28, 2001 as 28 °C; and, the extreme minimum temperature was observed on January 17, 1975 as -52.8°C.

Table 6-1: Climate Observations for the monitoring period of 1971 to 2000 collected at Coral Harbour A, Nunavut (source: EC, 2012)

Temperature	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average (°C)	-30	-30	-25.7	-16.7	-6.8	2.8	9.3	7.3	1.1	-7.3	-17.1	-25.8	-11.6
Standard Deviation	3.8	3.4	2.9	2.3	2.4	2.2	1.7	1.3	1.6	2.8	3.5	3.8	1.5
Daily Maximum (°C)	-25.8	-25.9	-20.8	-11.3	-2.6	6.3	13.9	11.4	4.1	-3.9	-12.8	-21.6	-7.4
Daily Minimum (°C)	-34.1	-34.1	-30.5	-22	-10.9	-0.8	4.6	3.1	-2	-10.7	-21.4	-29.9	-15.7
Extreme Maximum (°C)	-0.6	-1.1	0	5	9.4	23.3	**28**	26.1	20.6	7.6	1.1	1.1	
Extreme Minimum (°C)	**-52.8**	-51.4	-49.4	-39.4	-31.1	-15.6	-1.1	-3.3	-17.2	-34.4	-40.6	-48.9	
Precipitation													
Rainfall (mm)	0	0	0	0.1	2.5	20.7	38.4	50.5	31.3	11.3	0.4	0	155.2
Snowfall (cm)	7.8	6.9	10.6	17.6	14.4	7.4	0	0.8	9.7	25.5	19.9	12.9	133.5
Precipitation (mm)	7.6	6.6	10.3	17.3	16.6	28	38.4	51.3	41.4	36	19.5	12.7	285.7
Average Snow Depth (cm)	27	30	33	36	31	10	0	0	1	7	20	25	19
Median Snow Depth (cm)	27	29	33	36	32	8	0	0	0	7	20	25	18
Snow Depth at Month-end (cm)	28	32	35	37	24	2	0	0	3	15	24	28	19

6.2 Ecological Land Classification

An modified Ecological Land Classification (ELC) approach was undertaken at the Site during the Site visit to classify the local ecosystem, and assess the suitability of the species present for the treatment of pre-treated sewage from the new lagoon.

The ELC is an approach that attempts to identify the distribution and groupings of plant species, and categorize, organize and name ecosystems. When complete, the ELC can be used to improve the collective ability to manage both natural resources and the information that pertains to those resources.

Field notes were compiled with respect to community description and classification; stand characteristics; list of plant species present; extent of disturbance; and, a description of the wildlife habitat. Site photographs can be found in Appendix B of the report.

Animal and plant species significance or rarity on a regional level was based on standard status lists obtained from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 2012).

6.2.1 Stand Characteristics

A stand characteristic is the classification of a collection of plants having a relatively uniform composition and structure. The purpose of identifying the stand characteristics at a given Site is to categorize the type of habitats present so as to determine the kinds of natural features present and to investigate the wildlife expected to be at the Site. Refer to Figure 2 in Appendix A for the Site location identification.

The existing sewage wetland complex is generally situated in a valley flanked by rock outcrops to the east and west, composed of a series of Arctic wetland and small surface water bodies. The stand characteristic is dominated by low-lying Arctic wetland and tundra vegetation common to the region, ranging in height from ground cover species to grasses or shrubs up to 50 cm tall. The rock outcrops on both sides of the wetland complex provide some protection from wind; and, there are pockets of shelter among this area.

6.2.2 Plant Community

A plant community is a unit of vegetation within a given area. Identifying a plant community within a Site is necessary to determine the type of environment present (e.g. shade-tolerant area). This approach also helps resolve the possible wildlife expected to be at the Site due to this prevailing vegetation and habitats, in addition to sensitive areas that may exist in the area. This information will also aid in the identification of any locally, regionally or provincially rare, threatened or endangered vegetative species on the Site. If identified, these species will need to be preserved and protected.

A general vegetation survey was carried out during the Site visit in September 2012 for the existing wetlands complex. It is noted that the entire Site is relatively homogenous in plant composition, with the exception of more pollution-tolerant species that are present near the sewage inlet, as opposed to other species. The plant species lists for the Site are presented in Table 6-2. It should be noted that a complete plant list is not available, given that the current survey only reflects the late summer season.

Table 6-2: Plant Species Observed at the Wetlands Complex

Family	Common Name	Scientific Name
Aster (Asteraceae)	Arctic daisy	*Chrysanthemum articum*
Birch family (Betulaceae)	Dwarf birch	*Betula nana*
Heath family (Ericaceae)	Northern Labrador tea	*Rhododendron tomentosum*
	White arctic heather	*Cassiope tetragona*
Lichen	Worm lichen	*Thamnolia subuliformis*
Lichen (Cladoniaceae)	Reindeer lichen	*Cladonia rangiferina*
Lichen (Parmeliaceae)	Yellow lichen	*Cetraria tilesii*
Lichen (Teloschistaceae)	Jewel lichen	*Xanthoria elegans*
Lichen (Umbilicariaceae)	Rock tripe	*Umbilicari spp.*
Moss (Bryophytae)	Moss	*Sphagnum sp.*
	Alpine club moss	*Lycopodium alpinum*
Rose family (Rosaceae)	Mountain avens	*Dryas integrifolia*
Sedge family (Cyperaceae)	Arctic cotton	*Eriophorum callitri*
Willow family (Salicaceae)	Willows	*Salix sp.*
	Feltleaf or Alaska willow	*Salix alaxensis*
	Arctic willow	*Salix arctica*

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Various grasses were also observed at the wetlands area, most of which were heavily grazed by migrant birds. A list of potential species of grasses, sedges and rushes expected to be at the wetlands complex is presented in Table 6-3.

Table 6-3: Potential Grasses, Rushes and Sedges Expected at the Wetlands Complex

Family	Common Name	Scientific Name
Arrow-grass (Juncaginaceae)	Seaside arrow-grass	*Triglochin maritimum*
	Marsh arrow-grass	*Triglochin palustris*
Grass (Poaceae)	Fisher's tundra-grass	*Dupontia fisheri*
	Lyme-grass	*Elymus arenarius*
	Narrow alkali-grass	*Puccinellia contracta*
	Creeping alkali-grass	*Puccinellia phryganodes*
	Sheathed alkali-grass	*Puccinellia vaginata*
	Alpine foxtail	*Alopecurus alpinus*
Rush (Juncaceae)	Wire rush	*Junicus balticus*
	Wood rush	*Luzula sp.*
Sedge family (Cyperaceae)	Bog sedge	*Kobresia sp.*
	Sedges	*Carex sp.*
	Cotton-grass	*Eriophorum sp.*

The core of the wetlands complex was predominantly of swamp-like composition, consisting of moss and heavily-grazed grasses, sedges and rushes. Occasional willow, birch, rose, and heath species were also found at the wetlands, often nestled in between or beneath any rocks to receive shelter from the wind. An abundance of lichens of various sizes and colour were also present across the Site, predominantly growing on the rock outcrops both at the wetlands area and on both flanking sides.

It is noted that considerable evidence of wildlife grazing/foraging and nesting was observed throughout the wetlands complex.

Species richness was relatively consistent throughout the wetlands area, which is to be expected given the overall large surface area, in addition to the combination of various habitats including terrestrial, semi-aquatic and aquatic environments. Major portions of the wetlands area were also protected from the wind by adjacent rock outcrops flanking both sides; and, the amount of species present at a given area were reduced where there was little to no protection from the wind. In general, the majority of the Site was covered by moss, heavily-grazed grasses, sedges and rushes, and other low-lying vegetation typical of a swamp/wetland region of the Arctic.

It should be noted that a feltleaf willow (*Salix alaxensis*) was observed at the central portion of the wetlands area, approximately 100 m downgradient of the sewage inlet. This species is not to be mistaken for the felt-leaf willow (*Salix silicicola*), which is designated as a special concern species by COSEWIC (2012), given that it is endemic and restricted almost exclusively to the Athabasca Sand Dunes of Saskatchewan.

Given that a complete plant list is not available since the current survey only reflects the late summer season, other plant species known to the Arctic Nunavut region are listed in Table 6-4.

Table 6-4: Other Plant Species Known to the Area

Family	Common Name	Scientific Name
Aster (Asteraceae)	Mastodon flower	*Senecio congestus*
Buckwheat (Polygonaceae)	Mountain sorrel	*Oxyria digyna*
Buttercup (Ranunculaceae	Pygmy buttercup	*Ranunculus pygmaeus*
Evening primrose (Onagraceae)	River beauty	*Epilobium latifolium*
Ferns (Polypodiaceae)	Fragrant shield fern	*Dryopteris fragrans*
Figwort (Scrophulariaceae)	Arctic lousewort	*Pedicularis langsdorffii ssp. arctica*
Heath (Ericaceae)	Crowberry	*Empetrum nigrum*
	Mountain cranberry	*Vaccinium vitis-idaea*
Legume (Fabaceae)	Yellow oxytrope	*Oxytropis campestris*
Pink (Caryophyllaceae)	Moss Campion	*Silene acaulis*
	Arctic bladder campion	*Silene latifolia*
	Chickweed	*Stellaria media*
Poppy (Papaveraceae)	Arctic poppy	*Papaver gorodkovii*
Saxifrage (Saxifragaceae)	Alpine saxifrage	*Saxifraga nivalis*
	Purple saxifrage	*Saxifraga oppositifolia*
Willow (Salicaceae)	Least willow	*Salix herbacea*
	Net-veined willow	*Salix reticulata*
Willowherb (Onagraceae)	Fireweed	*Epilobium angustifolium*

All of the vegetation observed at the Site or expected to be present at the Site are highly adapted to the extreme conditions of the Arctic region. Various species are also adapted to disturbed Sites, including fireweed. As such, the composition of the vegetation community observed to be present at the Site is considered suitable for the proposed upgrade and expansion of the existing long term sewage treatment system for the Hamlet of Repulse Bay.

6.2.3 Extent of Disturbance

A Site can also be described by the extent and intensity of which management or disturbance has occurred on the Site. It is important to note disturbance as it can influence community structure and function. Anthropogenic disturbances are usually more selective, and directly affect one (1) or several specific species, whereas physical forces such as earthquakes or drought can affect the entire plant community.

By applying the ELC protocol, disturbance such as alien species, gaps in forest canopy, plantations, tracks and trails, noise, disease and death of trees as well as wind throw are recorded and observed at a given on-site location.

In general, the extent of disturbance at the Site is considered moderate. There is heavy, widespread evidence of grazing throughout the entire Site, suggesting that this location is frequented by migrating birds. There is also light, widespread evidence of dumping or rubbish and evidence of colonizing species at the Site, predominantly near the sewage inlet. The rubbish is likely originating from the north adjacent landfill. As such, given the moderate evidence of disturbance at the Site, the proposed upgrade and

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expansion of the existing long term sewage treatment system is not expected to significantly alter the existing environment.

6.2.4 Wildlife & Wildlife Habitat

In terms of wildlife and wildlife habitat, the Site may contain elements that can provide suitable habitats for wildlife. For example, small mammals often create burrows in the ground, and small insects often find ponds in order to survive winter months. In addition, the presence of vegetation that produce fruits such as berries may prove to be an important food source for some species.

There are numerous wildlife populations that inhabit the region of the northern Arctic. There are massive migrations of caribou, as well as birds. Larger carnivores in the northern Arctic include polar bears and wolves. The most common large herbivores are barren ground caribou. Smaller carnivores found in the northern Arctic ecozone include the Arctic fox, wolverine and ermine. These animals prey on smaller herbivores which include the brown lemming, collared lemming, and Arctic hare. Aquatic mammals include walruses, ringed and bearded seals, beluga whales, and narwhals.

Many birds migrate to the northern Arctic in the spring to breed, but spend the long cold winters further south. In addition, approximately 5 km north of the Hamlet of Repulse Bay there are bird nesting grounds located on cliffs; and, every June, thousands of seagulls occupy the area, as well as snow birds, loons, eider ducks, longtail ducks and jaegers (RB, 2011).

Common birds-of-prey of the northern Arctic include the gyrfalcon, rough-legged hawk, and snowy owl. Waterfowl typically found here include the red-throated loon, Arctic loon, snow goose, brant goose, oldsquaw duck and king eider. Some common shorebirds and seabirds of the northern Arctic are the red phalarope, parasitic jaeger, long-tailed jaeger, red-knot, dunlin, glaucous gull, white-rumped sandpiper, black-bellied plover and ruddy turnstone. Various terrestrial birds are also present at the northern Arctic, including the rock and willow ptarmigan, snow bunting, horned lark, hoary redpoll and Lapland longspur.

Some wildlife species were observed at the wetlands complex and surrounding area at the time the Site visit was conducted, as presented in Table 6-4.

Table 6-5: Wildlife Species Observed at the Site

Group	Common Name	Scientific Name
Birds	Northern pintail	*Anas acuta*
	Snow goose	*Chen caerulescens*
	Common raven	*Corvus corax*
	Common seagull	*Larus sp.*
Mammals	Arctic ground squirrel	*Spermophilus parryii*

Arctic ground squirrels, locally known as ‘siksiks’, were occasionally present at the Site, observed foraging for food. Large burrows, likely housing siksiks, were occasionally present at the wetlands area, predominantly situated on higher ground. Smaller burrows were also occasionally observed at the wetlands area, likely housing small mammals including lemmings, shrews and voles. Several small flocks and some individual birds were also observed at the Site.

The Arctic ground squirrel (*Spermophilus parryii*) inhabits areas with sandy or gravely soil, as it makes it easier for digging. They typically live near eskers, moraines, mountain slopes, river flats and banks, lake shores and tundra ridges. They house themselves in deep burrows that contain various tunnels, and

hibernate through the entire winter (approximately seven (7) to eight (8) months). Their excavated nests are placed well within the burrow system and are made up of dry grasses, lichens and caribou hair. Siksiks are social animals that live in scattered colonies. They are omnivorous and eat a variety of tundra vegetation such as leaves, seeds, flowers, stems, grass roots and fruit. Siksiks also tend to feed on other ground squirrels from neighbouring colonies, as well as carrion, eggs and small nesting birds (GN, 2012).

Common flocks of birds observed at the lagoon included snow geese (*Chen caerulescens*). The snow goose is a colonial nester in the Arctic tundra and inhabits areas within five (5) miles from the coast line. They are generally found in large flocks in the winter months and during migration. Snow geese feed almost exclusively on plant material such as seeds, leaves and roots of aquatic vegetation. Very young birds tend to eat invertebrates, with both young and adult birds randomly foraging on berries and grain in the winter (SAS, 2012a).

A small flock of ducks, likely the Northern pintail (Anas acuta), was observed within vicinity of the sewage inlet at the time of the Site visit. The Northern pintail is typically found in shallow ponds and marshes in open areas during the breeding season; and, in shallow wetlands, mudflats and flooded fields during the winter months. During the winter they feed on seeds and waste grain from agricultural fields, as well as roots, new shoots and aquatic invertebrates. The Northern pintail is among the earliest nesters, whereby they arrive on the breeding grounds as soon as they are free of ice. They do not form long-term pair ponds, with the female tending to the eggs alone (SAS, 2012b).

Gulls and ravens were also observed circling the wetlands area as well as the adjacent landfill. Gulls are birds in the family Laridae; most closely related to terns (family Sternidae), and are typically coastal and inland species, rarely found far out to sea. Gulls tend to nest in large, densely packed colonies. They have a prophylactic unhinging jaw, which allows them to consume large prey generally consisting of crabs and small fish (ABC, 2012). Ravens (*Corvus sp.*) are sometimes considered pests as they tend to coexist with humans. They have an omnivorous diet, feeding on carrion, insects, cereal grains, berries, fruit, small animals, and food waste. Young ravens may travel in flocks, but later mate for life, with each mated pair defending a territory (CLO, 2011).

It should be noted that a complete wildlife list is not available, given that the current survey only reflects incidental wildlife sightings during the Site visit at the late summer season. Other wildlife species that are known to be present in the northern Arctic ecozone, and may be present at the Hamlet and the surrounding area, are presented in Table 6-5.

Table 6-6: Other Northern Arctic Wildlife Species

Species Type	Common Name	Scientific Name
Mammals	Arctic fox	*Alopex lagopus*
	Arctic wolf	*Canis sp.*
	Collared lemming	*Dicrostonyx torquatus*
	Wolverine	*Gulo gulo*
	Brown lemming	*Lemmus trimucronatus*
	Arctic hare	*Lepus arcticus*
	Ermine	*Mustela erminea*
	Northern red-backed vole	*Myodes rutilus*
	Barren-ground caribou	*Rangifer tarandus groenlandicus*
	Polar bear	*Ursus maritimus*

Species Type	Common Name	Scientific Name
	Red fox	*Vulpes vulpes*
Marine Mammal	Bowhead whale	*Balaena mysticetus*
	Beluga whale	*Delphinapterus leucas*
	Bearded seal	*Erignathus barbatus*
	Narwhale	*Monodon monoceros*
	Atlantic walrus	*Odobenus rosmarus*
	Ringed seal	*Phoca hispida*
	Harbour seal	*Phoca vitulina*
Bird of Prey	Snowy owl	*Bubo scandiacus*
	Rough-legged hawk	*Buteo lagopus*
	Gryfalcon	*Falco rusticolus*
Waterfowl	Brant goose	*Branta bernicla*
	Oldsquaw duck	*Clangula hyemalis*
	Arctic loon	*Gavia arctica*
	Red-throated loon	*Gavia stellata*
	Eider duck	*Somateria spp.*
	King eider	*Somateria spectabilis*
Shorebird	Ruddy turnstone	*Arenaria interpres*
	Dunlin	*Calidris alpina*
	Red-knot	*Calidris canutus*
	White-rumped sandpiper	*Calidris fuscicollis*
	Glaucous gull	*Larus hyperboreus*
	Red phalarope	*Phalaropus fulicarius*
	Black-bellied plover	*Pluvialis squatarola*
	Long-tailed jaeger	*Stercorarius longicaudus*
	Parasitic jaeger	*Stercorarius parasiticus*
Terrestrial Birds	Lapland longspur	*Calcarius lapponicus*
	Hoary redpoll	*Carduelis hornemanni*
	Horned lark	*Eremophila alpestris*
	Willow ptarmigan	*Lagopus lagopus*
	Rock ptarmigan	*Lagopus muta*
	Snow bunting	*Plectrophenax nivalis*

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All of the wildlife observed at the Site or expected to be present at the Site are highly adapted to the extreme conditions of the Arctic region. Various species are also adapted to disturbed Sites, including Arctic ground squirrels and ravens. As such, the composition of the wildlife community observed to be present at the Site is considered suitable for the proposed upgrade and expansion of the existing long term sewage treatment system for the Hamlet of Repulse Bay.

6.3 Key Natural Heritage Features

For the purpose of this SLEA, the significance of a key natural heritage feature is identified as significant by a regional conservation authority or a regulatory agency or ministry. The sources of information consulted for the presence of significant features on or in the vicinity of the Site were the Natural Resources of Canada, The Atlas of Canada, Canada's Species at Risk Act (SARA) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

6.3.1 Heritage Rivers

Outstanding rivers of natural, cultural, historical, and recreational values are insured long term management and conservation by the Canada Heritage Rivers System (CHRS).

According to the Atlas Map of Canada, there are no Heritage Rivers located in the vicinity of the Site. The Thelon and Kazan Rivers are located approximately 450 km south west of Repulse Bay (NRC, 2009).

6.3.2 National Parks

The Government of Canada's objective is to have a park representing each of Canada's 39 natural regions. To date, Nunavut has three (3) National Parks. Public appreciation and enjoyment through education are encouraged as long as they do not affect the ecological integrity of the park.

According to the Atlas Map of Canada, there are no National Parks located in the vicinity of the Site. One (1) National Park, Ukkusiksalik National Park of Canada, established in 2003, is located approximately 165 km southwest of Repulse Bay. Other National Parks include the East Bay Migratory Bird Sanctuary and Harry Gibbons Migratory Bird Sanctuary both established in 1959 (NRC, 2009), located approximately 370 km and 348 km south of the Hamlet, respectively, on South Hampton Island.

6.3.3 National Wildlife Areas

The Canadian Wildlife Service of Environment Canada establishes and manages National Wildlife Areas to conserve essential wildlife habitats. These areas consist of land or water areas, with coastal waters extending out to twelve (12) nautical miles from shore. While most human activities are prohibited in these areas, permits can be issued for activities that are compatible with conservation.

According to the Atlas Map of Canada, there are no National Wildlife Areas located in the vicinity of the Site (NRC, 2009).

6.3.4 Migratory Birds Sanctuaries

The Canadian Wildlife Service (CWS) of Environment Canada establishes bird sanctuaries to control and manage areas of importance for the protection of migratory birds, their nests and eggs. The sanctuaries can include a range of habitat types such as terrestrial, wetland, or marine. The CWS establishes regulations determining what activities can be carried out within these areas. Prohibited activities include the harassment or killing of birds, and disturbing, destroying, or possessing nests or eggs.

Nunavut has an abundance of sites favourable to the migratory habits of several bird species. In 1999, ten (10) sites were legislated as Migratory Bird Sanctuaries. One (1) of these, the Queen Maud Gulf Migratory Bird Sanctuary present in central Nunavut with an area of 61,765 km^2, is the largest in Canada.

According to the Atlas Map of Canada, there are no Migratory Bird Sanctuaries located in the vicinity of the Site. However, East Bay Migratory Bird Sanctuary and Harry Gibbons Migratory Bird Sanctuary, both established in 1959, are located approximately 370 km and 348 km south of the Hamlet, respectively, on South Hampton Island (NRC, 2009). Furthermore, the Queen Maud Gulf Migratory Bird Sanctuary is located approximately 500 km west of the Hamlet.

In addition, approximately 5km north of the Hamlet lies nesting grounds located on cliffs for thousands of seagulls, as well as snow birds, loons, eider ducks, longtail ducks and jaegers (RB, 2011). The Inuktitut name for Repulse Bay is Naujaat, which translates to "nesting place for seagulls" (RB, 2011).

6.3.5 Species of Special Concern

The Committee on the Status of Endangered Wildlife in Canada is an independent committee of wildlife experts and scientists from federal, provincial and territorial governments, universities, and non-government organizations that use scientific processes to assess the risk of extinction for wildlife species. This committee meets on an annual basis to review status reports on species that are suspected of being at risk and provides an assessment to the government and public.

Once COSEWIC assesses whether a species is at risk or not, they assign designations based on status reports prepared by independent experts, scientific research, community knowledge and traditional Aboriginal insights. These designations are recommendations to the federal government, whereby the federal government makes the final decision on whether species will be listed under the *Species at Risk Act* (SARA).

Schedule 1 of SARA is the official list of wildlife species at risk in Canada. It includes species that are extirpated (extinct in Canada), endangered, threatened and of special concern. Once a species is listed on Schedule 1, protection and recovery measures are developed and implemented.

Species that were designated at risk by COSEWIC before the creation of SARA must be reassessed according to the new criteria of the Act before they can be added to Schedule 1. These species are listed on Schedules 2 and 3, and are not yet officially protected under SARA.

Once the species on Schedules 2 and 3 have been reassessed, the Schedules themselves will be eliminated, and species will simply be listed or not listed under the Act.

A general search of species of special concern, endangered and/or threatened was conducted for Nunavut, Canada. Both the SARA species list (SARA, 2012) and COSEWIC species assessment lists (COSEWIC, 2012) were consulted. The results were then screened against expected species home ranges, so as to refine the potential species expected at or near the Hamlet of Repulse Bay. The results are presented in Table 6-6 (Wildlife) and Table 6-7 (Plants).

It should be noted that a feltleaf willow (*Salix alaxensis*), specifically a single large specimen, was observed at the central portion of the wetlands area, approximately 100 m downgradient of the sewage inlet. A sample was returned to the laboratory and the identification was confirmed. However, this species is not to be mistaken for the felt-leaf willow (*Salix silicicola*), which is designated as a special concern species by COSEWIC (2012). It is unlikely that the special concern felt-leaf willow species is present at the Site, given that it is endemic and restricted almost exclusively to the Athabasca Sand Dunes of Saskatchewan (COSEWIC, 2012).

Table 6-7: Wildlife species that may be present in the Hamlet of Repulse Bay and their corresponding COSEWIC, Schedule and SARA Status

Species Type	Scientific Name	Common Name	COSEWIC Status	Schedule	SARA Status
Mammal	*Canis lupus arctos*	Arctic grey wolf	DD		
	Gulo gulo	Wolverine	SC	No Schedule	No Status
	Rangifer tarandus groenlandicus	Barren-ground caribou	SC	1	SC
	Ursus maritimus	Polar bear	SC	No Schedule	No Status
Marine Mammal	*Balaena mysticus*	Bowhead whale	THR		
	Delphinapterus leucas	Beluga whale (Western Hudson Bay population)	SC	No Schedule	No Status
	Erignathus barbatus	Bearded seal	DD		
	Monodon monoceros	Narwhale	SC		
	Odobenus rosmarus rosmarus	Atlantic walrus	SC	No Schedule	No Status
Birds	*Calidris canutus rufa*	Red knot (*rufa* subspecies)	END	No Schedule	No Status
	Falco peregrinus anatum/tundrius	Peregrine falcon	SC	No Schedule	No Status

COSEWIC: Committee on the Status of Endangered Wildlife in Canada; SARA: Species at Risk Canada; DD: Data Deficient; END-R: Endangered (Regulated); END: Endangered; SC: Special Concern; THR: Threatened; EXP: Extirpated

Table 6-8: Plant species that may be present in the Hamlet of Repulse Bay and their corresponding COSEWIC, Schedule and SARA Status

Species Type	Scientific Name	Common Name	COSEWIC Status	Schedule	SARA Status
Shrubs	*Salix silicicola*	Felt-leaf willow	SC	1	SC

COSEWIC: Committee on the Status of Endangered Wildlife in Canada; SARA: Species at Risk Canada; SC: Special Concern

6.3.6 Wildlife Corridors

Wildlife movement corridors are habitats that link two (2) or more other wildlife habitats that are critical to the maintenance of a population of a particular species or group of species. The key ecological function of wildlife movement corridors is to enable wildlife to move to and between areas of significant habitat or core natural areas with minimum mortality. They can provide critical links between shelter, feeding, watering, growing and nesting locations.

Wildlife and/or habitat corridors can help increase genetic diversity and aid in the re-establishment of populations after random events such as fires or disease outbreaks. These corridors can help to increase biodiversity and population stabilization.

In general, the Arctic region is characterized by vast expanses of natural habitat and low human presence. Annually, there are large migrations of various wildlife species that take place throughout Nunavut, including the Hamlet of Repulse Bay and the surrounding areas. For example, the Inuktitut name for Repulse Bay is Naujaat, which translates to "nesting place for seagulls". The name comes from the actual nesting grounds located on cliffs approximately 5 km north of the Hamlet; and, every June, thousands of seagulls occupy the area, as well as snow birds, loons, eider ducks, longtail ducks and jaegers (RB, 2011). The Repulse Bay area is also known for its abundant narwhal population; and, Inuit from surrounding communities gather at the Hamlet for the annual narwhal hunt (RB, 2011). It should be noted that hunting and fishing are important cultural activities of the Inuit peoples; however, to maintain the local populations, quotas are managed in each community by hunters and trappers organizations as well as the Elders of a given community.

As such, given that the general Arctic region is historically and currently known for its presence of various wildlife migratory routes, wildlife corridors are expected to be present at the Hamlet of Repulse Bay.

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Chapter 7 –
Environmental Effects and Mitigation

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7 Environmental Effects and Mitigation

The effects of the proposed project components on the Valued Ecosystem Components are presented in the following Sections.

7.1 Construction

The potential effects from the construction activities at the Site, as described in Section 5.1, and each affected component, the recommended mitigation(s), the likelihood of residual effect and the significance of residual effect is presented in Table 7-1.

Table 7-1: Construction Activities

Effect	Component	Recommended Mitigation	Likelihood of Residual Effect	Significance of Residual Effect
Construction of a sewage lagoon and additional roadway may affect the water quality through fuel/sewage spills and run off.	Surface water	Ensure that no run off from construction activities enters water courses or Hudson Bay; a spill response kit must be on-Site in the event of a spill; immediately contain and clean up any spill in accordance with regulatory requirements. All equipment fuelling and maintenance must be carried out at a safe distance from water courses and Hudson Bay 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 a sewage lagoon and additional roadway may affect the water quality through fuel/sewage spills and run off.	Groundwater	Ensure that no run off from construction/improvement activities enters water courses or seeps into the ground; a spill response kit must be on-Site in the event of a spill; immediately contain and clean up any spill in accordance with regulatory requirements. All equipment fuelling and maintenance must be carried out at a safe distance from water courses and Hudson Bay to ensure that no deleterious substances enter the groundwater.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Excavation activities may affect the soil and sediment quality and composition through fuel/sewage spills and run off.	Soils and sediments	All equipment fuelling and maintenance must be carried out in designated locations to ensure that no deleterious substances percolate into soils or sediments; 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 activities.	Air quality and climate change	Vehicles, machinery and equipment must be in good repair and equipped with emission controls, where applicable. All work shall be carried out in accordance with all applicable air-emissions regulations and bylaws.	Minimal potential due to the small magnitude, limited geographical extent	Not significant

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Effect	Component	Recommended Mitigation	Likelihood of Residual Effect	Significance of Residual Effect
			and duration of project activities.	
Presence of noise/vibration from engines and equipment during construction activities.	Noise and/or vibration	Vehicles, machinery and equipment must be in good repair. All work shall be carried out in accordance with all applicable noise regulations and bylaws.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Construction of a sewage lagoon and additional roadway may influence the terrain and topography in regards to natural overland flow.	Terrain and topography	Ensure proper monitoring of function of sewage lagoon and wetland system. Ensure that grading takes place according to design specifications.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Construction of a sewage lagoon and additional roadway may influence the downgradient wetlands in regards to natural overland flow, and may also affect the composition of the local vegetation.	Vegetation and wetlands	Ensure proper monitoring of function of sewage lagoon and wetland system. Ensure that grading takes place according to design specifications.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Construction of a sewage lagoon and additional roadway may interrupt the existing fish and fish habitat conditions.	Fish and fish habitat	Ensure proper monitoring of function of sewage lagoon and water courses.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant
Construction of a sewage lagoon and additional roadway may interrupt the existing wildlife and wildlife habitat conditions.	Wildlife and wildlife habitat	Ensure proper monitoring of function of sewage lagoon and wetland system.	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, as well as movement of heavy equipment, during construction and improvement activities may	Human health	Follow all applicable health and safety guidelines and proper use of personal protective devices (e.g. hard hats, steel-toed boots, safety glasses, etc.)	Minimal potential due to the small magnitude, limited geographical extent and duration of project	Not significant

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Effect	Component	Recommended Mitigation	Likelihood of Residual Effect	Significance of Residual Effect
affect the health and safety of workers.			activities.	

7.2 Accidents and Malfunctions

The potential effect(s) from accident and malfunctions at the Site, and each affected component, the recommended mitigation(s), the likelihood of residual effect and the significance of residual effect is presented in Table 7-2.

Table 7-2: Accidents and Malfunctions

Effect	Component	Recommended Mitigation	Likelihood of Residual Effect	Significance of Residual Effect
Spills can affect surface water, groundwater, soil and sediment quality, as well as effect fish, wildlife and natural habitats.	Fuel/oil/other hazardous substance spills	All equipment fuelling and maintenance must 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 and noise from engines and equipment, as well as movement of heavy equipment, during construction activities may affect the health and safety of workers.	Health and safety of workers	Follow all applicable health and safety guidelines and proper use of personal protective devices (e.g. 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 Effects of the Environment on the Project

The potential effect(s) of the environment on the Project, and each affected component, the recommended mitigation(s), the likelihood of residual effect and the significance of residual effect is presented in Table 7-3.

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Table 7-3: 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 conditions	Ensure that retention times are long enough to prevent untreated/under treated effluent from entering the wetland/water courses and ocean.	Minimal potential due to the small magnitude, limited geographical extent and duration of project activities.	Not significant

7.4 Cumulative Effects

Cumulative effects resulting from this project are not expected.

7.5 Any Other Matter

No other matter was identified during this screening.

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Chapter 8 –
Environmental Effects Summary Checklist

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8 Environmental Effects Summary Checklist

A summary of the potential environmental effects expected at the Site, as well as potential mitigation and residual effects is presented in Table 8-1. The potential environmental effects, potential mitigation and residual effects for other factors and cumulative effects are presented in Tables 8-2 and 8-3.

Table 8-1: Environmental Effects Checklist

Environmental Component	Potential Project Effects						Residual Effects	
	Potential adverse effect?			Can it be mitigated?			Is it 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/Hydrogeology	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
Transportation and Navigation		X						
Land Use		X						
Human Health	X			X				X
Socio-economic conditions		X						
Physical/Cultural heritage		X						
Aboriginal use of traditional lands/resources		X						
Structures/Sites of		X						

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Environmental Component	Potential Project Effects						Residual Effects	
	Potential adverse effect?			Can it be mitigated?			Is it significant?	
	YES	NO	Uncertain	YES	NO	Uncertain	YES	NO
significance								
Other		X						

Table 8-2: Other Factors

Environmental Component	Potential Project Effects						Residual Effects	
	Potential adverse effect?			Can it be mitigated?			Is it significant?	
	YES	NO	Uncertain	YES	NO	Uncertain	YES	NO
Accidents and Malfunctions	X			X				X
Effects of Environment on the Project	X			X				X

Table 8-3: Cumulative Effects

Environmental Component	Potential Project Effects						Residual Effects	
	Potential adverse effect?			Can it be mitigated?			Is it significant?	
	YES	NO	Uncertain	YES	NO	Uncertain	YES	NO
Construction activities		X						

Mitigation measures that are required as a result of the Screening Level Environmental Assessment are summarized in Table 8-4.

Table 8-4: Mitigation Measures

Environmental Component Potentially Affected	Proposed Mitigation	Responsibility to ensure implementation
Surface water	- Ensure that no run off from construction activities enters water courses or Hudson Bay; a spill response kit must be on-Site in the event of a spill; immediately contain and clean up any spill in accordance with regulatory requirements. All equipment fuelling and maintenance must be carried out at a safe distance from water courses and Hudson Bay to ensure that no deleterious substances enter the surface water bodies. - Ensure proper function of lagoon and wetlands through monitoring program.	Consultants and the Hamlet of Repulse Bay

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Environmental Component Potentially Affected	Proposed Mitigation	Responsibility to ensure implementation
Groundwater	- Ensure that no run off from construction activities enters water courses or seeps into the ground; a spill response kit must be on-Site in the event of a spill; immediately contain and clean up any spill in accordance with regulatory requirements. All equipment fuelling and maintenance must be carried out at a safe distance from water courses and Hudson Bay to ensure that no deleterious substances enter the groundwater. - Ensure proper function of lagoon and wetlands through monitoring program.	Consultants and the Hamlet of Repulse Bay
Soils and Sediments	- All equipment fuelling and maintenance has to be carried out in designated locations away from open drainage systems and surface water to ensure that no deleterious substances percolate into soils or sediments; 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 and the Hamlet of Repulse Bay
Air Quality and Climate Change	- Vehicles, machinery and equipment should be in good condition and equipped with emission controls, as applicable. All work shall be carried out in compliance with all applicable air-emissions regulations and bylaws.	Consultants and the Hamlet of Repulse Bay
Noise/Vibration	- Vehicles, machinery and equipment must be in good repair. All work shall be carried out in accordance with all applicable noise regulations and bylaws.	Consultants and the Hamlet of Repulse Bay
Terrain and Topography	- Ensure that grading takes place according to design specifications. - Ensure proper function of lagoon and wetlands through monitoring program.	Consultants and the Hamlet of Repulse Bay
Vegetation and Wetlands	- Ensure that no run off enters water courses, Hudson Bay or the wetlands; a spill response kit is 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, Hudson Bay or the wetlands to ensure that no deleterious substances effect the vegetation and wetlands. - Ensure that grading takes place according to design specifications. - Ensure proper function of lagoon and wetlands through monitoring program.	Consultants and the Hamlet of Repulse Bay
Fish and Fish Habitat	- Ensure that no run off enters water courses, Hudson Bay or the wetlands; a spill response kit is 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, Hudson Bay or the wetlands to ensure that no deleterious substances enter the	Consultants and the Hamlet of Repulse Bay

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Environmental Component Potentially Affected	Proposed Mitigation	Responsibility to ensure implementation
	surface water bodies. - Ensure proper function of lagoon and wetlands through monitoring program.	
Wildlife and Habitat	- Ensure spill prevention measures are in place. - Ensure proper function of lagoon and wetlands through monitoring program.	Consultants and the Hamlet of Repulse Bay
Human Health	- Follow all applicable health and safety guidelines and proper use of personal safety devices (e.g. hard hats, steel-toed boots, safety glasses, etc.)	Consultants and the Hamlet of Repulse 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 and the Hamlet of Repulse Bay
Water level fluctuations	- Silt fencing is to be placed in areas of concern to prevent loose soils, sediments and debris from entering surface water bodies and the wetlands.	Consultants and the Hamlet of Repulse Bay

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Chapter 9 – Consultation

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9 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 posed on the CEAR:

Yes..... ☐

Not applicable ..... ☒

Notice of public input posted on the CEAR:

Yes..... ☐

Not applicable ..... ☒

Public participation was not considered as part of this project since the project has no negative effects on the public, and is confined to the Site.

9.2 Consultation with the Public

A preliminary Site visit was conducted at the Hamlet of Repulse Bay by **exp** representative Mr. Stephen Douglas, accompanied by Mr. Malli Aulakh, P.Eng., Senior Project Officer, Department of Community & Government Services, Government of Nunavut, between July 16th and 18th, 2012. The purpose of this preliminary Site visit was for Mr. Douglas to meet with Hamlet staff to review the operations of the existing sewage facility, and review alternate sites for the location of a new facility. In addition, the visit was to also allow Mr. Douglas to meet with the Hamlet Council, and to introduce **exp** and the project. This visit allowed for Mr. Douglas to receive input and document concerns from the Hamlet Council regarding the project.

As part of the Site visit, a meeting was also held with the Senior Administrative Officer (SAO), in which the SAO was requested to indicate any alternate sites for the location of a sewage treatment facility. One (1) site was suggested which is located north of the existing runway close to the ocean. This site was reviewed but was determined that it was too close to the runway, and not a large enough area to allow for the construction of a new lagoon. Another site was also presented for consideration, based on topographical maps. However this second site was also ruled out because it was in close proximity to an area where the Hamlet was planning to build a facility for the Elders.

With regards to alternate sites for the location of the sewage treatment facility, the Hamlet Foreman concluded that the existing site was probably the best location as the Site.

On July 17th, 2012, a meeting was held with the Hamlet Council, during which Mr. Aulakh gave an overview of the project, with proposed timelines for construction to proceed in the 2013 construction season, being conditional on funding availability. Mr. Douglas then provided an overview of the purpose of **exp's** Site visit and intended schedule for tendering by the end of March 2013. After this presentation, a question and answer session was completed. This session allowed for the Hamlet's councilors to

obtain additional information. Topics of particular concern involved alternate sites for placement of the sewage treatment facility along with other concerns that they had regarding the existing facility. In general, the Hamlet Council had no major comments to provide, and were generally supportive of the project.

Therefore, these meetings with the Hamlet Council, Hamlet Foreman and others allowed for a strategy to be confirmed. This strategy, also based on a review of the local area for alternate sites, identified the preferred recommendation was to place emphasis on the option to rehabilitate/remediate the existing sewage treatment facility so as to meet the needs and requirements of the Nunavut Water Board. This approach was also intended to provide the long-term sewage disposal requirements of the Hamlet.

9.3 Consultation with other Federal Departments or Agencies

A request for information regarding the Site was sent to the Department of Fisheries and Oceans Canada (DFO) and Aboriginal Affairs and Northern Development Canada (AANDC). If any information is received from either agency, an addendum will be issued.

9.4 Consultation with other Jurisdictions

Consultation with other jurisdictions was not undertaken.

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Chapter 10 – Summary

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10 Summary

The SLEA revealed that the proposed upgrades and expansion of the existing long term sewage treatment system for the Hamlet of Repulse Bay will have net positive effects on the community. This project will not have significant long term negative effects on the environment or local wildlife. Most effects are related to the construction activities, and are short term. All potential effects can be managed by applying suitable mitigation measures. This management of potential effects will reduce or remediate the expected disturbance due to this project.

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Chapter 11 –
General Limitations and Closure

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11 General Limitations and Closure

The purpose of this report is to provide the Government of Nunavut with an evaluation of the potential environmental effects associated with the proposed upgrade to the existing long term sewage treatment system for the Hamlet of Repulse Bay.

The information presented in this report is based on information provided by others and visual observations as identified herein. Achieving the objectives stated in this report has required us to arrive at conclusions based upon the best information presently known to us. No investigative method can completely eliminate the possibility of obtaining partially imprecise or incomplete information; it can only reduce the possibility to an acceptable level. Professional judgment was exercised in gathering and analyzing the information obtained and in the formulation of the conclusions. Like all professional persons rendering advice, we do not act as absolute insurers of the conclusions we reach, but we commit ourselves to care and competence in reaching those conclusions.

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The SLEA was prepared based on the available site information and evaluated the potential effects posed on the environment based on the proposed upgrade to the existing long term sewage treatment system for the Hamlet of Repulse Bay. Should additional Site information become available, the SLEA should be re-evaluated to determine if the conclusions presented in the report are still valid.

Closure

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Yours truly,

exp Services Inc.

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Edyta Chorostkowska, M.Env.Sc.
Ecological Specialist

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Dean Fitzgerald, Ph.D.
Team Leader, Ecological Services

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Chapter 12 – References

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Appendix A – Figures

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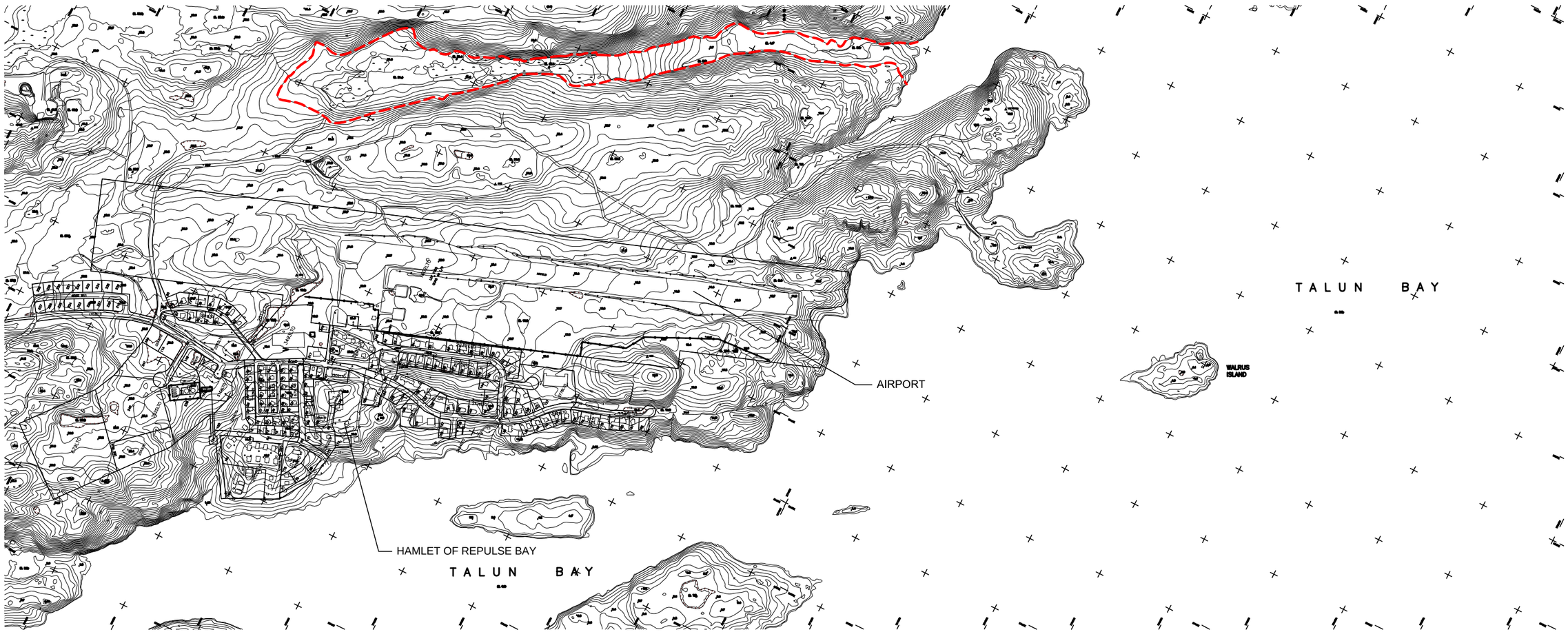

LEGEND:

APPROXIMATE SITE BOUNDARY

0 40 80 160 240 320 400 metres

CONTOUR INTERVAL: 0.5 METRES

exp Services Inc.
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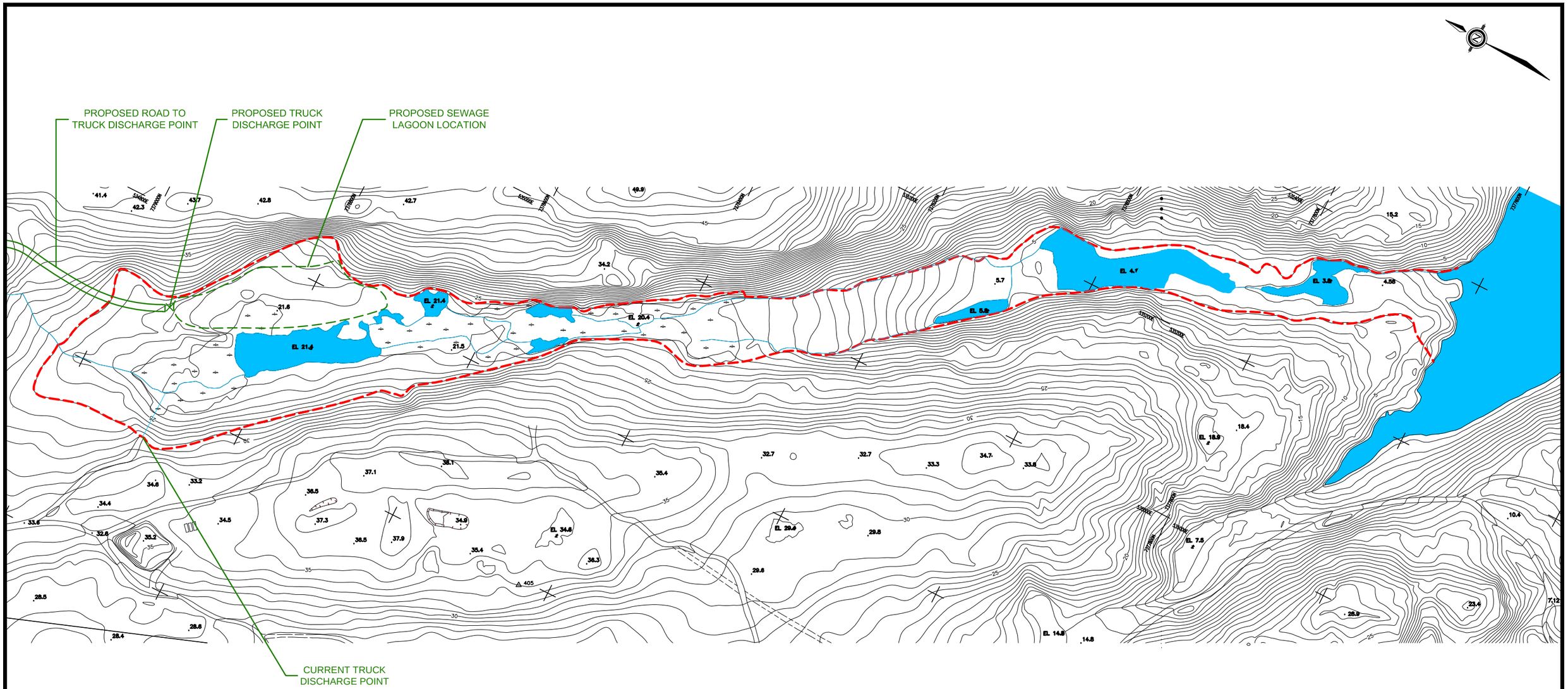
PROJECT TITLE AND LOCATION:

SCREENING LEVEL ENVIRONMENTAL ASSESSMENT
SEWAGE TREATMENT FACILITY
HAMLET OF REPULSE BAY, NU

DRAWING TITLE:

SITE LOCATION PLAN

PROJECT NO.: OTT-00207086-A0	DWN.: AZ
SCALE: AS NOTED	DWN.: EC
DATE: OCTOBER 2012	DWG. No.: 1



LEGEND:

- APPROXIMATE SITE BOUNDARY
- SURFACE WATER BODY
- WETLAND/SWAMP

0 20 40 80 120 160 200 metres

CONTOUR INTERVAL: 0.5 METRES

exp Services Inc.
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PROJECT TITLE AND LOCATION:

SCREENING LEVEL ENVIRONMENTAL ASSESSMENT
SEWAGE TREATMENT FACILITY
HAMLET OF REPULSE BAY, NU

DRAWING TITLE:

SITE LAYOUT PLAN

PROJECT NO.: OTT-00207086-A0	DWN.: AZ
SCALE: AS NOTED	DWN.: EC
DATE: OCTOBER 2012	DWG. No.: 2

Appendix B –
Site Photographs

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Photograph No. 1 – Truck Discharge Point

Photograph No. 2 – Sewage Discharge

Photograph No. 3 – Sewage Percolating into Wetlands

Photograph No. 4 – View of Truck Discharge Point

Photograph No. 5 – View of Truck Discharge Point with Wetlands in Forefront

Photograph No. 6 – First Natural Treatment Pond

Photograph No. 7 – View of Wetlands Area from Upstream (North End)

Photograph No. 8 – High Amount of Refuse Near Truck Discharge Point

Photograph No. 9 – Sheen on Water Near Truck Discharge Point

Photograph No. 10 – Surface Water Bodies, Wetlands and Meadows Across Entire Site

Photograph No. 11 – Typical Meadow at the Site

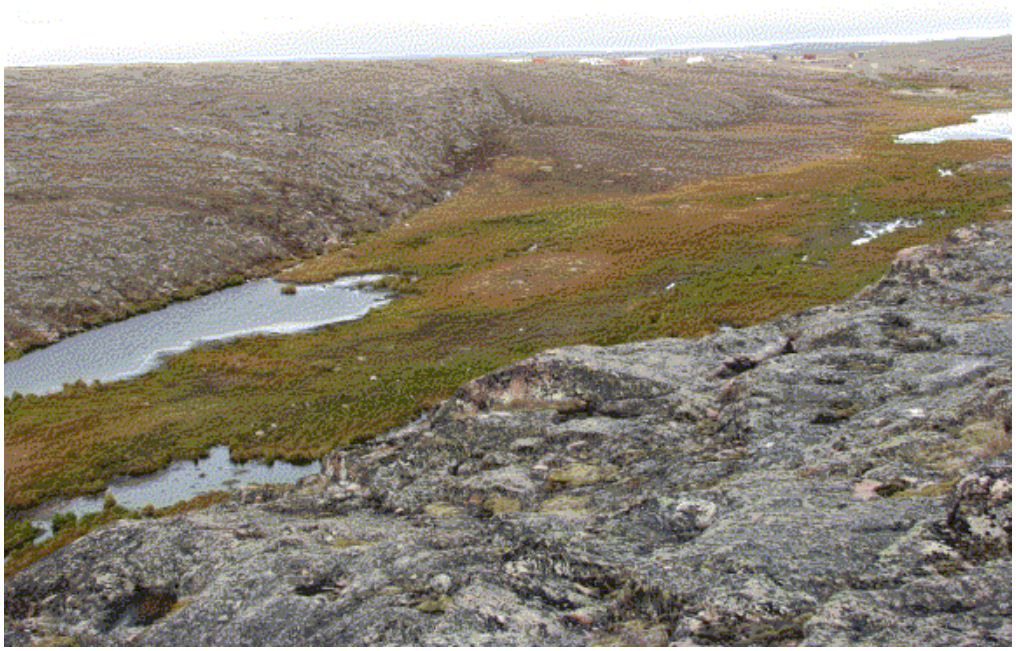
Photograph No. 12 – Most Ponds at the Site are Stagnant

Photograph No. 13 – Most Ponds Contain Some Algae

Photograph No. 14 – Most Creeks Contain Some Algae

Photograph No. 15 –High Amount of Detritus and Some Sheen on Water

Photograph No. 16 – Predominant Characteristics of the Site



Photograph No. 17 – Predominant Characteristics of the Site, Flanked by Bedrock Outcrops

Photograph No. 18 – Sheen on Water at Mid-Site Creek

Photograph No. 19 – Algae, Detritus and Sheen on Water at Mid-Site Surface Water Body

Photograph No. 20 –Downgradient Pond

Photograph No. 21 – Flowing Water at Downgradient Pond

Photograph No. 22 – View of Downgradient Site with Hudson Bay in Background

Photograph No. 23 – Wetland Discharge Point to Hudson Bay, Ocean in Background

Photograph No. 24 – Wetland Discharge Point to Hudson Bay

Photograph No. 25 – Heavy Grazing at the Site

Photograph No. 26 – Typical Grazing at the Site

Photograph No. 27 – Evidence of Migratory Bird Resting Area Across the Site

Photograph No. 28 – Small Flock of Snow Geese

Photograph No. 29 – Foraging Sparrows

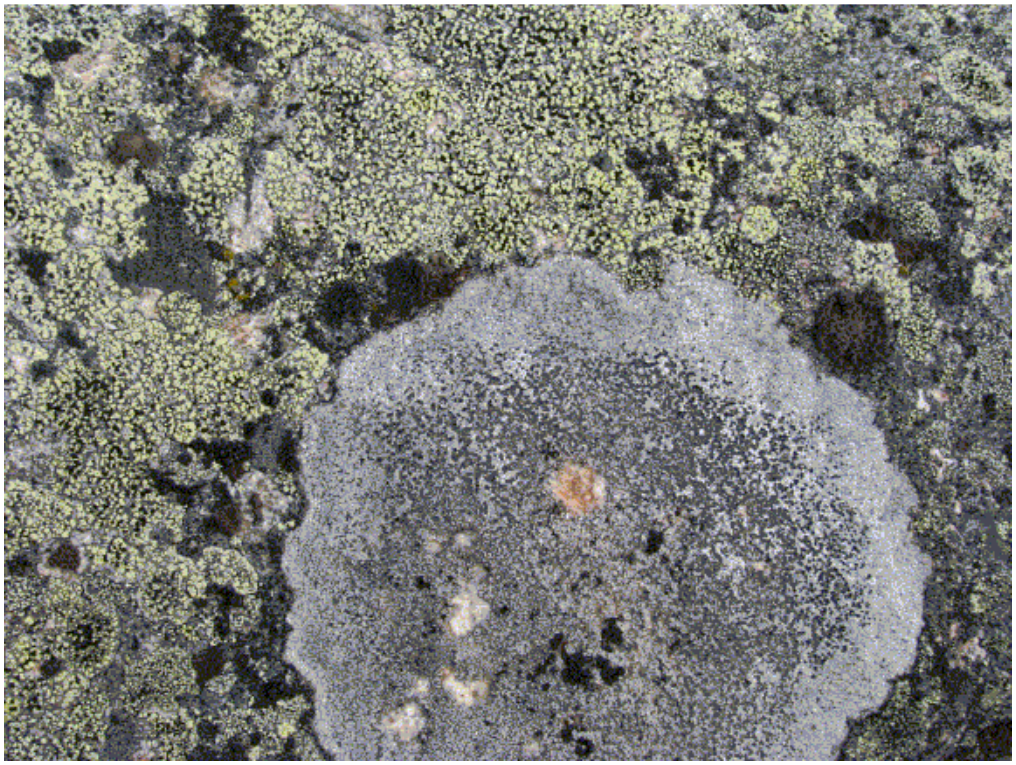
Photograph No. 30 – Evidence of Squirrel Dens

Photograph No. 31 – Arctic Ground Squirrel

Photograph No. 32 – Animal Carcass

Photograph No. 33 – Typical Moss Species Across the Site

Photograph No. 34 – Various Lichen Species Across the Site



Photograph No. 35 – Various Lichen Species Across the Site

Photograph No. 36 – Typical Arctic Vegetation Across the Site

Photograph No. 37 – Arctic Poppy at the Site

Photograph No. 38 – Low-Lying Willow at the Site

Photograph No. 39 – Typical Feltleaf Willow at the Site