MEMO

Job	**2013 Site survey Baffin Bay**
Customer	**Shell Greenland A/S**
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Date	**1/07/13**
To	**Shell**
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WORK SCOPE CHANGES

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Shell Greenland A/S proposes to perform a site survey campaign in Baffin Bay in 2013. The site survey campaign was originally planned to take place at up to ten sites and include 2D HR seismic survey and environmental baseline studies. A Preliminary EIA was prepared and submitted to BMP for public consultation on March 1st 2013.

Since the Preliminary EIA, ongoing evaluation of the subsurface data acquired during operations in 2012 concludes that further shallow coring data may be needed to calibrate the age and, to a certain extent, rock properties of the subsurface *stratigraphy* related to potential prospects identified in the Anu and Napu licences. The limited operational window in the Baffin Bay, however, does not allow for site surveys to determine potential shallow hazards, and shallow coring to be conducted in the same season. Hence, to ensure the possibility of applying for another shallow coring campaign in 2014, additional site surveys over potential shallow coring sites are proposed for 2013.

To account for the changes, a new Preliminary EIA that includes the proposed additional work scope has been prepared (Preliminary EIA – Additional Work Scope, July 2013). This EIA also includes technical details which had become available since the Preliminary EIA dated March 1st, corrections and modifications per the comments received following the public hearing.

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The Preliminary EIA – Additional Work Scope, July 2013, includes updates of the following sections of the Preliminary EIA, 1 March 2013:

- Introduction (section 1)
- Project description (section 3) presenting the final site survey
- An updated impact assessment (section 5), including updated sound propagation modelling for a new site.

The main changes made resulting from the additional scope of work are detailed in Table 1.

Section	Page number	Changes
0	Front page	Title updated to include license block 6 (Pitu)
1 Introduction		
1 Introduction	1	- Updated to include description of size, licensees and license number for license block 6 (Pitu) - Figure 1-1 updated to show the three license blocks and survey areas
1.1 Exploration activities	2	Description of planned activities detailed to include license block 6 (Pitu)
3 Project description		
3.1 Project overview	4,5,6	- Bullets updated to include shallow coring survey - Table 3-1 updated - Text added to present the location of the survey sites and AMAR recorders (previous terminology PAM buoys) - Figure 3-1 updated - New figure 3-2 - Total area of survey sites changed
3.2.1 General details	6	It is included that no seismic survey will be performed in block 6 after October 1st
3.2.2 2D HR seismic survey	7	-Expected duration of survey updated -Number of sites changed
3.2.3 Environmental baseline survey	7	- It is described that ROV and benthic sampling will only be undertaken at sites for potential exploration drilling prospects, while bathymetry survey will be at all 12 sites - The duration is updated
5 Impact assessment (planned events)		
5.2.1 Acoustic noise modelling	22,23	- Text updated to reflect number of survey sites - Figure 5-1 updated
5.2.2 Modelling results	25	Figure 5-3 updated to show survey site closest to shore and NPZ

5.5.1 Existing conditions (bathymetry)	28	Figure 5-4 updated to show the three license blocks and survey areas
5.10.1 Existing conditions (marine mammals)	40,43	- Figure 5-10 updated to show the three license blocks and survey areas - Description of narwhal updated to include that narwhals are anticipated to be in this area during the survey
5.10.2 Impact assessment (marine mammals)	51	Table 5-22 updated to include results from new modelling site (location 4)
5.11.1 Existing conditions (protected areas)	55	- Text updated to present the overlap between license block 6 (Pitu) and the seismic protection zone "narwhal zone I" (summer habitat) - Figure 5-13 updated to show the three license blocks and survey areas -Distance to Melville Bay updated
5.11.2 Impact assessment (protected areas)	55,56	An assessment is presented with regards to seismic activities in the seismic protection zone (NPZ).
5.13.1 Existing conditions (commercial and recreational fishery)	60	- Figure 5-15 updated to show the three license blocks and survey areas - Text is updated to reflect changed distance from the coast (55 km)
5.15.2 Impact assessment (tourism)	63	Text is updated to reflect changed distance from the coast (55 km)
5.18.3 Protected areas (summary of impacts)	65	- Text updated to present the overlap between license block 6 (Pitu) and the seismic protection zone "narwhal zone I" (summer habitat) - Table 5-32 updated regarding protected areas - Text is updated to reflect changed distance from the coast (55 km)
Appendix 2		
Appendix 2		Updated to include 4th modelling site

Table 1 Description of changes to the Preliminary EIA, March 2013, due to the additional work scope that are now included within the Preliminary EIA – Additional Work Scope, July 2013.

The proposed additional activities of the site survey are described below and presented in Figure 1. Table 2 presents a comparison of preliminary and updated site survey plans.

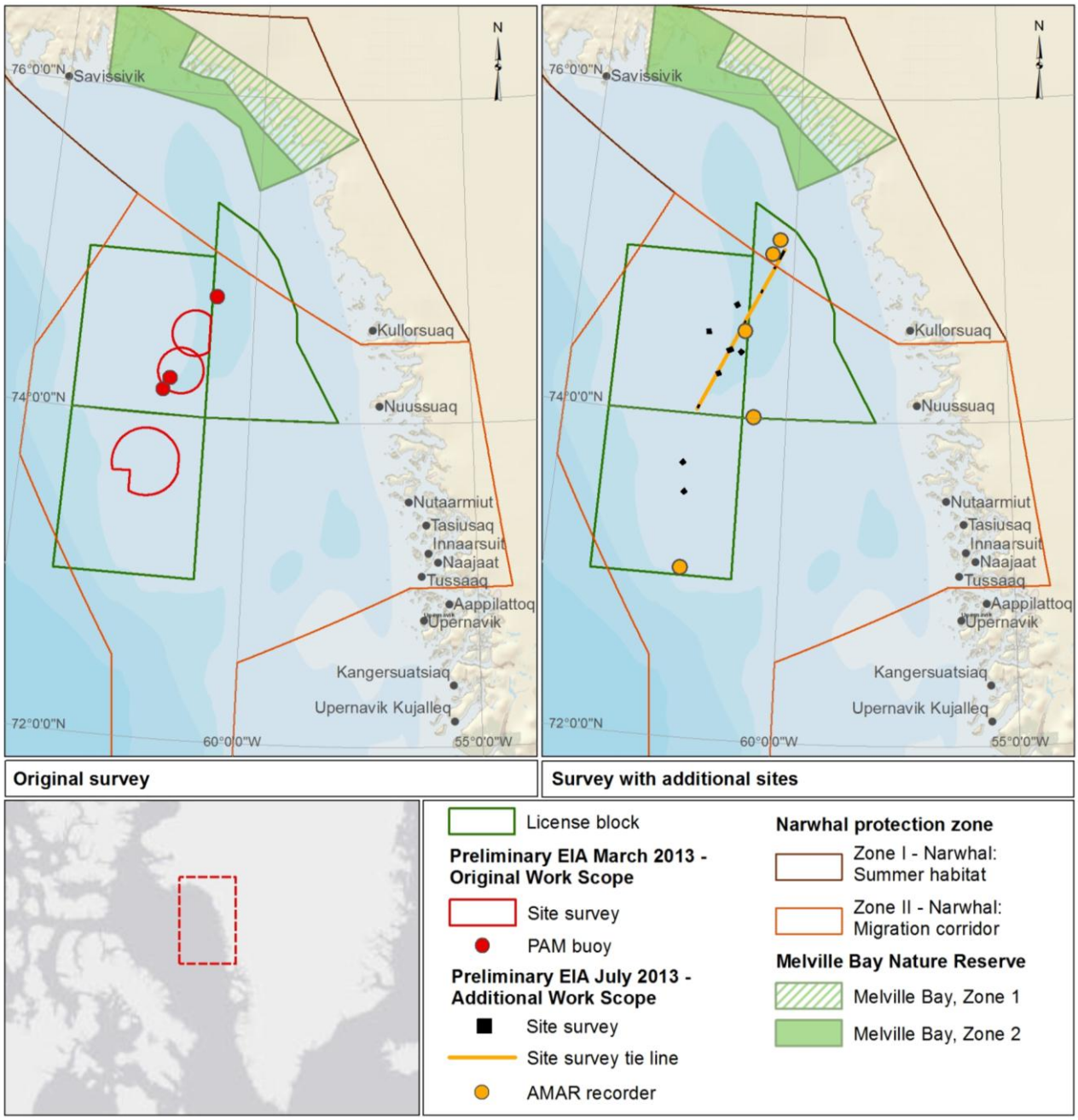

Figure 1 Original site survey (left) as presented in the Preliminary EIA, 1 March 2013 (up to ten sites within the survey areas and three PAM buoys) with locations of Narwhale Protection Zones. Survey with additional sites (right) and five AMAR recorders (replacing the PAM buoys).

	Unit	Original Plan *(Final EIA – Original Work Scope)*	Revised Plan *(Preliminary EIA – Additional Work Scope)*
Locations		10	12
Duration of data acquisition	days	10	10
Total duration of seismic survey operations, including tie lines, transit and stand-by due to weather and ice	days	22	31
Total duration of survey within the Narwhal Protection Zone I	days	0	4
Total area	km^2	90	80.5
Area within the Narwhal Protection Zone I	km^2	0	6.5
Total seismic line length	km	1440	1419.5
Closest distance to Melville Bay Nature Reserve	km	93	42

Table 2 Relative metrics for the original estimated work scope as compared to the additional work scope for the proposed 2DHR seismic survey.

Three of the survey sites for potential shallow coring locations are in the adjacent block 6 (Pitu), operated by Capricorn. All site surveys in the Pitu block will be terminated before 1st October.
The north-eastern most survey site is located up to 10 km in the Narwhal Protection Zone I, where the BMP guidelines recommend that "*seismic activities shall be avoided or of limited extent*". The proposed site survey will be limited to a single airgun array of 140 in^3 where as regular seismic surveys use more guns and with capacities up to 4000 in^3.

The impact assessment of the project on the environment has been re-assessed with the proposed additional site survey. Most of the impacts on the environment presented in the Preliminary EIA, March 2013 remain the same. However, as part of the survey is now proposed to take place within the Narwhal Protection Zone I, the assessed impact on this area has changed. Based on expected onset of behavioural response in narwhals up to 6 km from the source, the impact has now been assessed to be minor.

Noise modelling has been carried out for the north-easternmost additional survey site. The simulations show that the sound propagation from the source is similar to that from the three locations modelled in the Preliminary EIA March, 2013. The updated sound propagation model has been included in the Preliminary EIA – Additional Work Scope, July 2013.

In order to verify the modelling, and as additional baseline data gathering, it is proposed to add two AMAR recorders and place them in the Narwhal Protection Zone I. As well, two recorders would be left over winter to record ambient noise in the Baffin Bay area.