August, 2013

SHELL GREENLAND

2013 SITE SURVEY IN BAFFIN BAY

BLOCKS 5 (ANY), 6 (PITU) AND 8 (NAPU)

FINAL EIA - ADDITIONAL WORK SCOPE

NON-TECHNICAL SUMMARY

RAMBØLL
Akvaplan niva DHI

2013 SITE SURVEY IN BAFFIN BAY BLOCKS 5 (ANY), 6 (PITU) AND 8 (NAPU)
NON-TECHNICAL SUMMARY

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Ramboll
Hannemanns Allé 53
DK-2300 Copenhagen S
Denmark
T +45 5161 1000
F +45 5161 1001
www.ramboll.com

1. INTRODUCTION

Shell Greenland A/S is the operator of the license blocks 5 (Anu) and 8 (Napu) in Baffin Bay, Greenland. In addition to Shell, the licensees are GDF SUEZ E&P Greenland AS, Statoil Greenland A/S and NUNAOIL A/S. The neighbouring license block 6 (Pitu) is operated by Capricorn.

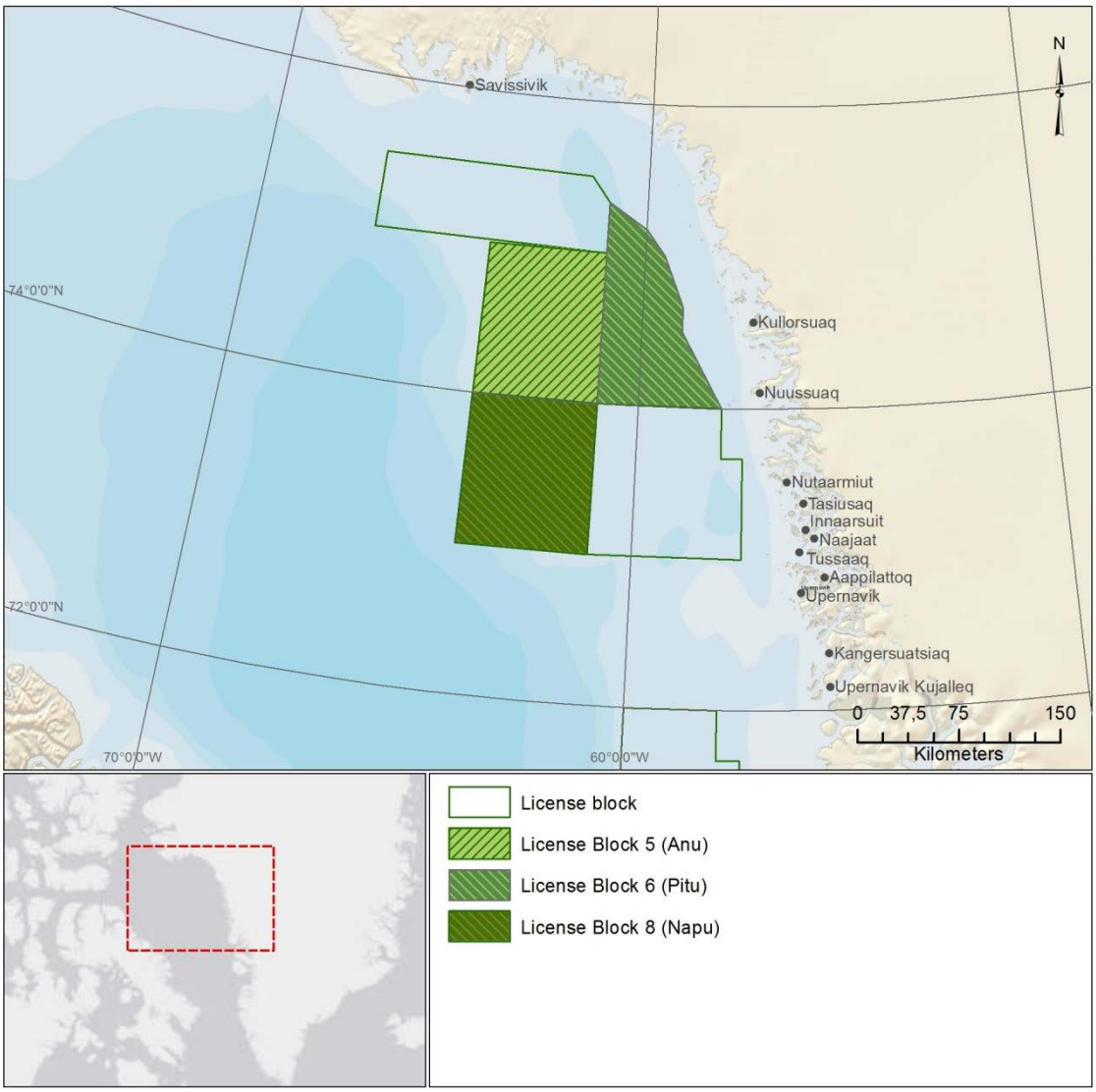

Figure 1-1 Location of the license blocks Anu (Block 5) and Napu (Block 8) in Baffin Bay, Greenland.

The past two years, a number of surveys have been completed under the licenses, and for this year Shell is planning to conduct a site survey of the potential drilling sites in license block 5 and 8, and potential shallow coring locations in license block 5 and 6.

Under the Greenlandic Mineral Resources Act, exploration-related activities require the submission of an Environmental Impact Assessment (EIA). The purpose of the EIA is to identify and assess expected impacts on the environment following from the planned site survey, and to identify appropriate measures to prevent and reduce impacts.

This document provides a summary of the final Environmental Impact Assessment (EIA) for the planned survey in July to October 2013.

2. PROJECT DESCRIPTION

The planned site survey includes a seismic survey and an environmental baseline survey. The objectives of the planned site survey are to evaluate the presence of subsurface hazards, such as shallow gas pockets, in the area and to obtain physical, chemical and biological characterization of the area around potential exploration drilling prospects and shallow coring locations.

Twelve survey sites will be located within the survey areas for potential exploration drilling prospects and potential shallow coring locations. The positions for the 2013 site survey are shown in Figure 2-1, at water depths of 500-800 metres. Of the twelve survey sites, seven sites are for potential exploration drilling prospects, and five are for potential shallow coring locations.

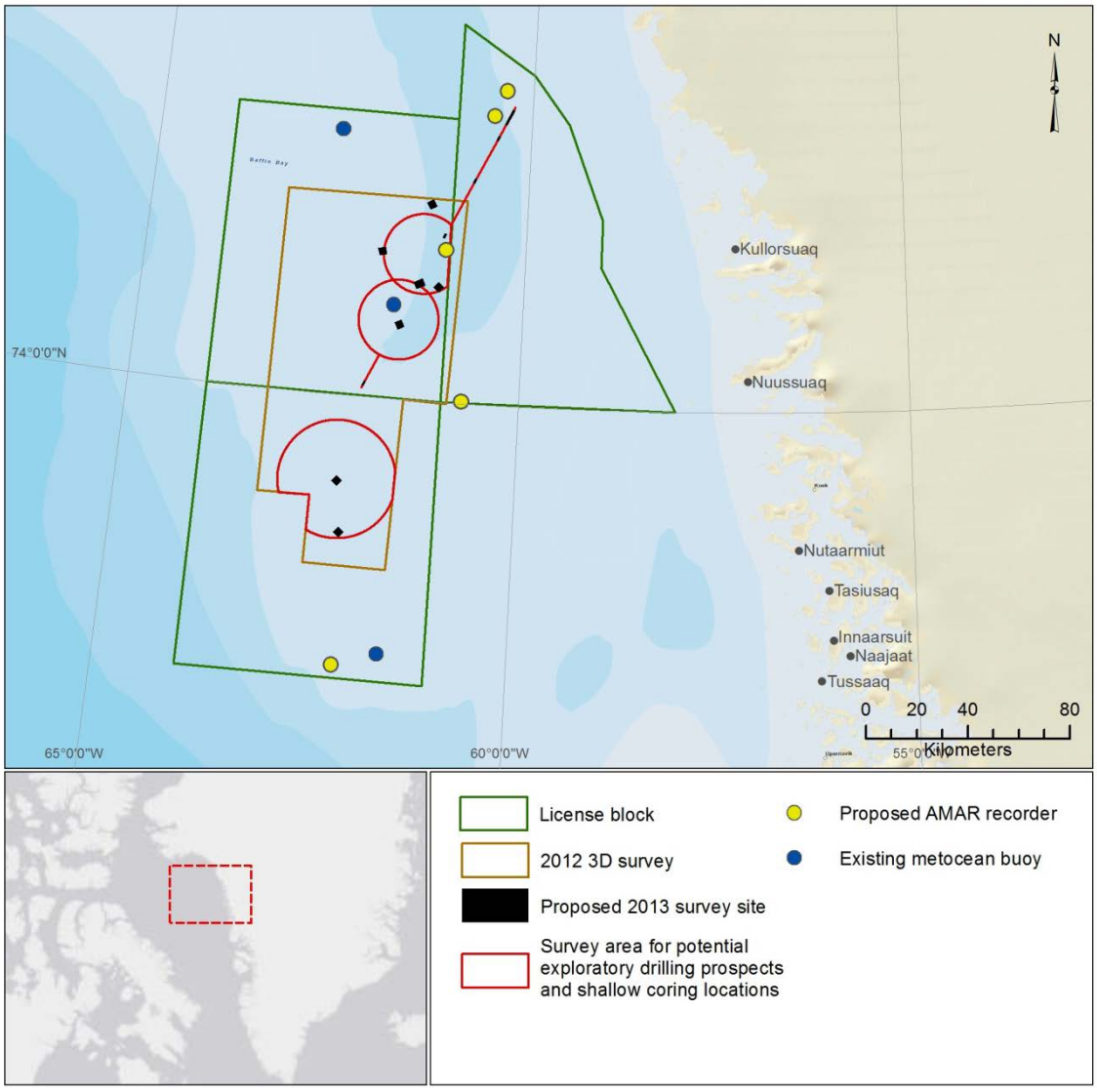

Figure 2-1 Location of the license blocks, and proposed positions for the 2013 site survey.

During the site survey one vessel will be used. Crew change, bunkering and resupply will take place as required. All waste and wastewater discharges will comply with Greenlandic and international regulations.

The seismic survey will use an airgun to generate a downward sound signal which travels through the seabed. Different layers of rock, water and hydrocarbons reflect this low-frequency sound in different manners. These reflective sounds are recorded by a streamer behind the vessel, and used to determine presence and location of hydrocarbons. The survey will also use an echo sounder to record water depth. An illustration of a typical seismic survey arrangement is presented in Figure 2-2.

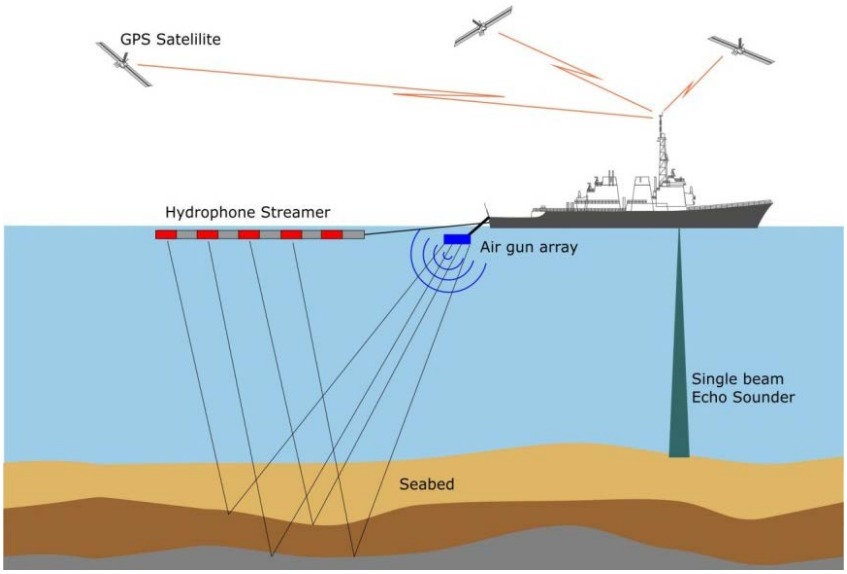

Figure 2-2 Schematic illustration of a typical seismic survey setup.

The Environmental Baseline Survey (EBS) will investigate seabed type, water depth and life on the seabed by using electronic tools (side scan sonar and echo sounding), an underwater camera and seabed sampling.

As part of the site survey metocean buoys and AMAR recorders will be deployed. Metocean buoys will gather meteorological (e.g. wind, air temperature) and oceanographic data (e.g. waves, currents) for a full year. AMAR recorders will record marine noise from the seismic survey and the sounds of marine mammals (e.g. whales) to obtain more data on the presence of marine mammals in the license blocks.

The site survey is planned to occur between July 15th and October 15th 2013. No seismic will be performed before August 1st. Seismic surveys in the Pitu block will be terminated before October 1st.

Marine Mammal and Seabird Observers (MMSOs) will be on board the survey vessels and have two tasks:

- To watch systematically for marine mammals before start-up and during seismic survey in order to mitigate and observe safety distances to whales and seals.
- To collect data on abundance and distribution of seabirds and marine mammals through systematic surveys. This task shall be carried out both when the seismic survey is being conducted, and when the vessels are in transit.

During seismic survey activities in conditions with poor visibility, an on board Passive Acoustic Monitoring (PAM) system will be used to detect presence and location of marine mammals.

The seismic survey proposed for 2013 is much smaller than the seismic survey undertaken in 2012 in terms of area covered, gun size and generated sound levels. Table 2-1 provides a comparison in key figures between the proposed 2013 survey and the 2012 survey, which occurred in the same area.

Table 2-1 Key figures concerning the 2012 and 2013 surveys

	2012 survey	Proposed 2013 survey
Area of seismic survey sites	~ 7,200 km^2	~ 80 km^2
Duration of seismic activities	~ 75 days	~ 10 days
Number of vessels	2 seismic (+ 5 support vessels)	1
Size of air gun array	2 at 3,480 in^3 each	1 at 140 in^3

3. IMPACT ASSESSMENT

Based on a description of the existing conditions an assessment of environmental impacts has been performed. Impacts related to the survey are identified and their character and severity assessed. Mitigating measures are described, and the residual impact (i.e. after applying mitigating measures) is assessed.

The environmental impact assessment (EIA) addresses physical, chemical and biological parameters related to the planned site survey. For each parameter, a description of existing conditions is presented. The recent 2011 Strategic Environmental Impact Assessment (SEIA) for the Baffin Bay, a scientific report prepared by Danish Centre for Environment and Energy, was a key source of information, as were the Greenland Red List and results of surveys undertaken in the license blocks during past surveys.

Since the survey sites are located more than 55 km from the coast, coastal topics have largely been considered outside the area of influence for the site survey. As recommended in the guidelines for seismic survey EIAs issued by the Bureau of Minerals and Petroleum, focus is on the biological components of the environment that are most likely to be impacted by the site survey, while other parameters are merely summarized.

The main source of impact is the underwater sound from the seismic survey and its effect on fish and mammals, which are summarized below. Impacts of routine activities associated with the survey, as the presence of vessels and waste and wastewater handling, are assessed to be minor. Also impacts of the environmental baseline survey are assessed to be minor.

Underwater sound
Acoustic modelling was undertaken to enable a qualified assessment of impacts of underwater sound to fish and marine mammals. The results of the modelling show a sharp decrease of sound levels in the first km from the source and a smoother decline in sound pressure levels at a longer range. An example of the noise propagation maps produced in the acoustic modelling is shown in Figure 3-1.

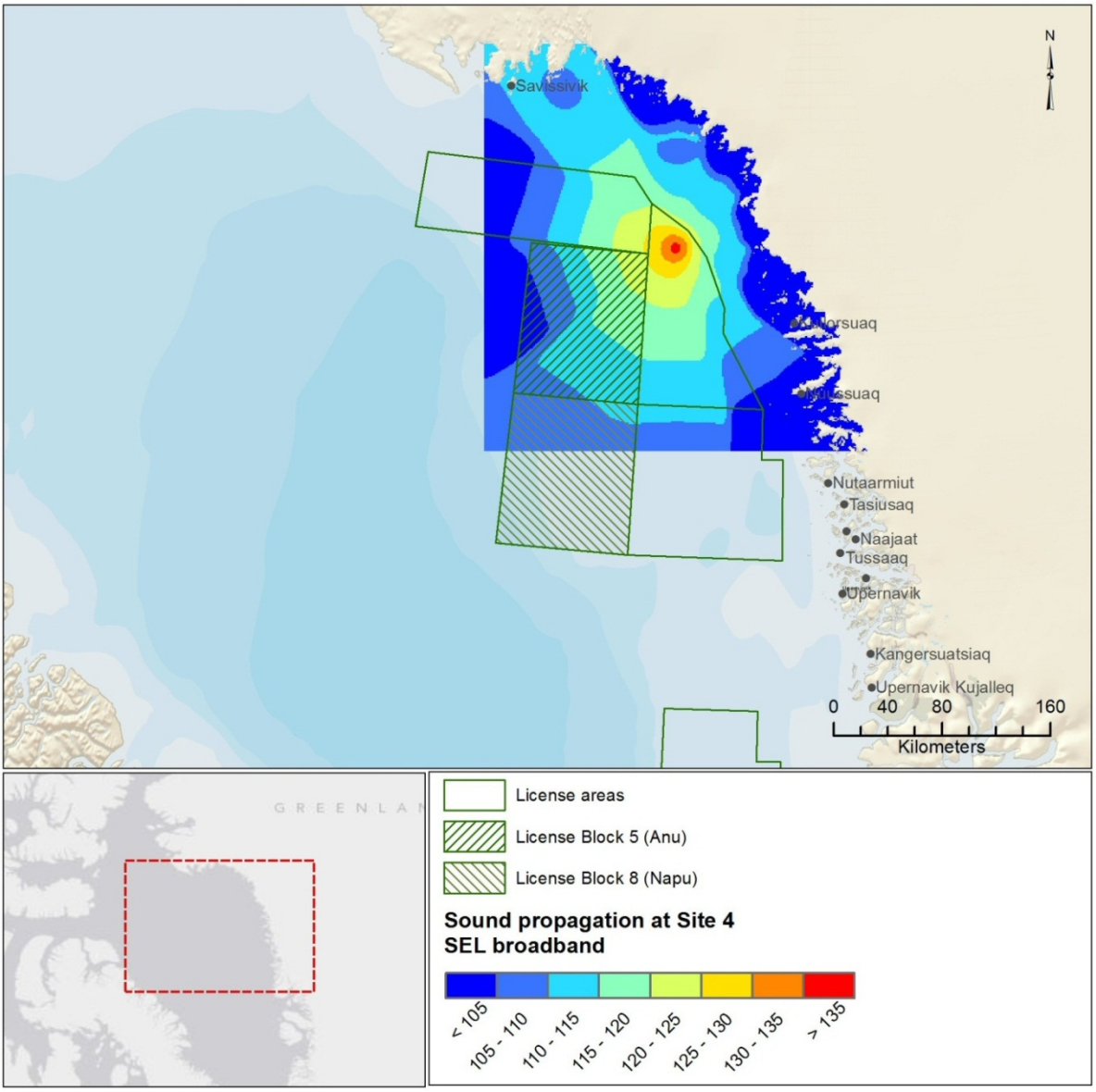

Figure 3-1 Example of noise propagation map at one of four sites where acoustic modelling has been undertaken.

Noise from the site survey has been assessed based on the modelled sound levels and criteria for behavioural and physiological response of fish and marine mammals to underwater noise.

Animal's response to the underwater noise associated with the planned seismic survey relate to physical change and/or behavioural changes.

Physical change may be

- Damage to the hearing leading to permanent changes in the animals' detection threshold.
- Temporary hearing impairment where the animal will regain its original detection abilities after a recovery period

Changes in behaviour range from strong reactions, such as panic or flight, to more moderate reactions where the animal may orient itself towards the sound or move slowly away.

Fish
At depths below approximately 500 m in Baffin Bay, the Greenland halibut is the dominant species, while species like lumpfish, spotted wolffish, American plaice, polar cod, capelin, greenland cod, atlantic cod, northern shrimp, snow crab and several species of sculpins, skates and rays also occur.

Physiological impacts due to the exposure to single pulses are restricted to temporary hearing impairment at very close ranges from the source. The onset of behavioural response in marine fish can take place at a maximum distance of 59 km.

Due to the geographic extent of the potential behavioural impacts, impacts to fish associated with the seismic survey are assessed to be moderate.

Marine mammals
No resident populations of marine mammals are known in the license blocks. Based on dedicated aerial surveys, the Strategic Environmental Impact Assessment and MMSO data from previous surveys, several species of marine mammals have been identified in the license blocks. Key species of marine mammals assessed to potentially occur in the area at the time of the site survey are bowhead whale, beluga whale, narwhal, bearded seal, ringed seal, walrus and polar bear. There were no sightings of beluga and narwhal in the license blocks during survey activities in 2011 and 2012.

It is clear from the assessment that physiological impacts are restricted to a temporary impaired hearing at very close ranges from the source (<100 m). Behavioural response can occur in narwhals, beluga whales and bowhead whales at up to 6 km from the source, while seals are much less affected with behavioural responses only when they are less than 40m from the source.

Based on the short-term duration and the sensitivity of the marine mammals the overall impact to marine mammals is assessed to be moderate (if no mitigating measures were to be put in place).

The mitigation measures which will be applied for the site survey are 1) Marine mammals observers ensuring that no marine mammals are near (~500 m) the source during seismic start-up, 2) Soft start procedure gradually increasing the sound energy to provide time for mammals to leave the area, 3) Observations of the ‘safety zone’ (500 m) where surveying is delayed if mammals are observed, and 4) Use of Passive Acoustic Monitoring (on board) in low visibility conditions.

All four mitigation methods would effectively alleviate the risk of temporary hearing impairment, and the residual (remaining) impact associated with the seismic survey is thus considered minor.

Fisheries
The survey sites are located at least 55 km from the coast, which is out of the normal range for many coastal fishing vessels. Fishing activity in Baffin Bay is primarily targeting Greenland halibut, while the shrimp fishery mainly takes place south of the license blocks. The Greenland halibut has no swim-bladder, and is thus potentially less disturbed by seismic surveys.

Based on the short-term duration, the small area and the medium intensity of impacts associated with survey activities, the overall impact to fisheries is assessed to be minor.

Protected areas
The site survey is planned at a distance of min 40 km from the Melville Bay Reserve.

The site survey has spatial overlap with two seismic protection zones.

Survey sites for potential shallow coring locations is located within a seismic protection zone (narwhal zone I), the summer habitat in Baffin Bay, where narwhals are present when the sea ice melts in summer until fall migration. The zone is protected in the period 1 June to 15 Oct, where only limited seismic activities are allowed. The impacts to narwhals caused by seismic activities are limited to potential behavioural impacts, and the survey site is situated in the southernmost area of the protection zone. The impact to the protection zone is thus considered to be minor.

Survey sites are also present in the fall migration habitat for narwhals (and beluga whales), narwhal zone II. According to the BMP guidelines, seismic activities in narwhal zone II shall be confined to a minimum in the protection period (15 October at least until 1 Dec). As there is no overlap between the site survey and the protection period, it is assessed that there will be no impacts to this protected area.

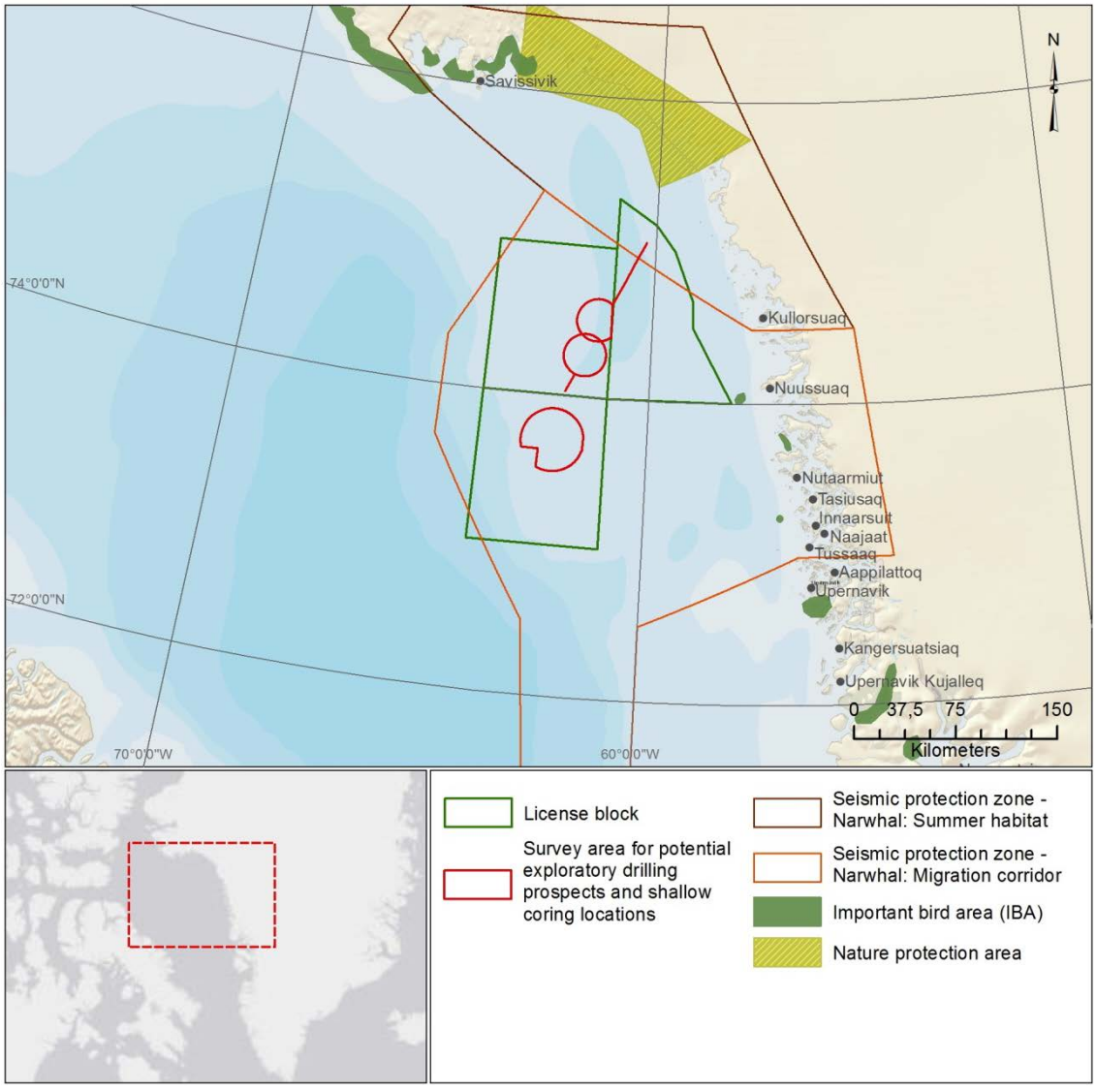

Figure 3-2 Protected and important areas in and near the license blocks.

Unplanned events
The planned site survey consists of seismic activities and sampling. Unplanned events could include accidental spill and loss of equipment during sampling. Preventative measures and plans will be in place to avoid any fuel spillage or other accidental events during the site survey. In the unlikely event of a spill, impacts will be minimized following vessel specific contingency plans.

Two scenarios for accidental fuel spill (of marine gas oil) were assessed. Based on the worst case scenario (total fuel loss from a vessel following a vessel collision with another vessel or an iceberg), the amount of marine gas oil that could be lost would form a diminishing surface slick lasting for between a few days to a week.

The primary species in the license blocks that would be vulnerable to exposure to marine gas oil is the polar bear, which could have reduced insulation capabilities. This is also the case for seabirds as fuel may destroy the insulating and water-resistant properties and affecting the buoyancy of the plumage.

The likelihood for an encounter between the short-lived surface slick and animals is considered low, as low densities of animals are encountered in the license blocks and the survey sites are situated some 55 km from the shore.

4. ENVIRONMENTAL MANAGEMENT AND COMMUNICATION

An Environmental Management Plan has been prepared that documents the monitoring and mitigation measures that will be taken to reduce impacts from the survey activities. These mitigation measures meet or exceed appropriate BMP guidelines and legislation and incorporate Best Environmental Practice and Best Available Technology.

Engagement with local communities will take place to ensure that community concerns are heard and acted upon wherever possible.