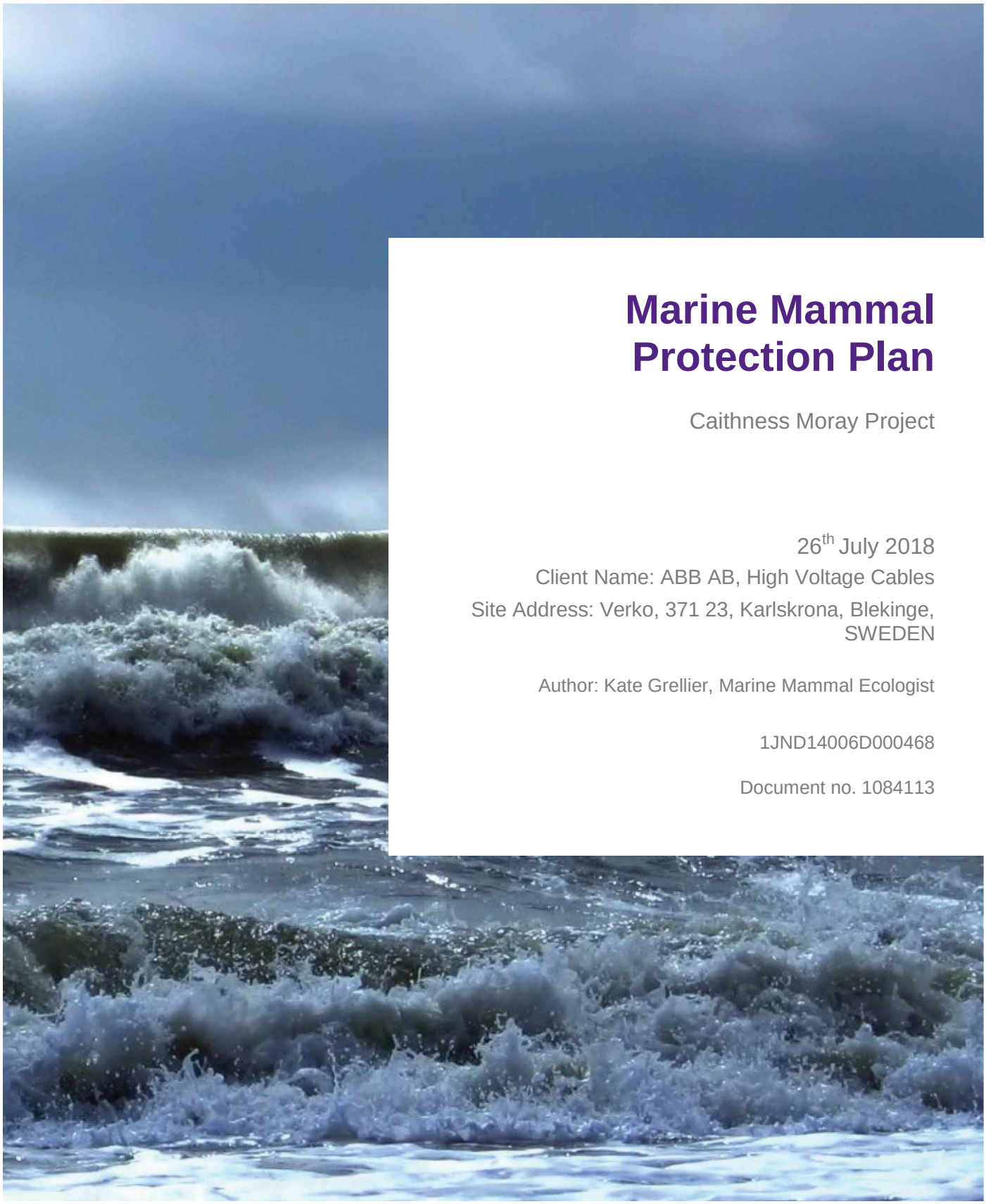

Marine Mammal Protection Plan

Caithness Moray Project

26th July 2018

Client Name: ABB AB, High Voltage Cables

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1JND14006D000468

Document no. 1084113

Planning & Development | Ecology & Hydrology | Technical Construction & Geotechnical | Asset Management | Due Diligence

natural power

Document history

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Issue	Revision (RRR)	Date	Revision Details
1	A	09/04/2015	First draft
2	A	15/04/2015	First draft transferred to Natural Power template; section 3 updated to be consistent with the legislation section of the EPS pre-lay survey risk assessment
3	A	30/04/2015	Second draft
4	B	26/05/2015	Third draft
5	C	17/07/2015	Additional information from the pre-lay geophysical survey incorporated; additional comments incorporated
6	D	14/08/2015	HDD works at Noss Head and geophysical/geotechnical (borehole) surveys at Spey Bay information added
7	D	02/09/2015	Caithness HDD information added
8	D	18/09/2015	Information added to the offshore cable lay works section
9	D	26/09/2015	Comments addressed from ABB meeting on 22/09/2015
10	D	19/10/2015	Updated Cable Lay and Moray HDD work sections
11	E	30/11/2015	SHET Comments addressed
12	F	03/02/2016	SHET Comments addressed
13	G	10/02/2016	Section 4 updated to reflect additional boreholes
14	H	06/04/2016	Section 3 updated to reflect programme change; Section 4 updated to reflect additional boreholes.
15	J	10/05/2016	Portgordon, Moray HDD section updated
16	K	09/06/2016	SHET Comments addressed
17	L	16/08/2016	Portgordon, Moray HDD section added for – 3 m LAT HDD option
18	L	14/10/2016	Portgordon, Moray – 3 m to -6 m LAT sleeve pipe installation works
19	M	27/10/2016	Section 9: Portgordon, Moray – 3 m to -6 m LAT options updated with current method statement
20	N	03/11/2016	Section 5: Cable Lay Works updated with current methodologies
21	O	25/11/2016	Section 5: Cable lay Works updated with new geophysical equipment and additional vessel
22	P	15/12/2016	Section 5: Cable lay Works updated with new geophysical equipment and additional vessel
23	Q	01/02/2017	SHET Comments on Section 5 addressed in line with RRR accepted with comments status (Rev P)
24	Q	16/03/2017	SHET Comments on Section 8 and 9 addressed in line with RRR accepted with comments status (Rev Q)
25	R	14/06/2017	Addition of Section 8: Offshore Rock Placement Works

Issue	Revision (RRR)	Date	Revision Details
26	S	27/06/2017	9: Jet trenching section added.
27	T	28/06/2017	9.2: Reference to EPS Risk Assessment added.
28	T	05/07/2017	8.1.3: Updates to timings to reflect programme; 8.2: Reference to EPS Risk Assessment added.
29	U	20/07/2017	9.3.1: Mitigation zone set to 500m to reflect existing Licence.
30	U	11/08/2017	8.1.2: Use of crane barge and rock grab added for placing rock armour at Noss; 8.1.2 (footnote 10): Added.
31	V	25/08/2017	9.1.4: Text updated to reflect programme; Table 9.1: Detail of dates against tasks removed as subject to change.
32	W	21/11/2017	10: Work Planned for 2018 inserted section
33	X	28/11/2017	10.2 Estimated Duration Of Work Proposed To Be Undertaken in 2018 updated
34	Y	18/07/2018	Addition of section 11 for extension of works in 2018/2019 2: Update to Marine Mammal occurrence and cetacean legislation.
35	Z	23/07/2018	11.2 Durations of works updated
36	AA	26/07/2018	Section 2 and 11 updated as per client comments

Contents

1. Introduction

Scottish and Southern Energy's (SSE) transmission business, Scottish Hydro Electric Transmission plc (SHE Transmission) has been granted consent to install a High Voltage Direct Current (HVDC) cable interconnector between the Caithness and Moray coasts. This upgrade of the electricity transmission infrastructure will be required to export power from the expected increase in renewable energy generation in the north of Scotland and the Northern Isles to areas of electricity demand.

A Marine Licence has been granted by Marine Scotland for the subsea cable from Noss Head in Caithness to the now obsolete proposed Hub in the Moray Firth (licence number 04368/13/0). A second Marine Licence (04878/13/0) to cover activities occurring in the area between the now obsolete proposed Hub and Portgordon in the Spey Bay area on the Moray coast has been applied for and draft conditions have been issued. Both licences will include for horizontal directional drilling (HDD) and cable lay activities.

The aims of this document (the Marine Mammal Protection Plan, hereafter referred to as the MMPP) are to:

- Summarise marine mammal occurrence in the area, along with associated legislation;
- Describe the proposed activities associated with installation of the interconnector;
- Provide Marine Mammal Mitigation Plans (hereafter referred to as MMMPs) for the following activities:
  - Pre-lay geophysical survey
  - Geophysical and borehole surveys at Spey Bay to inform HDD works
  - Offshore cable lay works
  - HDD works at Noss Head, Caithness
  - HDD works at Portgordon, Moray
  - Offshore rock placement work
  - Offshore jet trenching work
- Provide Species Protection Plans (SPPs) for protected species; and
- Summarise the required outputs of any proposed mitigation work undertaken.

This MMPP document details all required mitigation to ensure the protection of marine mammal species during the works. All conditions detailed within the marine consents for the project, and within any associated licences, will be complied with.

2. Marine Mammal Occurrence within the Working Area

Four marine mammal species occur in the Moray Firth all year – bottlenose dolphin (*Tursiops truncatus*), harbour porpoise (*Phocoena phocoena*), grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*). A fifth species occurs in late summer – minke whale (*Balaenoptera acutorostrata*). Other species including short-beaked common dolphin (*Delphinus delphis*), Risso's dolphin (*Grampus griseus*), white-beaked dolphin (*Lagenorhynchus albirostris*), humpback whale (*Megaptera novaengliae*), killer whale (*Orcinus orca*) and long-finned pilot whale (*Globicephala melas*) occur on a more occasional basis.

Due to sightings with in the Moray Firth (but outside the works area) in 2017 and 2018 sperm whales (*Physeter macrocephalus*) and fin whales (*Balaenoptera physalus*) have been added to the possible species list as an occasional visitor.

Local Special Areas of Conservation (SACs) have been designated for bottlenose dolphin (Moray Firth SAC) and harbour seal (Dornoch Firth and Morrich More SAC). The Inner Hebrides and Minches SAC for harbour porpoise was approved by Scottish Ministers and submitted to the European Commission as a candidate site in September 2016. Five other harbour porpoise SACs were consulted on in 2016 were given Ministerial clearance and submitted to the European Commission for approval to designate on 30 January 2017. All six are outwith the Moray Firth; they are in the Hebrides, Welsh, Northern Irish, English and offshore waters. Even if additional SACs are proposed, the risk assessments undertaken in Section 5 of this document will still be appropriate. This is because they have been undertaken using a species-based approach (rather than an area-based approach).

Whilst not considered specifically in this assessment due to their low likelihood of occurrence, any assessment of, or mitigation measures put in place for, the species assessed are considered to be appropriate/relevant for other less commonly occurring species of cetacean in the Moray Firth. Such mitigation measures are also relevant for seals and basking sharks (*Cetorhinus maximus*), neither of which are EPS.

2.1. Legislation

2.1.1. Cetaceans

All species of cetacean in waters around the UK are considered EPS under Annex IV of Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (known as the **Habitats Directive**) which covers animal and plant species of community interest in need of strict protection.

The need to consider EPS in waters off Scotland comes from two articles of legislation:

- The Conservation of Habitats and Species Regulations 2017 (known as the **Habitats Regulations**) which transpose the Habitats Directive into national law. This legislation covers waters within the 12 nautical mile limit (known as territorial waters); and
- The Conservation of Offshore Marine Habitats and Species Regulations 2017 (known as the **Offshore Regulations**) which transpose the Habitat Directive into UK law for all offshore activities. This legislation covers UK waters beyond the 12 nautical mile limit.

Both of these Regulations provide for the designation and protection of European sites (in this case Special Areas of Conservation (SACs)) and the protection of EPS.

Both the Habitats Regulations 2017 (under regulation 43) and the Offshore Regulations 2017 (under regulation 45) state that it is an offence to:

- Deliberately capture, injure or kill any wild animal of a EPS;
- Damage or destroy, or do anything to cause the deterioration of, a breeding site or resting place of a EPS; and

- Deliberately disturb EPS (in particular any disturbance which is likely to impair their ability to survive, breed or reproduce, or rear or nurture their young, or which might affect significantly the local distribution or abundance of the species to which they belong).

Licences may be granted which would allow otherwise illegal activities to go ahead.

Three tests must be passed before such a license can be granted:

1. The license must relate to one of the purposes referred to in regulation 44 and 46 of the Habitats Regulations and Offshore Regulations respectively;
2. There must be no satisfactory alternative (regulation 44, 10a and 46, 8a of the Habitats Regulations and Offshore Regulations respectively); and
3. The action must not be detrimental to the maintenance of the population of the species concerned at a Favourable Conservation Status (FCS) in their natural range (regulation 44, 10b and 46, 8b of the Habitats Regulations and Offshore Regulations respectively).

Favourable Conservation Status (FCS) is defined in the Habitats Directive as the following:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable element of its natural habitats;
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis.

The proposed cable route and landfall locations are located both within and out with the 12 nautical mile limit of STW. Therefore, the proposed works have the potential to affect cetaceans within both Scottish Territorial and offshore waters. Both the Habitats and Offshore Regulations therefore apply.

2.1.2. Pinnipeds

Unlike cetaceans, pinnipeds are not listed on Annex IV of the Habitats Directive and are therefore not EPS. Both grey and harbour seal are however listed on Annex II of the Habitats Directive (animal and plant species of community interest whose conservation requires the designation of SACs).

Designated in 2005, the Dornoch Firth and Morrich More SAC, which lists harbour seal as a qualifying interest feature, is approximately 52 km from the proposed works.

The conservation objectives for the SAC are as follows:

- To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving FCS for each of the qualifying features; and
- To ensure for the qualifying species that the following are established then maintained in the long term:
  - Population of the species as a viable component of the site;
  - Distribution of the species within the site;
  - Distribution and extent of habitats supporting the species;
  - Structure, function and supporting processes of habitats supporting the species; and
  - No significant disturbance of the species.

Grey and harbour seals are also listed on Annex V of the Habitats Directive (animal and plant species of community interest whose taking in the wild and exploitation may be the subject of management measures).

In 2010, harbour and grey seals were afforded protection in Scotland under the Marine (Scotland) Act 2010 which provided a new licence system for disturbing or killing seals. Under this Act, it is now an offence to kill or take any

seals at any time, unless under a licence issued by Marine Scotland. It is also an offence to “intentionally or recklessly harass” seals at significant haul-out sites identified under the Protection of Seals (Designation of Haul-out Sites) (Scotland) Order 2014.

In addition, harbour and grey seals are UK Biodiversity Action Plan priority species and are classed as Priority Marine Features under the Scottish Nature Conservation Strategy.

3. Pre-lay Geophysical Survey

3.1. Methodology

Geophysical surveys are executed using remote sensing equipment that is either installed on the hull of the survey vessel or towed below the vessel but above the sea bed. A 'picture' is built up of the seabed geophysical conditions using sound signal production and reception as a means of physical characterisation, as the vessel transits across the survey route. The geophysical surveys will be conducted to verify the seabed topography and to mitigate for unexploded ordinance (UXO). Surveys will be conducted where water depth is three metres or greater.

A Geophysical & UXO survey of the cable corridor, the omega joint area (located at KP 56.662) and the backfill trial area at KP 83.5 to KP 84 will be carried out. In addition, in order to ensure survey equipment is set up correctly prior to survey, patch tests will need to be carried out during mobilisation of the vessels to the start of the survey corridor, including a Surrogate Item Trial (SIT) to test the UXO survey equipment, specifically the Transverse Gradiometer (TVG) and the side scan sonar (SSS).

The offshore geophysical survey will be performed with a hull-mounted multi beam echo sounder installed on the vessel and a remotely operated towed vehicle (ROTV), Focus 2 (Edgetech 4200 sonar). The ROTV will be equipped with side scan sonar and sub bottom profiler. A transverse gradiometer will be towed behind the ROTV for the UXO survey. The UXO survey will be performed using a two field sensor setup, with a fixed lateral separation. The system comprises of a transverse gradiometer set up with two Geometrics G882 magnetometers set 1.5 m apart. Line spacing between the transverse gradiometer lines will be 5m.

The nearshore geophysical survey will be performed with a hull-mounted multi beam echo sounder, a hull-mounted side scan sonar and sub bottom profiler installed on the vessel. A Geometrics G-882 Magnetometer system will be towed behind the vessel.

Based on results from the pre-lay survey, objects defined as possible UXOs will be inspected visually by a remotely operated vehicle (ROV). Duration of the ROV inspections will be dependent on the results from the pre-lay UXO survey.

The survey operation requires the vessel to continue at a fixed speed of approximately 4 knots in order to maintain consistent seabed coverage. Wind speeds in excess of Beaufort Force 5 will normally prevent surveying.

It is assumed that the inshore and offshore surveys may be conducted concurrently , resulting in a maximum of up to two geophysical survey vessels being in operation at once.

3.1.1. Vessels

Vessels currently proposed for the geophysical surveys are:

- M/V Franklin; and
- M/V Seabeam.

The M/V Franklin is proposed to be used for the offshore geophysical survey component, while the M/V Seabeam is proposed for the inshore geophysical surveys at Portgordon and Noss Head.

The survey equipment for each of the proposed vessels is provided below (Table 3.1).

Table 3.1: Vessel specifications of geophysical equipment for proposed surveys

Category	Use	M/V Franklin	M/V Seabeam
Side Scan Sonar	Determines depth and nature of seabed by transmitting sound pulses into water (active sonar).	Edgetech 4200MP Side Scan 300/600kHz with a range of 100 m	Edgetech 4200MP Side Scan 300/600kHz with a range of 100 m

Category	Use	M/V Franklin	M/V Seabeam
	Creates an image of large areas of sea bed.		
Multi Beam Echo Sounder	Determines depth and nature of seabed by transmitting sound pulses into water (active sonar). Transmits a broad acoustic pulse.	Kongsberg EM2040D multi beam echo sounder. System frequency 200-400 kHz	EM 2040Q multi beam echo sounder. System frequency 200 – 400 kHz
Sub Bottom Profiler	Identifies and measures sediment layers below the sediment/water interface. An acoustic signal is emitted vertically down and reflected of seabed.	Edgetech DW 106 with output frequencies of 1 – 10 kHz	Knudsen with output frequencies of 3.5 – 15 kHz
Magnetometer/Transverse Gradiometer (TGV)	Detection and mapping of all sizes of ferrous objects and magnetic fields. Used during UXO survey.	No sound emitted	No sound emitted

3.1.2. Timing of activities

Mobilisation of the offshore survey vessel (*M/V Franklin*) from Peterhead is scheduled to commence on March 14th 2016 with offshore operations anticipated to take 16 days (excluding downtime).

Mobilisation of the nearshore survey vessel (*M/V Seabeam*) from Buckie is scheduled to commence on March 28th 2016 with nearshore operations anticipated to take 12.5 days (excluding downtime).

It is planned that the offshore survey will be carried out 24 hours per day and the nearshore survey will be carried out 12 hours per day.

3.2. Summary of Risk Assessment

The 'Caithness to Moray Offshore HVDC pre-lay geophysical survey EPS Risk Assessment' concluded that the geophysical surveys, particularly the operation of the sub bottom profiler, had the potential to disturb marine mammals. The disturbance level predicted constitutes a 'trivial disturbance' as defined by the Joint Nature Conservation Committee (JNCC) *et al*. (2010) guidance document, and thus the pre-lay geophysical survey will not require a derogation licence to disturb EPS in UK waters if the mitigation plans described below are carried out. The regulations that govern EPS disturbance within STW (Marine Scotland, 2014) are more precautionary than those of UK waters, as they also provide an offence to "*deliberately or recklessly disturb* ***any*** *dolphin, porpoise or whale (cetacean)*". As a consequence, disturbance that might be considered 'trivial' through consideration of the JNCC guidance (JNCC *et al*., 2010) may require a licence to disturb EPS species within STW.

The Seal Risk Assessment undertaken for the proposed geophysical pre-lay survey concluded that it was highly unlikely that the proposed works would affect seals (grey or harbour) within the Moray Firth. This assessment took into account the most recent (February 2015) advice from the SNCBs on risk of corkscrew seal injuries (which replaces all previous guidance) which states that "it is considered very likely that the use of vessels with ducted propellers may not pose any increased risk to seals over and above normal shipping activities and therefore mitigation measures and monitoring may not be necessary in this regard, although all possible care should be taken in the vicinity of major seal breeding and haul-out sites to avoid collisions". There are no major seal haul-out sites in the vicinity of either end of the proposed pre-lay survey route and the timing of the proposed pre-lay survey

does not coincide with either the harbour seal or the grey seal breeding season. As such no additional seal mitigation is required.

The predicted underwater noise impacts from sub-bottom profiling activities are shown in Table 3.2 below.

Table 3.2: Predicted M-weighted SEL and dB_{ht}(*Species*) impact ranges from sub-bottom profiling activities. As a worst case an estimated unweighted source level of 200 dB re 1 µPa @ 1 m was used

Marine mammal group	M-weighted SEL ranges out to which auditory injury is expected (m)		Marine mammal species	Predicted dB_{ht}(*Species*) impact ranges (m)	
	Fleeing animal	Stationary animal		90 dB_{ht}[1]	75 dB_{ht}[2]
Low-frequency cetaceans (198 dB re 1 μPa^2s)	<1	20	Minke whale	330	1,800
Mid-frequency cetaceans (198 dB re 1 μPa^2s)	<1	6	Bottlenose dolphin	82	630
High-frequency cetaceans (198 dB re 1 μPa^2s)	<1	3	Harbour porpoise	190	1,300
Pinnipeds in water (186 dB re 1 μPa^2s)	<1	180	Harbour seal	63	480

Source: Barham et al. (2014)

3.3. Marine Mammal Mitigation Plan

The following MMMP is proposed for the pre-lay geophysical survey in order to minimise the potential for impacts on marine mammals occurring in the area. It is applicable to all marine mammal species occurring in the Moray Firth. All site staff will receive an induction including relevant toolbox talks. Details of emergency contacts relevant to marine mammal protection will also be incorporated into the emergency response plans of Project vessels carrying out the survey work.

In addition to the activity specific mitigation proposed below, the following general measures will be adhered to:

- A nominated competent observer on the bridge of all vessels will keep watch for marine mammals and basking sharks during transit to and from the work sites. Any sightings will be communicated to the Master of the vessel and the following actions, as per the Scottish Marine Wildlife Watching Code, implemented:
  - The Master of the vessel will ensure that marine mammals and basking sharks are avoided to a safe distance (100 m or more) in all possible circumstances; and
  - The Master of the vessel will minimise high powered manoeuvres where this does not impair safety.

JNCC has written a series of best practice guidance documents for offshore activities including those for seismic surveys, hammer piling and use of explosives. It is considered that adherence to the measures outlined in these guidance documents constitutes best practice and will minimise the risk of causing injury or disturbance to marine mammals.

[1] A strong avoidance reaction is predicted by virtually all individuals

[2] Some avoidance reaction is predicted by the majority of individuals, but habituation or context may limit effect (in the presence of another biological imperative (such as migration to breeding or feeding grounds or avoiding a predator) individuals may not exhibit any behavioural reaction to the noise source)

The JNCC guidance for minimising the risk of injury and disturbance to marine mammals from seismic surveys is clearly applicable for geophysical surveys such as this one (seismic surveys are one form of geophysical survey).

According to the JNCC guidance (see http://jncc.defra.gov.uk/marine/seismic_survey) the operator should whenever possible implement the following best practice measures:

- If marine mammals are likely to be in the area, only commence seismic activities during the hours of daylight when visual mitigation using Marine Mammal Observers (MMOs) is possible;
- Only commence seismic activities during the hours of darkness, or low visibility, or during periods when the sea state is not conducive to visual mitigation, if a Passive Acoustic Monitoring (PAM) system is in use to detect marine mammals likely to be in the area, noting the limitations of available PAM technology (seismic surveys that commence during periods of darkness, or low visibility, or during periods when the observation conditions are not conducive to visual mitigation, could pose a risk of committing an injury offence under the EPS legislation described above);
- Plan surveys so that the timing will reduce the likelihood of encounters with marine mammals. For example, this might be an important consideration in certain areas/times, e.g. during seal pupping periods near SACs for common seals or grey seals;
- Provide trained MMOs to implement the JNCC guidance;
- Use the lowest practicable power levels to achieve the geophysical objectives of the survey; and
- Seek methods to reduce and/or baffle unnecessary high frequency noise produced by the airguns (this would also be relevant for other acoustic energy sources).

ABB AB intends to implement the guidance and employ the following mitigation in order to negate the possibility of inducing auditory injury (from use of the sub bottom profiler, side scan sonar or multi beam echo sounder) and reduce the potential for disturbance to marine mammals:

- Use at least one MMO who is experienced (because the Moray Firth is an important area for marine mammals) and trained to undertake observations. Two observers are recommended because daylight will exceed 12 hours per day at this latitude and time of year;
- Conduct visual pre-survey searches (commencing 30 minutes before the soft start period) to determine if any marine mammals are within the mitigation zone (defined as within 500 m of the sound source). While acknowledging that cetaceans may show some avoidance reaction to operation of the sub bottom profiler at distances greater than 500 m from the sound source (predicted 75 dB_{ht}(*Species*) impact ranges presented in Table 3.2), areas at greater distances cannot always be effectively searched using either visual or passive acoustic techniques;
- Use PAM to conduct pre-survey searches ahead of works commencing during the hours of darkness, low visibility or high sea state i.e. when visual pre-survey searches are not possible[3];
- Maintain Sufficient coverage of MMO and or PAM operators to facilitate 24 hour operations as required;
- Delay if marine mammals are detected within the mitigation zone. There should be a 20 minute delay from the time of the last sighting; and
- Conduct a soft start when using the sub bottom profiler (where the sound pressure level (intensity) and/or the 'firing frequency' (how often pings are made) is built up gradually).

[3] An array, rather than a single hydrophone, will be used in order to have the ability to detect individuals belonging to the different hearing groups (mid frequency cetaceans i.e. the dolphin species and high frequency cetaceans i.e. harbour porpoise). The ability to localise will not be required because it is the distance from the noise source that is of interest, not the exact position of the individual within the mitigation zone.

4. Geophysical and Geotechnical (Borehole) Surveys at Spey Bay to inform HDD Works

Integral to the HDD works at Portgordon, SSE and ABB (along with their specialist subcontractor LMR Drilling) will be undertaking standard site investigation surveys from 350 m to 2000 m offshore in order to assess the geophysical and environmental conditions and mitigate for the risk posed by a lack of information on the ground conditions in the area. Already to date, ABB have carried out satellite surveys, sought information from the British Geological Survey and other geological resources in order to better establish the conditions in which the works are to be carried out.

The site investigation surveys to be undertaken as part of the HDD campaign at Portgordon are:

- carry out a geophysical and bathymetric survey to establish the physical conditions present at/just below the seabed; and
- carry out borehole works at the pop-out location and along the length of any potential drill.

Both operations seek to hugely reduce the environmental risk profile of the main works that could be expected if the works were designed and constructed without more precise knowledge of the ground conditions. These proposed site investigation works will not only allow the optimum construction processes to be determined (reducing the risk of delays when on site and thus the minimising time required for HDD operations) but will also allow the optimal pop-out locations to be identified (minimising the risk of uncontrolled frac-outs during drilling). Undertaking the geophysical survey prior to boreholes will enable the boreholes to be properly targeted.

4.1. Methodology

4.1.1. Geophysical survey

The geophysical survey will be executed using remote sensing equipment that is either installed on the hull of the survey vessel or towed below the vessel but above the sea bed. A 'picture' is built up of the seabed geophysical conditions using sound signal production and reception as a means of physical characterisation, as the vessel transits across the survey route. The geophysical surveys will be conducted to verify the seabed topography and to mitigate for UXO.

The survey corridor is approximately 200 m wide and from 2000 m from MHWS to as close to shore as water depth will permit. The survey works will be restricted to a maximum sea state of 5, or 2 m swells. Works are expected to take 4days (October to December 2015) to complete (daylight working hours only and including weather downtime).

One vessel, the M/V Marine Sensor, is expected to be required in order to complete the geophysical survey. The vessel will be based in Buckie Harbour (2.5 km from the survey area) and will return there each night.

The geophysical survey will be performed using the following equipment:

- A hull-mounted multi beam echo sounder, R2Sonic 2022 (system frequency 200 – 400 kHz, source level of 191 – 221 dB). Before the multi beam echo sounder is used a patch test will be conducted to calibrate and determine the following errors:
  - Latency;
  - Pitch Offset;
  - Roll Offset; and
  - Heading Offset.
- A surface towed boomer system, Applied Acoustics AA201 (system frequency of 20 Hz – 10 kHz, anticipated source level of 45 dB, maximum source level 212 dB re 1 µPa @ 1m). The surface towed boomer system (sub bottom profiler) will use a soft start procedure over a period of 15 – 30 minutes until the operational level is

reached. Soft start will be achieved by increasing the pulse rate, starting at 1 pulse per second and increasing to 4 pulses per second before commencement of works.

4.1.2. Geotechnical (borehole) survey

The purpose of the marine borehole survey investigation is to confirm ground conditions in order to aid the design of the HDD landfall route in Spey Bay. The geotechnical survey will require the use of a jack-up barge (Fugro's Skate 3) for the borehole drilling and a tug for the mobilisation, movement between boreholes, and demobilisation of the jack-up barge. The tug will likely wait in port until the jack-up barge needs to be moved. It will also top up its supplies and offload the cores taken. The Jack up barge's RIB will be used for crew transfers.

The borehole operations will be conducted 24 hours a day (2 x 12 hour shifts) between October 2015 and February 2016 and are subject to weather conditions.

Initially it was expected that 6 boreholes would be sufficient to complete the investigation works, however an additional 3 boreholes have been subsequently added to the scope. Therefore 9 boreholes are expected to be drilled over the course of the survey.

Jack-up barge movements are anticipated to be restricted to slack tides only. The survey corridor is approximately 200 m wide and from 2000 m from MHWS to as close to shore as water depth will permit. Marine borehole works will include:

- Drilling – Cable Percussion – a borehole will be drilled by lowering and raising a variety of tools of various diameters up and down the boring in a wireline. Boreholes will be drilled down to approximately 30 metres, or to the rockhead.
  - Standard Penetration Test (SPT) testing procedure – a split-spoon sampler will be lowered into the borehole with rods attached to the top of the sampler. Once the split-spoon sampler has reached the bottom a trip hammer is attached to the top rod and will strike the rod until the split-spoon sampler has reached the required depth; and
  - 'Undisturbed' Open Drive Sampling – U100 – a drive sampler is lowered into the borehole and with the aid of the winch wire (through rising and lowering) the sampler is driven into the ground to collect the borehole sample.

After drilling works are complete, backfilling of the boreholes will be completed with cement mixed on board and pumped into the borehole.

4.2. Summary of Risk Assessment

The main areas of concern throughout the entirety of the works (geophysical and geotechnical) in terms of potential for impact on marine mammals were:

- Increased anthropogenic noise from:
  - Geophysical survey equipment;
  - The geotechnical surveys; and
  - Vessels.
- Collision with vessels.

Assessment of the potential for impact from activities associated with the geophysical and geotechnical surveys (bulleted above) concluded that the potential to impact cetacean EPS was minor. Any displacement is likely to be short term and very localised (i.e. within the immediate vicinity of the geophysical or geotechnical works). Proposed mitigation (in the form of pre-work surveys (visual or acoustic), soft starts, and nominated observers on all vessels who will keep watch for marine mammals including cetacean EPS during transit to and from work sites; see section 4.3) will further reduce any potential impacts to negligible levels.

Although seals are not required to be considered as part of EPS risk assessments (because they are not EPS), they have been considered (in relation to the potential for corkscrew seal injuries) because the geophysical and

geotechnical (borehole) surveys at Spey Bay are coastal. The seal risk assessment concluded that, because there were no major or designated seal breeding or haul-out sites in the vicinity of Portgordon (the closest being located at the mouth of the River Findhorn, outside Findhorn Bay), it was highly unlikely that the proposed works would affect either species of seal occurring in the Moray Firth. However, a nominated competent observer on each vessel will keep watch for marine mammals (including seals) and basking sharks during transit to and from the work site. Any sightings will be communicated to the Master of the vessel as soon as is practicable who will adhere to the Scottish Marine Wildlife Watching Code (see section 4.3).

4.3. Marine Mammal Mitigation Plan

The following MMMP is proposed for the geophysical and geotechnical surveys at Spey Bay in order to minimise the potential for impacts on marine mammals occurring in the area. It is applicable to all marine mammal species occurring in the Moray Firth.

The JNCC, in association with DEFRA and the country agencies, has produced guidance on the protection of EPS from injury and disturbance, most recently the “Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from seismic noise” (August, 2010). The mitigation methods proposed here are based on these recommendations. Although geotechnical surveys are not seismic surveys, these measures will be adopted due to the potential for disturbance from drilling noise.

It is considered that adherence to the measures outlined in these guidelines constitutes best practice and will minimise the risk of causing injury or disturbance to marine mammals.

All site staff will receive an induction including relevant toolbox talks.

4.4. Pre-work survey

The mitigation measures outlined in this guidance include the presence of at least one experienced (minimum of 30 days experience of observing the species likely to be encountered in the area) and competent marine mammal observer (MMO) conducting visual surveys prior to commencing geophysical or geotechnical surveys, and to advise crew of the presence of marine mammals.

The radius of the mitigation zone will be defined after consultation, but will be no less than 500 m radius from the survey location. The pre-work survey is to be conducted for 30 minutes prior to beginning operations. The MMO will survey the surrounding area and notify the crew if any marine mammals occur within the mitigation zone. The area will be surveyed primarily using the naked eye, with binoculars being used to confirm presence and identification. A range-finder or similar can be used to estimate distance. If a marine mammal is observed within 500 m of the vessel during a 20 minute period prior to commencing survey, the start of the survey will be delayed until the animal has not been sighted for 20 minutes within the 500 m zone. Any MMO will have received formal training from a JNCC approved course and will have minimum of 30 days of experience of observing the species likely to be encountered in the area. The MMO will be given sufficient breaks or a rotation will be in place, if there is more than one MMO on board, to ensure observer fatigue is minimised.

Observations will be carried out from the noise source vessel, or a vessel in the immediate vicinity, and will be positioned to allow as unobstructed a view as possible. Clear channels of communication will be in place prior to commencing MMO duties in order that should a cetacean EPS be observed during the pre-start survey period, effective and rapid transmittal of information between relevant parties can take place. The MMO would be aware of the timing of the proposed operations so they can ensure they are in place at the appropriate times. The MMO will be equipped with binoculars, a copy of the mitigation methods and recording forms.

If work is to start in low visibility conditions or at night when standard observer surveys would not be effective mitigation, a PAM system will be used instead. In addition, concurrent visual and passive acoustic pre-work surveys will be conducted prior to survey work involving use of the sub-bottom profiler within 3 km of the coast at Spey Bay. Any PAM surveys would be undertaken by a suitably qualified and experienced operator ahead of works commencing. The operator will have a minimum of 30 days of experience in using the equipment to be

deployed. PAM will be used during the hours of darkness, low visibility or high sea state. It should however be noted that:

- PAM is not as accurate as visual observation for determining range, therefore works may be delayed unnecessarily because it may not be possible to determine whether animals detected are within or out with the mitigation zone.
- Of the marine mammal species likely to be present in the area at this time of year (harbour porpoises, a small number of dolphin species, minke whales, harbour seals, and grey seals), PAM will not detect minke whales, harbour seals or grey seals.
- Of the species it can detect, PAM will only detect individuals which are vocalising directly towards hydrophones, that are sufficiently loud and close, and where background noise is minimal (Todd *et al.,* 2015). It may not detect individuals which are present (even in the mitigation zone).

During any PAM, an array, rather than a single hydrophone, will be used in order to have the ability to detect individuals belonging to the different hearing groups (mid frequency cetaceans i.e. the dolphin species and high frequency cetaceans i.e. harbour porpoise). The ability to localise will not be required because it is the distance from the noise source that is of interest, not the exact position of the individual within the mitigation zone. The pre-work PAM survey will be conducted for 30 minutes prior to beginning operations. The PAM operator will notify the relevant parties if any marine mammals are detected. If a marine mammal is detected, the start of the works will be delayed until the animal has not been detected for 20 minutes.

Sufficient coverage of MMOs and or PAM operators will be maintained to facilitate 24 hour operations where required.

4.5. Soft-Start

The surface towed boomer system will use a ‘soft start’ procedure over a period of 15 – 30 minutes until operational level is reached. The soft start will be achieved by increasing the pulse rate from 1 pulse per second, up to 4 pulses per second before commencement of works.

If a marine mammal is observed / detected within the mitigation zone (500 m), the soft-start will be delayed until the animal has not been sighted / detected for 20 minutes within the mitigation zone. If a marine mammal enters the mitigation during the soft start the geophysical survey would cease or at least power will not increase until the animal has not been detected for 20 minutes.

If the animal can still be observed, but is outside the mitigation zone, surveys will commence with its presence noted on the records. If an animal is observed within the mitigation zone after the operations have begun, there is no requirement to stop operating as disturbance is not occurring.

4.6. Additional Measures

In addition to the mitigation proposed above, the following measures will be adhered to:

- A nominated competent observer on the bridge of all vessels will keep watch for marine mammals and basking sharks during transit to and from the work sites. Any sightings will be communicated to the Master of the vessel as soon as is practicable and the following actions, as per the Scottish Marine Wildlife Watching Code, implemented:
  - The Master of the vessel will ensure that marine mammals and basking sharks are avoided to a safe distance (100 m or more) in all possible circumstances; and
  - The Master of the vessel will minimise high powered manoeuvres where this does not impair safety.

The nominated competent observer will receive training from the MMO during toolbox talks prior to commencement of works and transit.

5. Offshore Cable Lay Works

The activities predicted to be undertaken as part of the Caithness to Moray HVDC Link offshore cable lay works from Caithness to Moray are:

- Route clearance in preparation for cable trenching;
- Trenching of the cable route;
- Cable laying;
- Backfill cable trench; and
- Rock placement over areas of exposed cable where burial is not possible.

The following sections set out the methods, impacts on cetacean EPS, and proposed mitigation to be implemented during the subsea cable lay works. In addition to this MMPP, a full EPS Risk Assessment has been undertaken on the procedures and equipment to be used for the work, and an EPS Licence application has been submitted.

5.1. Methodology

Summary details of the proposed cable installation methodology for the Caithness Moray HVDC project are as follows. Methodologies are subject to change if required following the application of Reasonable Endeavours.

5.1.1. Route Preparation

Route clearance is anticipated to start from -6 m Lowest Astronomical Tide (LAT) at Portgordon and continue to the start of the horse mussel bed (-100 m) at Noss Head.

The route preparation operations will be undertaken using an Anchor Handling Tug Supply (AHTS) vessel with a SCAR plough to clear a minimum of a 10 m wide corridor along the entire cable route. Route clearance will not be completed over environmentally constrained areas (i.e. the horse mussel bed at Noss Head).

The use of a work class Remotely Operated Vehicle (ROV) will be used to during the route preparation operations to:

- Monitor the launching, towing, and recovered of the SCAR plough system;
- Investigate targets or obstructions on the seabed in the path of the SCAR plough;
- Complete seabed surveys; and
- Assist with contingency operations.

During open water operations (> 15 m LAT) for route clearance operations, one AHTS vessel will be required for operations. In nearshore waters (< 15 m LAT) a shallow draft vessel (multicat) will also be used to assist with route clearance operations (positioning of the SCAR plough at the starting location, USBL monitoring the SCAR plough, and post route preparation surveys).

If required (and permitted), a mulitcat mounted crane may be used for remedial clearance work post route preparation to grab and move boulders from the proposed route.

The work will require the use of a Multi Beam Echo Sounder (MBES) system for post-work surveys, Ultra Short Baseline (USBL) positioning systems and positioning transponders (to monitor positioning of the SCAR plough and ROV), a Doppler Velocity Log (DVL) for positioning and navigation, and Object Avoidance Sonar (OAS) to monitor progress during the works. A detailed description of the geophysical equipment is presented in Section 5.1.6.

A Post Route Preparation/Pre-trenching MBES survey will be conducted.

5.1.2. Trenching

The trenching operations will be undertaken using an AHTS vessel. A trench will be excavated over the whole cable route (with the exception of environmentally constrained areas e.g. the horse mussel bed at Noss Head) using the SCAR plough.

A work class ROV will be used during the trenching operations to:

- Monitor the launching, towing, and recovered of the SCAR plough system;
- Investigate targets or obstructions on the seabed in the path of the SCAR plough;
- Complete seabed surveys; and
- Assist with contingency operations.

It is anticipated that two passes will be required to achieve the required trench depth, each of which will be completed in two stages. One stage will start at the Portgordon landfall and run to the jointing location at Kilometre Point (KP) 56.7 km. The other stage will start at the Noss Head landfall and finish at the same jointing location.

During trenching operations in nearshore waters (<15 m LAT), an additional shallow draft vessel (multicat) will be utilised to assist with the works (to pick up and relocate the SCAR plough, to monitor positioning via USBL, and to undertake post trenching survey work in the nearshore area). The AHTS vessel will then begin to pull the SCAR plough, with the assistance of the multicat if required. Positioning beacons will be located on the SCAR plough. If a second pass is required within nearshore waters (< 15 m LAT) then the method will follow that described for the first pass.

Post-trench surveys will be conducted after each trenching pass to determine the depth and shape of, and the changes to, seabed topography in relation to the post-route clearance survey. A final post-trench survey will be conducted after all trenching activities have been completed to determine the final depth and profile of the trench.

The work will require the use of an MBES system for post-work surveys, USBL positioning systems and positioning transponders to monitor positioning of the SCAR plough and ROV, a DVL for positioning and navigation, and OAS to monitor progress during the works. A detailed description of the geophysical equipment is presented in Section 5.1.6.

5.1.3. Cable Laying

The following activities, which together form the whole of the cable laying operations, are described separately below:

- Cable pull in at landfall locations;
- Cable lay operations; and
- Cable handling at Omega joint.

5.1.3.1. Cable Pull In at Landfall Locations

The cable pull in operation will require the use of one cable lay vessel (CLV). Dynamic positioning (DP) trials will be conducted before the cable pull in operations are conducted. The cable pull in procedure[4] includes the following tasks and will utilise an ROV for the duration of the operations. The CLV will position itself as near to the Horizontal Directional Drill (HDD) pop out location as water depth and cable parameters allow.

[4] Methods outlined are for the cable pull in at Noss Head, however it has been assumed similar methods will be used for Portgordon. Pull in operations at Portgordon may require additional vessels and diver/ROV support to aid float in due to water depth and the resulting distance the cable lay vessel will be from the HDD entrances.

Recovery of the shore winch wire

The ROV will be deployed and used for survey and recovery of the cable. The ROV will conduct a survey of the HDD entrances and the HDD bellmouth. After the HDD entrances and bellmouths have been surveyed, the crane hook will be guided by an ROV and a cable catenary wire towards one of the HDD entrances.

The bell mouth and shore winch wire at the HDD entrance will be lifted back up onto the vessel's deck. Once the shore winch wire has been recovered to the deck it will be attached to one of the (HVDC or fibre optic) cables for pull in operations into the HDD entrance and to the landfall location.

The above methods will be used to recover the shore winch wires and bell mouths from the remaining two HDD entrances.

HVDC and Fibre Optic cable pull in

Simultaneously, the cable will be paid out from the CLV while the shore winch wire will be paying in. The ROV will monitor the pull in operations at the HDD entrance and bell mouth. The landfall team will inform the vessel team when 30 m, 20 m, and 10 m of the shore winch wire has been paid on shore. Once the correct length of the cable has been paid out and retrieved onshore, the landfall team will inform the vessel team to stop paying out the cable. This will be repeated for subsequent cables.

After the cables have been pulled in successfully to the landfall location, the ROV will complete an 'as laid' survey to inspect the three cables laid before the bundled cable laying for the offshore cable laying operations begin.

5.1.3.2. Cable Lay Operations

Cable lay operations will be split into two campaigns utilising one CLV.

The first campaign will start at either the Portgordon or the Noss Head landfall location[5] and work to c. KP 56.7 (the jointing location). An ROV[6] will be deployed to monitor the touchdown of the cables being laid into the trench. Cables (two HVDC and one fibre optic) will be laid in a bundle into the pre-cut trench. A final ROV inspection survey will be completed of the cable ends on the seabed once the first cable laying campaign has finished.

The second campaign of cable laying will be completed using the same methodology as the first cable lay campaign, except that it will start from the opposite landfall.

Within the cable route is a Marine Protected Area (MPA), designated for horse mussel beds, from KP 110.339 to KP 111.334 (c. 995 meters). During cable lay operations over this portion of the route cable protection sleeves will be added onto the cables with 120 m overlap of the MPA edge.

5.1.3.3. Cable Handling at Omega Joint

Cable joining at the junction joint (c. KP 56.7) will be conducted when the second cable laying campaign has been completed. The cable joining operations will require the use of one vessel. The cable joining operation will include the following:

Cable recovery

Once deck preparations have been completed, the vessel will position itself (if not already positioned) above the cable ends using DP. An ROV will be deployed and will perform an 'as-found' survey[7]. The ROV will then attach winches to the two cables on the seabed. After both cables have been confirmed to be attached to the winches by the ROV, recovery of both cable ends will be completed recovering the cable to the vessel deck.

[5] Order of campaigns is yet to be finalised.

[6] The ROV will be equipped with MBES, OAS, and USBL positioning beacons.

[7] Survey to check that everything on the seabed is as it should be (i.e. cable in correct position within the trench).

Overboarding joint and quadrant

Once the cable ends have been joined together, the cable joint and quadrant[8] will be prepared for overboarding. The joint will be attached to the crane via the quadrant and will then be lifted up and overboarded from the vessel. The deployed ROV will monitor the lowering of the cable joint and quadrant by the crane. Once the joint and quadrant have reached the seabed, the ROV will complete a survey to assess position of the joint and quadrant, and if necessary repositioning will be conducted.

Quadrant tripping and retrieval

After the overboarding and laydown of the cable joint has been completed, the quadrant will be removed from the cable and retrieved back onto the vessel deck. The ROV will prepare the quadrant for retrieval by cutting all straps which are holding the cable into the quadrant. The main crane will begin to lift out the quadrant with the ROV monitoring progress. Once the quadrant has been secured on the vessel deck, the ROV will conduct a final inspection of the cable joint and junction location.

5.1.4. Backfill

Prior to commencing backfill operations a post-lay MBES survey may be undertaken and the survey data reviewed to determine the installed cable position.

Backfill operations will be conducted from the AHTS vessel undertaking detailed geophysical surveys of the route. The mechanical backfill will use the SCAR plough which will be used in backfill mode and will return the trenching excavation materials from along the cable route to over the exposed cable to provide suitable cover. Backfill will not be conducted over environmentally constrained areas (e.g. the horse mussel bed at Noss Head).

A work class ROV will be used during the backfill operations to:

- Monitor the launching, towing, and recovery of the SCAR plough system;
- Investigate targets or obstructions on the seabed in the path of the SCAR plough;
- Complete seabed surveys; and
- Assist with contingency operations.

During the nearshore (<15 m LAT) backfill, up to two passes are anticipated to be needed. A multicat vessel is anticipated to be required to support the positioning and towing of the SCAR plough by the AHTS vessel. The multicat will use USBL positioning to monitor the progress of the SCAR plough during the operations. It is anticipated that only one pass will be required to complete the backfill operations >15 m LAT.

Surveys will be performed as soon as possible after backfill has been completed over any section of the cable route; this is to allow the release of the guard vessels and to open up the area for marine users.

The work will require the use of an MBES system for post-work surveys, USBL positioning systems and positioning transponders to monitor positioning of the SCAR plough and ROV, a DVL for positioning and navigation, and OAS to monitor progress during the works. A detailed description of the geophysical equipment is presented in Section 5.1.6.

5.1.5. Rock Placement

Detailed methodology for rock placement is not currently available. Therefore, rock placement activities will be assessed in a separate EPS risk assessment when sufficient information is available.

[8] Used to support the cable bend while being lifted by the crane to be over boarded. The quadrant will be removed once touchdown has been completed.

5.1.6. Use of Geophysical Survey Equipment to Monitor Installation

During the above described works, geophysical survey equipment will be utilised to survey the route, to monitor the progress of the work, and for positioning of any ROVs or other underwater equipment needed to complete the works. Table 5.1 provides information on the potential geophysical survey equipment that may be used. It is recognised that this equipment specification list may change and any changes will be communicated to Marine Scotland as soon as that information is available, along with any resulting alterations to mitigation which may be required.

Table 5.1: Proposed geophysical survey equipment

Multicat			**AHTS / CLV**		
Equipment	Frequency (kHz)	Maximum Source Pressure Level (dB (rms) re 1 µPa @1 m)	Equipment	Frequency (kHz)	Source Pressure Level (dB (rms) re 1 µPa @1 m)
R2 Sonic 2024 MBES	200 to 450	221	R2 Sonic 2024 MBES (AHTS only)	200 to 450	221
IxSea GAPS USBL	19 to 30	191	Teldyne Reson Seabat MBES 7125 (CLV only)	400	220
IXBlue MT832 Transponder	8-16 or 20-30	192	Kongsberg HiPAP 501 - USBL	25.6 (21 – 31)	207
Tritech Gemini 720 OAS	720	198	Kongsberg cNode Mini 34-180 Transponder	21-31	190
			Blueview M450 OAS	>450	<207
			Teledyne Workhorse DVL	1200	217*

** Source pressure level is not known and has been anticipated from similar (closely related) systems*

The anticipated number of days where geophysical equipment will be used (at the vessel level) is detailed in Table 5.2 – with the number of days and vessel(s) required specified per activity. It should be noted that activities may not be undertaken in isolation, for example survey work may be undertaken for the whole route or for sections of the route as work is completed.

Table 5.2: Duration of Activities (excluding weather, transit, or other associated activities)

Activity	**Anticipated Total No. Days (excluding weather)***	**Vessel(s) Required**
Nearshore Route Preparation (< 15 m LAT)	2	Multicat and AHTS
Offshore Route Preparation	9.5	AHTS
Nearshore Post-Route Preparation Survey	1	Multicat
Offshore Post-Route Preparation Survey	4	AHTS
Nearshore Trenching Operations	5	Multicat and AHTS
Offshore Trenching Operations	17 (1st Pass) 23 (2nd Pass)	AHTS

Activity	Anticipated Total No. Days (excluding weather)*	Vessel(s) Required
Nearshore Post-Trenching Survey	1	Multicat
Offshore Post-Trenching Survey	4	AHTS
Cable Pull In at HDD Entrances	6 (3 days at each landfall site)	CLV
Cable Lay Operations	11 (1st Campaign) 12 (2nd Campaign)	CLV
Nearshore Pre-Backfill Survey	1	Multicat
Offshore Pre-Backfill Survey	4	CLV
Nearshore Backfill Operations (< 15 m LAT)	2	Multicat and AHTS
Offshore Backfill (> 15 m LAT)	13	AHTS
Nearshore Post-Backfill Survey	1	Multicat
Offshore Post-Backfill Survey	4	AHTS

** Maximum number of days not anticipated to exceed 150% of number of days listed, excluding weather.*

5.2. Proposed Vessels

Details of the vessels proposed for use during each cable laying activity and vessel details are provided below (Table 5.3).

Table 5.3: Vessel expected to be used for cable installation activities

Vessel	Use
Anchor Handling Tug Supply (AHTS) Vessel	Will be used to tow the scar plough during route clearance, trenching and backfill cable operations.
Shallow draft multicat vessel	Assist in launching and monitoring the scar plough until the water depth is suitable for the ROV. May be required to assist route clearance using boulder grab. May be required to assist pull in at Portgordon due to water depth.
Cable Lay Vessel (CLV)	Cable laying activities.
Guard vessels	Will be used for protection of insufficiently protected cables during cable lay activities, including: • each near shore section; • as required along the offshore cable route until adequately protected; and • at the offshore joint location.

5.3. Timing of activities

The cable laying operations have been scheduled to take place between February and September 2017. These dates include all aspects of the cable laying operation (excluding rock placement) including weather downtime, mobilisation and demobilisation. Table 5.4 details the anticipated dates and estimated total time required for each activity listed in section 5.2, including weather downtime and transit time for all activities.

Table 5.4: Anticipated activity timescales for cable laying operations (including weather downtime and transit time to and from site) – *all timings subject to change*.

Activity	Timescale	Total number of days
Route Clearance	3rd February 2017 – 23rd February 2017	21
Trenching	21st March 2017 – 22nd May 2017	63
Cable laying (Portgordon to Omega Joint)	14th May 2017 – 6th June 2017	24 (including cable pull in at Portgordon, cable lay)
Cable Laying (Noss Head to Omega Joint)	20th June 2017 to 22nd July 2017	33 (including cable float operations at Noss Head, cable laying, cable handling at junction point)
Backfill	31st July 2017 – 1st September 2017	33
Guard vessels	18th April 2017 – 30th November 2017	197*
* Potential number of days guard vessels will be needed for unprotected cable sections		

5.4. Summary of Risk Assessment

During the planned cable lay works for the Caithness to Moray cable route, there is the potential for some European Protected Species of cetacean to be impacted.

To determine potential impacts of the proposed cable lay works, the main activities associated with the works have been identified.

The main routes to impact are considered to be:

- Increased anthropogenic noise from geophysical survey systems operation;
- Increased anthropogenic noise from cable installation operation activities;
- Increased vessel noise; and
- Collision with vessels.

It is proposed that the cable installation construction activities for the Caithness to Moray HVDC cable interconnector will be carried out between February 2017 and November 2017 inclusive.

Cetaceans have been recorded within the Moray Firth all year round, with peak abundances for harbour porpoises from April to September. Bottlenose dolphins are resident within the Moray Firth and minke whales are present in the Moray Firth region from May until September. White-beaked dolphins and common dolphins are all usually observed during the summer months. It is possible, therefore, that all of these species will be present within the Moray Firth during at least some part of the proposed cable installation works.

Assessments against the potential for impact from cable installation activities, vessel noise from, and vessel collision with, the cable installation vessels, have all concluded a likely **negligible** impact to cetacean EPS:

- Following JNCC, Natural England (NE) and the Countryside Council for Wales (CCW) (JNCC *et al.*, 2010) guidance it can be concluded that cable installation activities are unlikely to result in the harassment, disturbing, injuring or killing of an EPS, as defined under regulations 39(1) (a) and (b) of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007.
- Following Marine Scotland and SNH guidance (2014) “The protection of Marine European Protected Species from injury and disturbance” (2014) for inshore waters (less than 12 nautical miles), there is negligible potential for the disturbance of animals as defined in regulations 39 (1) (a) and (b) and 39 (2) of the Conservation of Habitats and Species Regulations 1994 (as amended in Scotland), from cable installation activities.

Assessment against geophysical survey systems used during cable installation activities concluded that there is the potential for disturbance on cetacean EPS.

- Following JNCC, Natural England (NE) and the Countryside Council for Wales (CCW) (JNCC *et al.*, 2010) guidance it can be concluded that cable installation activities are unlikely to result in the harassment, disturbing, injuring or killing of an EPS, as defined under regulations 39(1) (a) and (b) of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007. It can also be concluded that operation of geophysical survey systems during cable installation operations can be considered 'trivial' and are unlikely to be detrimental to the maintenance of the population of the species concerned at a Favourable Conservation Status (FCS) in their natural range, as defined under regulations 39(1) (a) and (b) of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007.
- Following the 2014 Marine Scotland and SNH guidance (Marine Scotland and SNH, 2014) for territorial waters, there is the potential for disturbance of animals, as defined in regulations 39 (1) (a) and (b) and 39 (2) of the Conservation of Habitats and Species Regulations 1994 (as amended in Scotland), from the proposed cable installation activities from the operation and use of geophysical systems. Up to 86 harbour porpoises, four bottlenose dolphins, and seven minke whales have the potential to be disturbed during the operation of geophysical survey systems during cable installation works. This disturbance will not be sufficient to cause any population level effects, and thus it is considered that an EPS licence to disturb can be issued under section 39 of The Conservation (Natural Habitats, &c) Regulations 1994 (as amended in Scotland).

5.5. Marine Mammal Mitigation Plan

The following MMMP is proposed for the cable lay activities in order to minimise the potential for impacts on marine mammals occurring in the area. It is applicable to all marine mammal species occurring in the Moray Firth.

The disturbance level to marine mammals from cable installation operations, which include **route clearance**, **trenching**, **cable laying**, **cable pull in**, and **backfill** activities, have been predicted to constitute a 'trivial disturbance' as defined by JNCC *et al.* (2010). Trivial disturbances are defined as 'without any likely negative impact on the species such as those resulting in short-term behavioural reactions' therefore no mitigation will be required (for disturbance in UK waters). Although the regulations that govern EPS disturbance within STW (Marine Scotland, 2014) are more precautionary than those for UK waters (JNCC *et al*., 2010), the potential for disturbance from cable installation operations is so small that it is considered to be trivial. Therefore it is considered that no mitigation will be required for cable installation activities.

However, the operation of geophysical survey systems during the cable installation activities has the potential to cause injury to cetacean EPS at very close range. Therefore, mitigation in the form of pre-work searches will be undertaken prior to the use of geophysical survey systems during all cable installation operations. Transit watches will be undertaken throughout the cable installation operations when transiting between port and the work site.

All site staff will receive an induction and/or attend any relevant toolbox talks.

5.5.1. Pre-work survey

The JNCC, in association with DEFRA and the country agencies, has produced guidance on the protection of EPS from injury and disturbance (JNCC, 2010). It is considered that adherence to the measures outlined in the guidelines constitutes best practice and will minimise the risk of disturbing marine mammals, and will be necessary to ensure that physical or auditory injury is not induced in any cetaceans present within the injury zone from the equipment. The pre-work searches will be based on these recommendations.

At least one dedicated and experienced Marine Mammal Observer (MMO)/Passive Acoustic Monitoring (PAM) operator shall be available to undertake pre-work searches. Visual searches will be conducted when weather and daylight conditions allow. During the hours of darkness or when visual observation is not possible due to weather conditions or sea state, a proven PAM system and experienced operator(s) will be employed. If continuous watches during the course of survey activities are required (to reduce waiting time in the event of breaks in activity), more than one MMO/PAM operator will be required depending on the working hours proposed.

Once a pre-work search has been conducted prior to use of the USBL (or other geophysical equipment which emits sound across all cetacean group hearing ranges i.e. 0.007 – 180 kHz) and the equipment is running, all other geophysical equipment (which emits sound within or outwith cetacean group hearing ranges) may be turned on or off freely without having to conduct another pre-work search provided the equipment is adjacent to the existing noise source. This is because the initial sound source will act as an acoustic deterrent and should prevent animals from entering the area in which they may be susceptible to PTS onset (auditory injury). Additional pre-work searches would only be required if the initial sound source (in this case a USBL) is turned off for a period of greater than 10 minutes or cetaceans are observed within the mitigation zone during a break of less than 10 minutes. A pre-work search will always be conducted if the only geophysical equipment already in use emits sound outwith cetacean hearing ranges.

5.5.2. Transit watches

A nominated competent observer on the bridge of all vessels will keep watch for marine mammals during transit between port and the location of works for the HVDC cable route. Any sightings will be communicated to the Master of the vessel as soon as is practicable and the following actions, as per the Scottish Marine Wildlife Watching Code, implemented:

- The Master of the vessel will ensure that marine mammals are avoided to a safe distance (100 m or more) in all possible circumstances; and
- The Master of the vessel will minimise high powered manoeuvres where this does not impair safety.

The nominated competent observer will receive training from the MMO prior to commencement of transiting to/from the work site.

6. Caithness Horizontal Directional Drilling and Marine Assistance Works

The HDD works at Noss Head, Caithness are part of the Caithness to Moray Interconnector project to install HVDC and fibre optic cables between Noss Head, Caithness and Portgordon, Moray.

6.1. Methodology

6.1.1. Horizontal Directional Drilling (HDD)

The HDD works at Noss Head, Caithness will be undertaken as follows:

- There will be four adjacent 500 m long landfall drills at Noss Head. Each pilot borehole is separated by approximately 15 m giving a total corridor of approximately 45 m.
- HD drilling operations will be conducted in a single pilot hole drilling operation. The pilot hole will be guided and will follow a pre-determined profile. Pilot drilling will continue until punch-out on the seabed at 12m LAT. The drill string and drilling assembly will then be removed from the drilled hole in preparation for installation of the duct. With the drilling anticipated being through strong and abrasive siltstone / mudstone rock, specialist equipment will be used throughout.
- Bentonite drilling muds will be used for the works. To mitigate for the potential of bentonite escaping into the marine environment at pop-out, prior to drill fluid returns being lost there will be a change from using the bentonite-based drill fluid to water (either fresh or saline). This will minimise the volume of drill fluid lost at the exit point as far as is practicable.
- A duct will be installed into each drilled hole. The ducts will be fabricated from steel pipes. They will be installed with a drill rig and pushed through the drilled holes to the seabed exit points.
- Easily removable end caps will be connected to the front of each duct to preclude the ingress of material into the duct until it is required for cable installation. Six mm steel messenger wires will be installed into each of the ducts to enable the cables to be subsequently installed.

6.1.2. Marine Assistance Aspect of the HDD Works

The marine assistance work planned at Noss Head can be summarised as follows:

- Mobilisation of vessels (self-propelled crane barge (the Woodstock 1) and accompanying tug (the Jack James)) and equipment to the site and establishment of a 4-point anchor mooring system above the duct location. To assist positioning, compressed air is pumped through the duct creating bubbles at the surface visible by the Woodstock 1. Anchors will have buoyed tenant wires to facilitate their recovery on the completion of the works, or in the event of adverse weather necessitating return of the Woodstock to port. No re-anchoring would otherwise be required to complete the marine works on all 4 no. ducts. Crew transfers will be conducted by the Jack James which will either anchor off or return to the local home port (anticipated to be Wick).
- A foam gauging pig is installed into top-end of duct at the drill site. The pig is attached to a drum of 9 mm polypropylene rope (with a length equal to that of the installed duct plus 100 m) which is fed through a pack-off within a steel end cap for the duct.
- The pig is pumped (with water) through the steel casing pipe from landward end to seaward end trailing the 9 mm polypropylene rope.
- A diver (using surface fed gasses via umbilical) disconnects the nose section of the casing on the seabed using hand tools. The nose section is recovered to vessel using the winch.
- A bellmouth is lowered to seabed where diver connects the bellmouth to the end of the uncapped duct using hand-tools.

- A diver attaches the vessels winch wire to the front of the pig which is sat in the end of the duct;
- The pig is winched to deck of the vessel with polypropylene rope remaining attached;
- The diver returns to the vessel with all tools used for the work;
- At the drill site, a drum containing a single length of 20 kN steel messenger wire (equal to the length of the duct +50 m) is set-up on an A-frame.
- One end of the messenger wire is connected to the end of the polypropylene rope.
- At the vessel, the pig is removed from the rope and the rope spooled onto a deck winch. This winch then spools in the polypropylene rope thereby pulling the messenger wire through the full length of the installed duct and up to the vessel.
- A buoy is connected to end of messenger wire on board the vessel.
- A messenger wire is pulled back towards drill site until buoy pulled into bellmouth effecting 'seal'. A diver will confirm that the buoy is correctly seated.
- The messenger wire is attached to ratchet strap and tensioner welded to outside of duct at the drill site and manually tensioned.

No acoustic devices (e.g. multi beam echo sounders, side scan sonars, or diver tracking devices) will be used during the marine assistance works.

6.1.3. Frac-out Contingency Plan

A frac-out contingency plan will be in place throughout the duration of the drilling works.

Given that the drilling will be through strong siltstone / mudstone formations for the vast majority of the drill length, drill fluid breakout is considered highly unlikely. However, as the environment above a large proportion of the drills is marine or intertidal, pressure sensors will be incorporated into the drill string to better monitor the risk of a breakout occurring. These pressure sensors within the drilling head monitor the pressure of the drill fluid within the borehole and will alert the drilling engineer to factors that may result in a breakout (e.g. increased pressure). If increased potential for frac-out is detected, drilling will be stopped, and contingency procedures within the frac-out plan will be implemented.

The exit point is below water and as such there is little possibility to contain and control breakout as the drill approaches the exit point. To mitigate for contamination of the marine environment by drilling fluids, prior to drill fluid returns being lost at pop-out there will be a change from using the bentonite-based drill fluid to water (either fresh or saline). This will minimise the volume of drill fluid lost at the exit point as far as is practicable.

6.2. Timing of Activities

The HDD operations at Noss Head, Caithness are currently anticipated to begin at the end of February 2016 and to finish at the end of May 2016. It is planned that HDD works will be carried out for 9.5 hours per day from January to March and 12 hours per day from April to May. The offshore marine assistance works are anticipated to take place after all four ducts have been drilled and will last for approximately 10 days (weather permitting). Marine assistance works are anticipated to be undertaken on a 12 hours a day, 7 days a week schedule.

6.3. Summary of Risk Assessment

The 'EPS Risk Assessment for HDD and marine assistance works at Noss Head, Caithness' concluded that there is no potential for the activities associated with the HDD and duct installation and marine assistance works at Noss Head, Caithness to result in the injury or killing of any cetacean. In addition, as it is unlikely that noise from the majority of the HDD works will be distinguishable from the average background noise experienced by marine mammals in the Moray Firth, disturbance from the HD drilling activity itself is unlikely. Because drilling noise may be distinguishable from background noise at the point of breakout, mitigation will be conducted on the days

breakout is anticipated (see Section 6.4). Disturbance from and the risk of collision with the HDD marine assistance vessels is unlikely because the vessels will either be anchored on site or transiting between the site and the local home port (assumed to be Wick) at slow speeds. However, a nominated competent observer on each vessel will keep watch for marine mammals and basking sharks during transit and communicate any sightings to the Master of the vessel who will follow the Scottish Marine Wildlife Watching Code. Therefore it is considered that there is no potential for the disturbance of animals as defined in regulations 39 (1) (a) and (b) and 39 (2) of the Conservation of Habitats and Species Regulations 1994 (as amended in Scotland), from activity associated with the HDD and marine assistance works, and consequently no offence will be committed under section 39 of The Conservation (Natural Habitats, &c) Regulations 1994 (as amended in Scotland).

Although not EPS, seals were also considered. However, due to the localised nature of the noise predicted, the distance between the proposed works and the closest designated seal haul-out sites and the timing of the works in relation to the grey seal breeding season, it was concluded that there will be no harassment of seals at designated haul-out sites from the proposed HDD and marine assistance works at Noss Head, Caithness.

King (2013) points out that new experimental data have better informed the relationship between sound exposure and hearing threshold shifts in marine mammals. For example, it appears that harbour porpoises may be more sensitive to sound exposure than previously thought, while other odontocetes such as bottlenose dolphins may be less sensitive. As such, King (2013) uses the species dependant range of 177-198 dB re 1 μPa^2-s (SEL) for Permanent Threshold Shift (PTS) onset to measure a significant impact for pulsed noise rather than the Southall criteria used here (198 dB re 1 μPa^2-s for cetaceans; 186 dB re 1 μPa^2-s for pinnipeds). Without appropriate noise propagation modelling, it is not possible to assess the magnitude of potential effects on marine life using the criteria suggested by King (2013). However, because a precautionary approach to mitigation has been proposed (see sections 6.4), it is anticipated that the potential for effects to occur will be alleviated.

6.4. Marine Mammal Mitigation Plan

Potential impacts on cetacean EPS from the HDD and marine assistance works at Noss Head, Caithness, are considered to be nil or negligible, therefore there is no potential for disturbance of animals, as defined in regulations 39 (1) (a) and (b) and 39 (2) of the Conservation of Habitats and Species Regulations 1994 (as amended in Scotland).

However, ABB and SHE Transmission are committed to working responsibly. Therefore the following mitigation measures will be adhered to:

- An Ecological Clerk of Works (ECoW) will be present at the drill site during works in accordance with the CEMP. The ECoW will be experienced working in the coastal environment, and will be familiar with Scottish marine wildlife legislation.
- An MMO will be present onshore on the day breakout at each of the four HDD locations is anticipated. Drilling to the point of breakout will only commence if no marine mammals are present within the mitigation zone (see section 6.4.1).
- A nominated competent observer on the bridge of all vessels will keep watch for marine mammals and basking sharks during transit between port and the work sites. Any sightings will be communicated to the Master of the vessel and the following actions, as per the Scottish Marine Wildlife Watching Code, will be adhered to:
  - The Master of the vessel will ensure that marine mammals and basking sharks are avoided to a safe distance (100 m or more) in all possible circumstances; and
  - The Master of the vessel will minimise high powered manoeuvres where this does not impair safety.
- All site staff will receive an induction including relevant toolbox talks. Nominated competent observers will receive a dedicated briefing by the ECoW/MMO setting out their roles and responsibilities.

Details of emergency contacts relevant to marine mammal protection will also be incorporated into the emergency response plans of Project vessels undertaking the marine assistance works.

6.4.1. Pre-work survey

The JNCC, in association with DEFRA and the country agencies, has produced guidance documents on the protection of EPS from injury and disturbance. The mitigation methods proposed are based on these recommendations. It is considered that adherence to the measures outlined in these guidance documents constitutes best practice and will minimise the risk of causing injury or disturbance to marine mammals.

An onshore MMO will conduct visual searches prior to drilling commencing on days breakout at each of the four HDD locations is anticipated. The radius of the mitigation zone will be no less than 500 m from the proposed pop-out location. The MMO will be aware of the timing of the proposed operations so they can ensure they are in place at the appropriate time. The pre-initiation survey will be conducted for 30 minutes prior to beginning operations. The MMO will survey the area and notify relevant parties if any marine mammals are present within the mitigation zone. Clear channels of communication will be in place in order that effective and rapid transmittal of information between the MMO and relevant parties can take place. The area will be surveyed primarily using the naked eye, with binoculars being used to confirm presence and identification. A range-finder or similar may be used to estimate distance. If a marine mammal is observed within the mitigation zone during a 20 minute period prior to commencing drilling, drilling will be delayed until the animal has not been sighted within the zone for 20 minutes.

The MMO will have received formal training from a JNCC approved course and will have experience of observing the species likely to be encountered in the area. They will be equipped with a copy of the mitigation methods and recording forms.

A ‘close-out’ noise registry will be submitted within 12 weeks after the completion of any noisy activity.

7. Moray Horizontal Directional Drilling Works and Marine Assistance Works

The HDD works at Portgordon, Moray are part of the Caithness Moray Interconnector project to install HVDC and fibre optic cables between Noss Head, Caithness and Portgordon, Moray.

7.1. Methodology

7.1.1. Installation of casing

The ground conditions below the drill site consist of approximately 6 m of sand and gravel. In order to safeguard drill fluid returns and access to the onshore end of each drilled hole beyond this gravel it will be necessary to install a steel casing pipe (35 m long, 0.711 m in diameter) between the drill entry point and the bedrock underlying the gravel i.e. through the overburden (the material which lies above the bedrock through which the duct needs to pass).

In each case this will involve:

- excavation of a trench;
- construction of a ramp;
- positioning of the casing installation rig and starter-piece of pipe equipped with an internal air hammer;
- welding a length of steel casing to the starter-piece;
- pushing the steel casing down to the start of the trench;
- driving the casing into the hole formed by the air hammer;
- welding additional sections of steel casing to the installed section until the casing has been installed; through the gravel and down into the underlying rock;
- removal of hammer leaving casing in situ; and
- removal of casing rig.

7.1.2. Drilling of pilot holes

For pilot drilling operations, the rotational action of a tri-cone rock bit, coupled with a push force from the drilling rig, will cut through the material ahead of the bit forming the hole. Borehole size will be 17.5 inches. Drill fluid will be pumped throughout the pilot drilling operations carrying the crushed rock cuttings out of the hole. Bentonite drill fluid will be used for as much of this process as possible but, prior to breakthrough onto the seabed (or from the point at which drill fluid returns are lost – whichever is earlier), the Bentonite drill fluid will be replaced with either PureBore or TEQBIO drill fluid. Both of these drill fluids are fully biodegradable polysaccharides, and both were approved for use on the project when similar conditions were encountered at the Noss Head landfall.

While not as effective as Bentonite in terms of stabilising the borehole, both PureBore and TEQBIO drill fluids are able to suspend and carry cuttings from the bore.

The strength of the rock coupled with the length of the drill means that total drilling time on each hole may well exceed the life of the drill bit (which will need to be replaced after 80 – 120 hr of drilling time). This requires the entire drill string to be withdrawn from the hole and for the drill bit (and mud motor if necessary) being replaced with new components. The drill string is then run back through to the bottom of the hole and drilling continues. Throughout this process, drill fluid is pumped to flush any residual cuttings/detritus from the borehole. This process acts, therefore, as a cleaning run. The periodicity of future bit-changes will take into account the findings of previous trip-outs. If it proves unnecessary to trip-out to change the drill bit (or for other reasons) during the pilot hole drilling process, at a point shortly before the drill can be expected to reach the sands, gravels and cobbles approaching the exit point a dedicated cleaning run trip-out will be performed while pumping drill fluid so as to flush any residual cuttings/detritus from the borehole. The pilot-drilling assembly will then be re-run through the pilot hole and drilling operations will continue with the intention of drilling through to the drill exit point.

After completion of the pilot drill, it is planned to withdraw the assembly with the drill bit remaining on the end of the drill string, but it is also possible that pulling the drill bit back through the overburden may prove to be difficult or impossible. If that is the case then the drill bit would be pushed back out and onto the seabed and divers operating from an anchored (four point anchor spread) vessel would cut the bit from the mud motor on the seabed before withdrawing the string back through the borehole until it is completely removed. The anchor points used during the first vessel mobilisation will then be used for the duration of the works.

7.1.3. Stabilisation of exit section of boreholes

The exit section of the bores (through the potentially unstable sands, gravels and cobbles) will need to be stabilised. This will be achieved by running a steel casing through the boreholes and casing the exit section of the bores (from the point at which they exit the rock to the point where they breach the seabed).

The casing will be attached to a drill string, with the front section of casing containing the mud motor and a 16 inch drill bit attached at the drill head in order to 'tow' the steel casing pipe through the borehole and out through the overburden material.

The casing pipe will be uncoupled from the drill string and mud motor by divers cutting away a section of the casing between the bit-stabiliser and the mud motor. This will separate the drill bit and a small section of pipe from the drill string and casing and allow the drill string and mud motor to be withdrawn back through the borehole. The drill bit and removed section of casing will be lifted up to the dive support vessel using the vessel's winch.

7.1.4. Duct installation

A duct (273.9 mm diameter steel pipe) will be pushed into each drilled hole using the drilling rig, with the pipes being welded together as the string is extended through the drilled hole. The installation process will continue with the duct passing through the open hole and then through the casing pipe until it emerges from the end of the casing pipe and out onto the seabed. It will be pushed through with a target upstand from the seabed of 0.5 m.

The front of the duct string will be sealed with an end-cap. The end-cap (which will incorporate nozzles) will be designed to ensure it can be relatively easily removed at a subsequent date for the purpose of installing the bellmouth, retrieving the messenger wire and the other post-installation works to facilitate the later installation of the cable.

7.1.5. Frac-out Contingency Plan

A frac-out contingency plan (as per the CEMP) will be in place throughout the duration of the HDD drilling works at Portgordon.

Pressure sensors will be incorporated into the drill string to monitor the risk of a breakout occurring. These pressure sensors within the drilling head monitor the pressure of the drill fluid within the borehole and will alert the drilling engineer to factors that may result in a breakout (e.g. increased pressure). If increased potential for frac-out is detected, contingency procedures will be implemented.

The duct exit point is below water and as such there is little possibility to contain and control breakout as the drill approaches the exit point. To mitigate for contamination of the marine environment, the Bentonite drill fluid will be replaced with PureBore or TEQBIO drill fluid prior to breakthrough onto the seabed (or from the point at which drill fluid returns are lost – whichever is earlier). This will minimise the volume of bentonite drill fluid lost at the exit point as far as is practicable.

7.2. Timing and Duration of Activity

The HDD operations at Portgordon are currently anticipated to take place between July 2016 and April 2017. Onshore enabling works may take place in advance of July 2016. Anticipated durations of individual elements of HDD work are provided below (see Table 7.1).

Table 7.1: Proposed schedule for the HDD work at Portgordon

Task	Duration (days) per drill	Total duration (days)
Prepare landside casing	10	40
Mobilise rig	5	20
Commence drill	40	280
Pop out operations	10	40
Duct installation	10	40
Total	**75**	**300**

Work will be ongoing seven days per week. Drilling of the pilot hole will be undertaken on a 12 hr/day basis from drill entry to 1500 m (drill length measured from drill entry point). Following this point (i.e. 1500 m until pop out) drilling will proceed on a 24hr/day basis. When working 12 hr/day the working day will be 0700 to 1900 with a second shift working from 1900 to 0700 when working 24 hr/day.

7.3. Summary of Risk Assessment

The 'Portgordon HDD EPS Risk Assessment' concluded that there is no potential for the activities associated with the works to result in the injury or killing of any cetacean. In addition, as it is unlikely that noise from the majority of the HDD works will be distinguishable from the average background noise experienced by marine mammals in the Moray Firth, disturbance from the HDD activity itself is unlikely. Furthermore, disturbance from and the risk of collision with the HDD marine assistance vessels is unlikely because the vessels will either be anchored on site or transiting between the site and the local home port (assumed to be Wick) at slow speeds. However, a nominated competent observer on each vessel will keep watch for marine mammals and basking sharks during transit and communicate any sightings to the Master of the vessel who will follow the Scottish Marine Wildlife Watching Code (see section 7.4). Given the location of the drilling fluid and the implementation of the CEMP and frac-out contingency plan, the potential for toxic contamination of cetacean EPS (and basking sharks) is considered highly unlikely.

Although not EPS, seals were also considered. Due to the localised nature of the noise predicted, the distance between the proposed works and the closest designated seal haul-out sites, it was concluded that there will be no harassment of seals at designated haul-out sites from the proposed HDD works.

Following the 2014 Marine Scotland and SNH guidance (Marine Scotland and SNH, 2014) entitled "The protection of Marine European Protected Species from injury and disturbance" for territorial waters, there is negligible potential for disturbance of animals, as defined in regulations 39 (1) (a) and (b) and 39 (2) of the Conservation of Habitats and Species Regulations 1994 (as amended in Scotland), from the proposed trial HDD works at Portgordon. No offence will therefore be committed under section 39 of The Conservation (Natural Habitats, &c) Regulations 1994 (as amended in Scotland) and no mitigation is required.

7.4. Marine Mammal Mitigation Plan

ABB and SHE Transmission are committed to working responsibly and so where effective mitigation is appropriate this will be put in place. As such, in addition to the above mentioned measures (i.e. provision of a frac-out contingency plan) the following mitigation measures will be adhered to during the works:

- A nominated competent observer (who will be briefed by the project's environmental advisors) on the bridge of all vessels will keep watch for marine mammals and basking sharks during transit to and from the work sites. Any sightings will be communicated to the Master of the vessel as soon as is practicable and the following actions, as per the Scottish Marine Wildlife Watching Code, implemented:
  - The Master of the vessel will ensure that marine mammals and basking sharks are avoided to a safe distance (100 m or more) in all possible circumstances; and
  - The Master of the vessel will minimise high powered manoeuvres where this does not impair safety.

8. Offshore Rock Placement Works

8.1. Methodology

The rock placement is required in areas where no trenching is foreseen, where the soil conditions are deemed unsuitable for trenching and where the required burial depth is not met after the backfill operations. All proposed rock placement work has been based on an assessment made prior to trenching operations. The locations, engineering and design will therefore be updated after the post-backfill survey; however dates and durations are not expected to exceed those outlined.

The work will require the use of a Multi Beam Echo Sounder (MBES) system for pre and post-work surveys, Ultra Short Baseline (USBL) positioning systems and positioning transponders (to monitor positioning of the remotely operated vehicle (ROV)), a Doppler Velocity Log (DVL) for positioning and navigation, and Object Avoidance Sonar (OAS) to monitor progress during the work.

8.1.1. Use of geophysical equipment during rock placement operations

Geophysical equipment will be used during the duration of the rock placement work in order to provide the navigational services, and bathymetric and mapping data of the seabed. A summary of the likely worst case (i.e. highest Source Pressure Level (SPL)) geophysical, positioning, monitoring and navigational equipment (from here out collectively referred to as geophysical equipment) is given in Table 8.1 below.

Table 8.1: Operating frequencies and greatest source pressure levels of sound-emitting equipment proposed for rock placment activities

Example Unit Type	Purpose	Frequency Range (kHz)	Maximum Source Pressure Level (dB (rms) re 1 µPa @1 m) [9]
USBL	Monitor position of the ROV during operations	18 - 36	220
Multi Beam Echo Sounder (MBES)	Seabed imagery	200 - 455	221
Doppler Velocity Log (DVL)	Underwater inertial navigation system	600 or 1200	217*
Obstacle Avoidance Sonar (OAS)	Obstacle avoidance	325 - 900	< 207*
Transponder	Monitor positioning of the ROV	19 - 36	< 206*

** Source pressure level is anticipated from similar (closely related) systems*

8.1.2. Vessels

Tideway Offshore Solutions will supply one of three possible DPFPVs for the majority of the rock placement operations, the *Flintstone*, the *Tideway Rollingstone* or the *Seahorse* (Table 8.2). The DPFPVs are purpose built vessels for the accurate placement of rock/gravel material in a controlled manner by using a fall pipe. The fall pipe is deployed through a moonpool in the centre of the vessel. An ROV operates at the bottom end of the fall pipe. DPFPV *Tideway Rollingstone* and DPFPV *Seahorse* are also equipped with an inclined fallpipe system (IFPS) or

[9] Noise output values are for nominal comparative systems and are based on the equipment being operated at the highest power levels and the longest pulse lengths. The actual noise output of each system may change depending on the equipment spread proposed by the contractor.

Rock Side Dumping Unit (RSDU) which are used for hard to reach locations in shallow waters or close to structures. For the placement of any large rocks, a single crane vessel (TBC[10]) equipped with a rock grab will be used.

Table 8.2: Proposed Dynamic Positioned Fall Pipe Vessels (DPFPVs)

	Flintstone	*Tideway Rollingstone*	*Seahorse*
Length	154.6 m	139.00 m	162.00 m
Width	32.2 m	32.00 m	38.00 m
Draught loaded	7.74 m	6.60 m	6.34 m
Loading capacity approx.	20,000 ton	12,000 ton	17,500 ton
Cruising speed	15 kts	12 kts	13 kts

Source: http://www.deme-group.com/fall-pipe-vessels

8.1.3. Timing and duration

The rock placement activities are currently anticipated to take place between September and December 2017. This may be pushed back to the spring/summer 2018 depending on the progress of the cable laying and the increased chance of a better weather window for the more weather sensitive work, such as that at Noss head. The total duration of the operations will last approximately 60 days[11] including loadout, transit and rock placement, excluding weather delays.

8.2. Summary of Risk Assessment

An EPS Risk Assessment was undertaken for the activity (document number 1143732) which concluded that during the planned rock placement along the Caithness to Moray Offshore Cable, there is potential for marine EPS to be impacted.

The main potential routes to impact are considered to be:

- Increased anthropogenic noise from rock placement work and associated geophysical equipment;
- Increased vessel noise; and
- Collision with vessels.

Based on the information presented in the JNCC *et al.* (2010) guidance document and the underwater noise assessment conducted by Subacoustech Environmental Ltd., it is concluded that the potential for the activities associated with rock placement works on the HVDC cable installation to result in the injury, killing or disturbance of any cetacean is negligible.

The regulations that govern EPS disturbance within STW (Marine Scotland and SNH, 2014) are more precautionary than those for UK waters (JNCC *et al*., 2010), therefore based on the information presented in the Marine Scotland and SNH (2014) guidance document, it is concluded that:

- There is no potential for lethal effects, physical injury or auditory injury to any cetacean from the rock placement work (rock placement work, vessel noise and collision risk);
- There is no potential for lethal effects during use of the geophysical equipment associated with the rock placement work. With the mitigation measures proposed in Section 8.3, there is negligible potential for auditory injury or physical injury due to the operation of geophysical equipment during the rock placement work;

[10] Anticipated to be a large vessel equivalent to the DPFPV for the purposes of this assessment.

[11] With contingency, the rock placement work is not expected to exceed 90 days of operations in total.

- There is negligible potential for disturbance to any cetacean from activities associated with the rock placement work (rock placement work, vessel noise, and collision risk); and
- There is potential for disturbance from use of the USBL and transponders.

Following JNCC, Natural England (NE) and the Countryside Council for Wales (CCW) (JNCC *et al.*, 2010) guidance it can be concluded that the rock placement activities are unlikely to result in the harassment, disturbing, injuring or killing of an EPS, as defined under regulations 39(1) (a) and (b) of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007.

Following the 2014 Marine Scotland and SNH guidance (Marine Scotland and SNH, 2014) for territorial waters, there is the potential for disturbance of animals, as defined in regulations 39 (1) (a) and (b) and 39 (2) of the Conservation of Habitats and Species Regulations 1994 (as amended in Scotland), from use of the geophysical equipment on the vessels involved during the rock placement operations. This disturbance will not be sufficient to cause any population level effects, and thus it is considered that an EPS licence to disturb can be issued under section 39 of The Conservation (Natural Habitats, &c) Regulations 1994 (as amended in Scotland). With mitigation, the potential for the onset of auditory injury due to the operation of geophysical equipment during the rock placement work is reduced to negligible levels.

8.3. Marine Mammal Mitigation Plan

Operation of geophysical equipment during the rock placement work has the potential to cause physical and/or auditory injury to cetacean EPS at very close range. Therefore, mitigation in the form of pre-work searches will be undertaken prior to the use of geophysical equipment during all rock placement work.

Since the release of the JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys in April 2017, MBES surveys in shallow waters (< 200m) are not subject to mitigation requirements as it is thought the higher frequencies typically used fall outside the hearing frequencies of cetaceans and the sounds produced are likely to attenuate more quickly than the lower frequencies used in deeper waters. JNCC do not, therefore, advise mitigation is required for multi-beam surveys in shallow waters'. Furthermore, due to the fact that the rock placement works will take place outside of designated areas or other 'areas of importance'[12], and the fact that the majority of the work is in offshore waters, no mitigation requirements are anticipated for the use of the MBES.

8.3.1. Pre-work searches

It is considered that adherence to the measures outlined in the JNCC guidelines (2017) constitutes best practice and will minimise the risk of disturbing marine mammals, and will be necessary to ensure that auditory injury is not induced in any cetaceans present within the injury zone, from the equipment. The pre-work searches will be based on these recommendations. However due to the limited range for disturbance and physical and/or auditory injury from the equipment in use it is recommended that the mitigation zone be 200m.

At least one dedicated and experienced Marine Mammal Observer (MMO)/Passive Acoustic Monitoring (PAM) operator shall be available to undertake pre-work searches. Visual searches will be conducted when weather and daylight conditions allow. During the hours of darkness or when visual observation is not possible due to weather conditions or sea state, a proven PAM system and experienced operator(s) will be employed.

Once a pre-work search has been conducted prior to use of the USBL (or other geophysical equipment which emits sound across all cetacean group hearing ranges i.e. 0.007 – 180 kHz) and the equipment is running, all other geophysical equipment (which emits sound within or outwith cetacean group hearing ranges) may be turned on or off freely without having to conduct another pre-work search provided the equipment is adjacent to the existing noise source. This is because the initial sound source will act as an acoustic deterrent and should prevent

[12] As defined by the guidance as discrete areas of important habitat to marine mammal species (e.g. the Moray Firth bottlenose dolphin SAC).

animals from entering the area in which they may be susceptible to PTS onset (auditory injury). Additional pre-work searches will only be required if there is a break in operation of the initial sound source (in this case a USBL) and continuous monitoring has not been in effect as per the revised JNCC guidance (2017). A pre-work search will always be conducted if the only geophysical equipment already in use emits sound outwith cetacean hearing ranges. Soft starts should be performed prior to equipment use where possible (if the equipment specifications allow) and conducted after breaks of greater than 10 minutes.

8.3.2. Transit watches

A nominated competent observer on the bridge of all vessels will keep watch for marine mammals during transit between port and the location of works for the HVDC cable route. Any sightings will be communicated to the Master of the vessel as soon as is practicable and the following actions, as per the Scottish Marine Wildlife Watching Code, implemented:

- The Master of the vessel will ensure that marine mammals are avoided to a safe distance (100 m or more) in all possible circumstances; and
- The Master of the vessel will minimise high powered manoeuvres where this does not impair safety.

9. Jet Trenching Work

9.1. Methodology

The proposed jet trenching work forms part of the construction work required for the Caithness to Moray HVDC Project. It will augment the plough trenching currently being undertaken, and is required over approximately 20% of the subsea cable route.

9.1.1. Jet Trenching Work

Jet trenching work (in order to bury the bundle of HVDC and FO cables, hereafter referred to as the product, post-lay) will be carried out using either of the following jet trenching systems:

- A T1200 purpose built jet trencher; or
- A T1500 flexible and rigid product high performance jet trenching solution.

The jet trenching system (which can be operated in either backwash or eduction and backfill modes[13]) will first locate the product (using a TSS 440 pipe tracker, a passive (in terms of underwater noise) product location / tracking system) before sinking and covering it to the required depth of 1 m (or as much as possible at the northern end of the route (between locations (KPs) 109.414 to 109.967 and 110.129 to 110.340) where the sediment is sand with underlying bedrock).

Depending on the composition of the sediment between KPs 18.500 and 41.500, either one or two passes will be required. If there is sufficient silt, jet trenching may be completed in a single pass. In this case the jet trencher will be configured to minimise backwash in order to retain material in the trench which will then settle on to the product to provide cover. If very soft clay dominates, a two-pass jet trenching strategy will be required. In this case the first pass will be run with reduced backwash to lower the product and the second (backfill) pass will collapse the trench walls onto the product. This scenario (two passes) is considered most likely (and is therefore presented in Table 9.1).

An in-built mechanism allows the jetting tool to be lowered to depth thereby maintaining a constant jetting angle.

9.1.2. Pre- and Post-Jet Trenching Surveys

Pre- and post-jet trenching surveys will be conducted from a work class survey ROV. *Grand Canyon I* is equipped with two Triton XLX work class survey ROVs while *Grand Canyon II* and *Grand Canyon III* are equipped with Schilling UHD work class survey ROVs.

Pre-jet trenching surveys

The purpose of the pre-jet trenching surveys is to:

- Determine the project KPs;
- Determine the condition of the product;
- Report any product freespans (where the cable is not supported by the seabed); and
- Report any debris that may impact the jet trenching operations.

The pre-jet trenching surveys will be performed by running the work class survey ROV along the line. It will track the line using both cameras and a TSS 440 pipe tracker.

[13] An educator dredge will be fitted complete with integral backwash jets to allow selection of dredge or backwash operation remotely i.e. when the jet trenching system is in the water. A backfill tool is fitted to collapse the trench wall using water jets above and inside the trench (performed as a separate jet trenching pass).

Post-jet trenching surveys

The purpose of the post-jet trenching surveys (also to be performed by the work class survey ROV) is to provide an accurate profile of the product / trench configuration.

9.1.3. Vessels

A purpose-built offshore construction / ROV / survey vessel will be used for the planned jet trenching work, either the *Grand Canyon I*, *Grand Canyon II* or *Grand Canyon III*. At approximately 125 m in length, all three vessels in Canyon Offshores *Grand Canyon* series are considered, for underwater noise assessment purposes, to be large vessels. The vessel will carry and deploy both the jet trenching system and the work class survey ROV.

9.1.4. Timing and duration

The work is planned to be undertaken within September and October 2017.

A breakdown of the tasks involved in the proposed jet trenching work, and their locations (KPs) and durations, can be found in Table 9.1 below. Although this estimate does not include weather downtime, at just over 20 days the proposed jet trenching work is considered to be short term in duration.

Table 9.1: Proposed dates, durations and locations of the tasks involved in the proposed jet trenching work

Task	Duration (days)
Mobilisation (includes testing)	0.5
Transit to site and set-up (includes Dynamic Positioning (DP) trials and USBL verifications)	1.58
Jet trenching trial (includes pre- and post-trench surveys)	0.42
Jet trenching between KPs 21.072 and 41.364)	
- Pre-trench survey	1.19
- Jet trenching – 1st pass	4.31
- Post-trench survey	1.29
- Jet trenching – 2nd pass	5.73
- Post-trench survey	1.29
Jet trenching between KPs 56.536 and KP 56.816 (omega joint)	
- Pre-trench survey	0.13
- Jet trenching – 1st pass	0.5
- Post-trench survey	0.13
- Jet trenching – 2nd pass	0.5
- Post-trench survey	0.13
Jet trenching between KPs 109.414 to 109.967 and 110.129 to 110.265)	
- Pre-trench survey	0.08
- Jet trenching	0.25
- Post-trench survey	0.08
Transit to port	1.08
Demobilisation	0.5
Allowances	1.79
Total	**21.48**

Source: 10.1 – Estimated Trenching Schedule – Rev 0.pdf

9.2. Summary of Risk Assessment

The EPS Risk Assessment for Proposed Jet Trenching Work (document number: 1146416) concluded that the following potential impacts on EPS likely to be present in the Moray Firth (the three main cetacean species are minke whale, bottlenose dolphin, harbour porpoise) required assessment:

- Increased anthropogenic noise from jet trenching work;
- Increased anthropogenic noise from geophysical equipment which emits sound;
- Increased vessel noise; and
- Collision with vessels.

Based on the information presented in the JNCC *et al.* (2010) guidance document and the underwater noise assessment conducted by Subacoustech Environmental Ltd., it is concluded that the potential for the activities associated with rock placement works on the HVDC cable installation to result in the injury, killing or disturbance of any cetacean is negligible.

The regulations that govern EPS disturbance within STW (Marine Scotland and SNH, 2014) are more precautionary than those for UK waters (JNCC *et al*., 2010), therefore based on the information presented in the Marine Scotland and SNH (2014) guidance document, it is concluded that:

- There is no potential for lethal effects, physical injury or auditory injury to any cetacean from the rock Jet Trenching (jet trenching, vessel noise and collision risk);
- There is no potential for lethal effects during use of the geophysical equipment associated with the Jet Trenching. With the mitigation measures proposed in Section 7, there is negligible potential for auditory injury or physical injury due to the operation of geophysical equipment during the Jet Trenching;
- There is negligible potential for disturbance to any cetacean from activities associated with the rock placement work (jet trenching, vessel noise, and collision risk); and
- There is potential for disturbance from use of the USBL and transponders.

Following the JNCC *et al.* (2010) guidance (relevant to work on the section of the cable route which occurs in waters beyond the 12 nautical mile limit) it can be concluded that, with mitigation for the USBL system and transponder beacons (which will reduce the potential for physical and auditory injury to negligible levels), potential impacts from the proposed jet trenching work are unlikely to result in the disturbing, injuring or killing of an EPS as defined under regulation 39(1) of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended) (referred to as the Offshore Regulations). It is therefore concluded that an EPS licence is not required for jet trenching work taking place beyond the 12 nautical mile limit.

Following the Marine Scotland and SNH (2014) guidance (relevant to work on the sections of the cable route which occur in waters within the 12 nautical mile limit) it can be concluded that, with mitigation for the USBL system and transponder beacons (which will reduce the potential for physical and auditory injury to negligible levels), potential impacts from the proposed jet trenching work are unlikely to result in the harassment, disturbing, injuring or killing of an EPS as defined under regulation 39(1) of the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) (referred to as the Habitats Regulations). In relation to regulation 39(2) of the Habitats Regulations, the percentage of the reference population of each species which has the potential to be disturbed by use of the USBL system and transponder beacons is considered to be negligible (less than 1 % for the three main cetacean species which occur in the Moray Firth) and therefore not detrimental to the maintenance of the population of the species concerned at a FCS. Therefore it is considered that use of the USBL system and transponder beacons can be carried out under the existing EPS licence (MS EPS 05/2017/0) which permits the disturbance of cetacean EPS along the route of the Caithness to Moray HVDC in connection with the use of geophysical survey and positioning equipment.

9.3. Marine Mammal Mitigation Plan

Operation of the USBL system and transponder beacons during the jet trenching work has the potential to cause physical and/or auditory injury to cetacean EPS at very close range. Therefore mitigation in the form of pre-work

searches will be undertaken prior to use of the USBL system and transponder beacons during all jet trenching work in order to reduce the potential for physical and auditory injury to negligible levels.

Since the release of the JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys in April 2017, MBES surveys in shallow waters (< 200m) are not subject to mitigation requirements as it is thought the higher frequencies typically used fall outside the hearing frequencies of cetaceans and the sounds produced are likely to attenuate more quickly than the lower frequencies used in deeper waters. JNCC do not, therefore, advise mitigation is required for multi-beam surveys in shallow waters. This does not apply to the activities which were risk assessed prior to the release of the 2017 JNCC guidelines and as such they were/are currently being carried out under licence.

9.3.1. Pre-work searches

The pre-work searches (which will be undertaken in order to reduce the potential for marine mammals to occur in close proximity to the USBL system and transponder beacons prior to their initiation to negligible levels) are based on the recommendations outlined in the JNCC guidelines (2017). A 500 m radius mitigation zone will be employed in line with the existing EPS Licence.

As per the existing EPS Licence, at least one dedicated MMO/PAM operator will be available to undertake pre-work searches. Visual searches will be conducted when weather and daylight conditions and sea state allow. During the hours of darkness or when visual observation is not possible due to weather conditions or sea state, a proven PAM system (and operator) will be used.

It is understood that it is not possible to soft start the USBL system or transponder beacons therefore no soft starts will be employed.

As per the 2017 JNCC guidelines, unplanned breaks refer to instances where the USBL system/transponder beacons cease pinging unexpectedly during operations. In these instances:

- Work will resume without a pre-work search after unplanned breaks of 10 minutes or less provided that no animals are detected in the mitigation zone during the breakdown period; and
- A full pre-work search will be conducted before work resumes after unplanned breaks of longer than 10 minutes. Any time the MMO/PAM operator has spent observing prior to the breakdown period will contribute to the pre-work search time.

9.3.2. Transit watches

A nominated competent observer on the bridge of all vessels will keep watch for marine mammals during transit between port and the location of works for the HVDC cable route. Any sightings will be communicated to the Master of the vessel as soon as is practicable and the following actions, as per the Scottish Marine Wildlife Watching Code, implemented:

- The Master of the vessel will ensure that marine mammals are avoided to a safe distance (100 m or more) in all possible circumstances; and
- The Master of the vessel will minimise high powered manoeuvres where this does not impair safety.

10.Work Planned for 2018

The activities predicted to be undertaken as part of the Caithness to Moray HVDC Link offshore cable lay works in 2018 are:

- Cable pull in and mass flow excavation work at Portgordon;
- Backfill; and
- Rock placement.

As the work in 2018 will be covered by a new EPS Licence (no TBC), the mitigation plan for these activities is re-established in this Section to ensure any updates in the new Licence are captured. The following sections set out the methods, impacts on cetacean EPS, and proposed mitigation to be implemented during the subsea cable lay works in 2018. In addition to this MMPP, a full EPS Risk Assessment has been undertaken on the procedures and equipment to be used for the work (Report Number 1156585).

10.1. Methodology

Summary details of the proposed cable installation methodology for the Caithness Moray HVDC project are as follows. Methodologies are subject to change if required following the application of Reasonable Endeavours.

10.1.1. Cable Pull In At Portgordon

The cable pull in procedure includes the following tasks and will utilise an ROV and/or divers for the duration of the operations. The cable lay vessel (CLV) will position itself as near to the Horizontal Directional Drill (HDD) pop out locations as water depth and cable parameters allow.

Recovery of the shore winch wire

An ROV/diver will be deployed and used for survey and recovery of the shore cable. The ROV/diver will conduct a visual/sonar survey of the HDD entrances and bellmouths. After the HDD entrances and bellmouths have been surveyed, the shore winch wire will be attached to one of the cables (HVDC or fibre optic) for pull in operations into the HDD and up to the landfall location. This process will be repeated for each cable (2 x HVDC and 1 x Fibre optic). The divers/ROV will be fitted with USBL positioning beacons.

HVDC and fibre optic cable pull in

The cable will be paid out from the CLV while the shore winch wire will pay in. The ROV/diver will monitor the pull in operations at the HDD entrances as well as the as laid position of the cable in the trench. This process will be repeated for each cable.

After the cables have been pulled in successfully to the landfall location, the ROV (or potentially small survey vessel/Autonomous Underwater Vehicles (AUV)) will complete an ‘as laid’ survey to inspect the cables laid.

Proposed Vessels

The cable pull in will require the use of the CLV. Multiple additional vessels (e.g. shallow draught multicats/workboats and diver/ROV support vessels) may also be required to aid the pull in in due to water depth and the resulting distance the cable lay vessel will be from the HDD entrances at Portgordon. Small survey vessels/AUV’s may be utilised for pre/post lay surveys.

10.1.2. Mass Flow Excavation Work at Portgordon

A ‘Sea-Axe’ mass flow excavation system will be deployed from a crane barge and operated topside via an umbilical. It will be used to erode seabed material to allow burial of the cables. Pre/post work surveys may be required.

Proposed Vessels

Previously the self-propelled crane barge (*Woodstock I*) was used with assistance from the tug *Shuna* when laying out its anchors. It is anticipated that the same/similar vessels will be used in 2018 (note, if weather conditions dictate then a larger vessel, e.g. an offshore supply ship may be used). Small survey vessels/AUV's may be utilised to survey the work if required.

10.1.3. Backfill

Backfill operations will be conducted from an anchor handling tug supply (AHTS) vessel or similar. The mechanical backfill will use a SCAR plough which will be used in backfill mode and will return the trenching excavation materials from along the cable route to over the exposed cable to provide suitable cover.

A work class ROV will be used during the backfill operations to:

- Monitor the launching, towing, and recovery of the SCAR plough system;
- Investigate targets or obstructions on the seabed in the path of the SCAR plough;
- Complete seabed surveys; and
- Assist with contingency operations.

During the nearshore (<15 m LAT) backfill, up to two passes are anticipated to be needed, although more may be undertaken if deemed neccesary. A multicat vessel is anticipated to be required to support the positioning and towing of the SCAR plough by the AHTS vessel. The multicat will use USBL positioning to monitor the progress of the SCAR plough during the operations. It is anticipated that only one pass will be required to complete the backfill operations >15 m LAT however multiple passes may be required.

Surveys will be performed as soon as possible after backfill has been completed over any section of the cable route; this is to allow the release of the guard vessels and to open up the area for marine users.

The work will require the use of an MBES system for pre/post-work surveys, USBL positioning systems and beacons to monitor positioning of the SCAR plough and ROV, a DVL for positioning and navigation, and OAS to monitor progress during the works.

Proposed Vessels

Details of the vessels proposed for use during backfill are provided in Table 10.1 below.

Table 10.1: Vessels potentially used for backfill

Vessel	Use
Anchor Handling Tug Supply (AHTS) Vessel	Towing of the plough/ROV surveys
Shallow draft multicat vessel	Assist in launching and monitoring the scar plough until the water depth is suitable for the ROV
Small survey vessel/AUV*	Pre/post backfil surveys

**not necessarily required*

10.1.4. Rock Placement

The rock placement work will comprise stabilisation and protection work in discreet areas along the entirety of the route (i.e. from Portgordon, Moray to Noss Head, Caithness) except where not permitted under existing consents. The exact locations where rock placement will be needed are not yet finalised as they are dependent on other ongoing work. Water depths where rock placement is required vary from 6m LAT up to 100m LAT. The rock placement activities will be executed by Dynamic Positioned Fall Pipe Vessels (DPFPVs). Larger rocks (i.e. those that cannot be placed by fall pipe) will be placed on to the rock berm through use of a crane and large rock grab.

The rock placement is required in areas where no trenching is foreseen, where the soil conditions are deemed unsuitable for trenching and where the required burial depth is not met (or where it is not anticipated that it will be met) after the backfill operations.

The work will require the use of a Multi Beam Echo Sounder (MBES) system for pre and post-work surveys, Ultra Short Baseline (USBL) positioning systems and beacons (to monitor positioning of the remotely operated vehicle (ROV)), a Doppler Velocity Log (DVL) for positioning and navigation, and Object Avoidance Sonar (OAS) to monitor progress during the work.

Proposed Vessels

The DPFPVs are purpose built vessels for the accurate placement of rock/gravel material in a controlled manner by using a fall pipe. The fall pipe is deployed through a moonpool in the centre of the vessel. It is envisaged that DPFPV *Seahorse* will be the main vessel for this work (as per the scope complete in 2017), however other comparable vessels may be used. DPFPV *Seahorse* is also equipped with an inclined fallpipe system (IFPS) which is used for hard to reach locations in shallow waters or close to structures. For the placement of any large rocks, a crane vessel (anticipated to be of equivalent size to the DPFPV) equipped with a rock grab will be used. Small survey vessels / AUV's may also be used for the pre/post survey activities.

10.1.5. Use of Geophysical Survey Equipment to Monitor Installation

During the above described works, geophysical survey equipment will be utilised to survey the route, to monitor the progress of the work, and for positioning of any ROVs or other underwater equipment needed to complete the works. Table 10.2 provides information on the potential geophysical survey equipment that may be used. It is recognised that this equipment specification list may change and any changes will be communicated to Marine Scotland as soon as that information is available, along with any resulting alterations to mitigation which may be required.

Table 10.2: Details of the proposed types of geophysical equipment which emit sound

Equipment Type	Typical Source Pressure Level (dB re 1 µPa @ 1 m)	Potential for auditory injury?	Typical Frequency Range (kHz)	Potential for a behavioural response?
USBL System	< 220	Potential risk	18-36	Y
USBL Beacons	< 206	Potential risk	19-36	Y
Multi Beam Echo Sounder (MBES)	< 221	Negligible risk	200-455	N
Obstacle Avoidance Sonar (OAS)/Multi Beam Imaging Sonar	< 207	Negligible risk	200-1100	N
Dual Head Scanning Sonar (DHSS)	< 210	Negligible risk	200-2250	N
Doppler Velocity Log (DVL)	< 217	Negligible risk	600 or 1200	N

10.2. Estimated Duration of 2018 Work

All work is planned to be carried out between January and the end of June 2018, however work may extend until the end of August 2018.

The estimated duration of each of the proposed activities/tasks can be found in Table 10.3 below. It should be noted that activities may be undertaken concurrently.

Table 10.3: The estimated duration of each of the activities proposed to be undertaken in 2018

Task	Estimated duration (days) excl. weather/other delays*
Cable pull in at Portgordon	22
Mass flow excavation work at Portgordon	26
Backfill	55
Rock placement	70

**Maximum duration (excluding weather/other non-working days) not anticipated to exceed 200% of estimated durations stated above*

10.3. Summary of Risk Assessment

A full EPS Risk Assessment has been undertaken on the procedures and equipment to be used for the work in 2018 (Report Number 1156585). This risk assessment assessed that during the planned cable lay works for the Caithness to Moray cable route, there is the potential for some European Protected Species of cetacean to be impacted.

To determine potential impacts of the proposed cable lay works, the main activities associated with the works have been identified.

The following potential impacts on EPS likely to be present in the Moray Firth were assessed:

- Increased anthropogenic noise from cable pull in, mass flow excavation, backfill and rock placement work;
- Increased anthropogenic noise from geophysical equipment which emits sound;
- Increased vessel noise; and
- Collision with vessels.

The proposed cable pull in, mass flow excavation, backfill and rock placement work on the Caithness to Moray HVDC cable interconnector will be undertaken between January and April 2018 (with potential for work to extend to the end of June 2018).

Following the JNCC *et al.* (2010) guidance (relevant to work on the section of the cable route which occurs in waters beyond the 12 nautical mile limit) it can be concluded that, with mitigation for the USBL systems and beacons (which will reduce the potential for physical and auditory injury to negligible levels), potential impacts from the proposed backfill and rock placement work are unlikely to result in the disturbing, injuring or killing of an EPS as defined under regulation 39(1) of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended) (referred to as the Offshore Regulations).

Following the Marine Scotland and SNH (2014) guidance (relevant to work on the sections of the cable route which occur in waters within the 12 nautical mile limit) it can be concluded that, with mitigation for the USBL systems and beacons (which will reduce the potential for physical and auditory injury to negligible levels), potential impacts from the proposed cable pull in, mass flow excavation, backfill and rock placement work are unlikely to result in the harassment, disturbing, injuring or killing of an EPS as defined under regulation 39(1) of the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) (referred to as the Habitats Regulations). In relation to regulation 39(2) of the Habitats Regulations, the percentage of the reference population of each species which has the potential to be disturbed by use of the USBL systems and beacons is considered to

be negligible (less than 1 % for the three main cetacean species which occur in the Moray Firth) and therefore not detrimental to the maintenance of the population of the species concerned at a FCS.

It is therefore considered that an EPS licence (in order to permit the disturbance of cetacean EPS along the route of the Caithness to Moray HVDC in connection with the use of USBL systems and beacons) can be awarded.

10.4. Marine Mammal Mitigation Plan

Operation of the USBL systems and beacons during the cable pull in, mass flow excavation, backfill and rock placement work has the potential to cause (1) physical injury at very close range and (2) induce the onset of auditory injury in (low and high frequency) cetacean EPS. Therefore mitigation in the form of pre-work searches will be undertaken prior to use of the USBL systems and beacons during all cable pull in, mass flow excavation, backfill and rock placement work in order to reduce the potential for physical and auditory injury to negligible levels.

10.4.1. Pre-Work Searches

The methodology for the pre-work searches (which will be undertaken in order to reduce the potential for marine mammals to occur in close proximity to the USBL systems and beacons prior to their initiation) is based on the recommendations outlined in the JNCC guidelines (2017).

Clear channels of communication between the MMO/PAM operator and relevant crew will be established prior to commencement of any operations. The crew will inform the MMO/PAM operator (or nominated lead) sufficiently in advance of any proposed work so that a full pre-work search can be completed prior to work commencing.

At least one dedicated MMO/PAM operator will be available to undertake pre-work searches of 30 minutes in length. Visual searches of a 500 m radius mitigation zone will be conducted when weather conditions, daylight and sea state allow. During the hours of darkness, or when visual observation is not possible due to weather conditions or sea state, a proven PAM system (and operator) will be used.

If marine mammals are detected within the mitigation zone during a pre-work search (either visually or acoustically), work will be delayed until their passage, or the transit of the vessel, results in them being outside the mitigation zone. There will be a minimum of 20 minutes from the time of the last detection within the mitigation zone to the commencement of the work.

As per the 2017 JNCC guidelines, unplanned breaks refer to instances where the USBL system/beacons cease pinging unexpectedly during operations. In these instances:

- Work will resume without a pre-work search after unplanned breaks of 10 minutes or less provided that no animals are detected in the mitigation zone during the breakdown period; and
- A full pre-work search will be conducted before work resumes after unplanned breaks of longer than 10 minutes. Any time the MMO/PAM operator has spent observing prior to the breakdown period will contribute to the pre-work search time.

10.4.2. Soft Starts

It is understood that it is not possible to soft start the USBL system or beacons therefore no soft starts will be employed. Where it is possible to do so, soft starts (gradual increase in the sound pressure over a duration of 20-40 minutes) will be employed on other pieces of geophysical equipment.

10.4.3. Transit Watches

A nominated competent observer on the bridge of all vessels will keep watch for marine mammals during transit between port and the location of works for the HVDC cable route. Any sightings will be communicated to the Master of the vessel as soon as is practicable and the following actions, as per the Scottish Marine Wildlife Watching Code, implemented:

- The Master of the vessel will ensure that marine mammals are avoided to a safe distance (100 m or more) in all possible circumstances; and
- The Master of the vessel will minimise high powered manoeuvres where this does not impair safety.

11.Extension of Proposed 2018 Work

Due to the extension of the program the activities predicted to be undertaken as part of the Caithness to Moray HVDC Link offshore cable lay works from 1st September 2018 until the end of May 2019 are:

- Backfill operations;
- Rock placement;
- Excavation work (of laid cable) and burial works;
- Cable replacement work; and
- Associated surveys for each activity.

As the work in 2018 is covered by a new EPS Licence (MS EPS 01 2018 1 which expires on 31st August) and an extension to this licence is been sought, the mitigation plan for these activities is re-established in this section to ensure any updates in the new Licence are captured. The following sections set out the methods, impacts on cetacean EPS, and proposed mitigation to be implemented during the extension to the subsea cable lay works in 2018/2019. In addition to this MMPP, a full EPS Risk Assessment has been undertaken on the procedures and equipment to be used for the work (Report Number 1174549).

11.1. Methodology

Summary details of the proposed cable installation methodology for the Caithness Moray HVDC project are as follows. Methodologies are subject to change if required following the application of Reasonable Endeavours.

11.1.1. Backfill

Backfill operations will be conducted from an Anchor Handling Tug Supply (AHTS) vessel or similar. The mechanical backfill will use a SCAR plough which will be used in backfill mode and will return the trenching excavation materials from along the cable route to over the exposed cable to provide suitable cover.

A work class ROV will be used during the backfill operations to:

- Monitor the launching, towing, and recovery of the SCAR plough system;
- Investigate targets or obstructions on the seabed in the path of the SCAR plough;
- Complete seabed surveys; and
- Assist with contingency operations.

During the nearshore (<15 m LAT) backfill, a multicat vessel is anticipated to be required to support the positioning and towing of the SCAR plough by the AHTS vessel. The multicat will use USBL positioning to monitor the progress of the SCAR plough during the operations.

Surveys will be performed as soon as possible after backfill has been completed over any section of the cable route; this is to allow the release of the guard vessels and to open up the area for marine users. Surveys may be undertaken by a separate vessel (i.e. a small survey vessel/ autonomous underwater vehicle (AUV)) – particularly in the nearshore areas.

The work will require the use of an MBES system for pre/post-work surveys, USBL positioning systems and beacons to monitor positioning of the SCAR plough and ROV, a Doppler Velocity Log (DVL) for positioning and navigation, and Obstacle Avoidance Sonar (OAS) to monitor progress during the works.

Proposed Vessels

Details of the vessels proposed for use during backfill are provided in Table 11.1 below.

Table 11.1: Vessels potentially used for backfill

Vessel	Use
Anchor Handling Tug Supply (AHTS) Vessel	Towing of the plough/ROV surveys
Shallow draft multicat vessel	Assist in launching and monitoring the scar plough until the water depth is suitable for the ROV
Small survey vessel/AUV*	Pre/post backfill surveys

**not necessarily required*

11.1.2. Rock Placement

The rock placement work will comprise stabilisation and protection work in discreet areas along the entirety of the route (i.e. from Portgordon, Moray to Noss Head, Caithness). The exact locations where rock placement will be needed are not yet finalised as they are dependent on other ongoing work. Water depths where rock placement is required vary from 6m LAT up to 100m LAT. The rock placement activities will be executed by Dynamic Positioned Fall Pipe Vessels (DPFPVs). Larger rocks (i.e. those that cannot be placed by fall pipe) will be placed on to the rock berm through use of a crane and large rock grab.

The rock placement is required in areas where no trenching is foreseen, where the soil conditions are deemed unsuitable for trenching and where the required burial depth is not met (or where it is not anticipated that it will be met) after the backfill operations.

The work will require the use of a MBES system for pre and post-work surveys, USBL positioning systems and beacons (to monitor positioning of the ROV), a DVL for positioning and navigation, and OAS to monitor progress during the work.

Proposed Vessels

The DPFPVs are purpose built vessels for the accurate placement of rock/gravel material in a controlled manner by using a fall pipe. The fall pipe is deployed through a moonpool in the centre of the vessel. It is envisaged that DPFPV *Seahorse* will be the main vessel for this work (as per the scope complete in 2017), however other comparable vessels may be used. DPFPV *Seahorse* is also equipped with an inclined fallpipe system (IFPS) which is used for hard to reach locations in shallow waters or close to structures. For the placement of any large rocks, a crane vessel (anticipated to be of equivalent size or smaller than the DPFPV) equipped with a rock grab will be used. Small survey vessels / AUV's may also be used for the pre/post survey activities.

Table 11.2: Vessels potentially used for rock placement

Vessel	Use
Dynamic Positioned Fall Pipe Vessels (DPFPVs)	Rock placement offshore
Crane barge	Large rock placement and nearshore works
Small survey vessel*	Pre/post operational surveys

**not necessarily required*

11.1.3. Excavation and Burial Works

Additional excavation/burial works will likely be required and will take one of the forms previously assessed such as the mass flow excavation system; jet trenching; an air lift/excavation system operated by an ROV or a subsea excavation vehicle. The exact locations for excavation and inspection are yet to be decided however it is anticipated that excavation/burial work may be required between KP 83-86, and between KP 11-16 (although this activity may be required at other locations).

A survey of burial depth is also due to be undertaken in the nearshore Portgordon area (KP 1.6-3.5) using cable tracking equipment or a Pangeo acoustic profiler operated from an ROV. Alternatively, a diver survey may be utilised to undertake the burial depth survey using a hand held cable tracker. Depending on the outcome of the

survey, additional burial work may be undertaken in line with that proposed at other locations, however due to the shallow water, the dredge heads may be positioned by divers for some or all of the remedial scope.

The excavation system(s) will be deployed from an AHTS vessel (or similar) and will be used to erode seabed material to expose or bury the cables. Pre/post work surveys are likely to be required.

The work will require the use of a MBES system for pre and post-work surveys, USBL positioning systems and beacons (to monitor positioning of the ROV/subsea excavation vehicle) to monitor progress during the work.

Proposed Vessels

Previously the works have been carried out by an AHTS vessel or a self-propelled crane barge with assistance from a tug when laying out its anchors in the nearshore areas. It is anticipated that the same/similar vessels will be used for other work of this type, although it is recognised that it will depend on the exact excavation method decided and the working environment. Small survey vessels / AUV's may be utilised to survey the work if required.

Table 11.3: Vessels potentially used for excavation/burial works

Vessel	Use
Anchor Handling Tug Supply (AHTS) Vessel	Deployment of excavation/burial systems
Shallow draft multicat vessel	Deployment of excavation/burial systems for works in shallow water
Small survey vessel/AUV*	Pre/post backfill surveys

**not necessarily required*

11.1.4. Cable Replacement Works

The cable replacement procedure will utilise an ROV and/or divers. The replacement works are proposed to occur between KP11-16 and 83-86 and will be confirmed after completion of testing and surveys.

The Cable Lay Vessel (CLV) will position itself as near to replacement locations as water depth and cable parameters allow. An ROV/diver will be deployed and used for survey and recovery of the cable. The ROV/diver will conduct a visual/sonar survey. The divers/ROV will be fitted with USBL positioning beacons.

The cable will be paid out from the CLV once replaced and jointed. The ROV/diver will monitor the replacement operations as well as the as laid position of the cable in the trench. This process will be repeated for each section as required.

After the cables have been replaced successfully, the ROV (or potentially small survey vessel/ AUV) will complete an 'as laid' survey to inspect the cables laid.

It is assumed the work will require the use of a MBES system for pre and post-work surveys, USBL positioning systems and beacons (to monitor positioning of the ROV), a DVL for positioning and navigation, and OAS to monitor progress during the work.

Proposed Vessels

The cable replacement will require the use of the CLV. Additional vessels (e.g. shallow draught multicats/workboats and diver/ROV support vessels) may also be required to aid the replacement due to water depth. Small survey vessels / AUV's may be utilised for pre/post lay surveys.

Table 11.4: Vessels potentially used for cable replacement works

Vessel	Use
Cable Lay Vessel (CLV)	Cable replacement works
Shallow draft multicat vessel and/or workboats	Diver/ROV support for works in shallow water
Small survey vessel/AUV*	Pre/post work surveys

**not necessarily required*

11.1.5. Use of Geophysical Survey Equipment to Monitor Works

During the above described works, geophysical survey equipment will be utilised to survey the route, to monitor the progress of the work, and for positioning of any ROVs or other underwater equipment needed to complete the works. Table 11.5 provides information on the potential geophysical survey equipment that may be used. It is recognised that this equipment specification list may change and any changes will be communicated to Marine Scotland as soon as that information is available, along with any resulting alterations to mitigation which may be required.

Table 11.5: Details of the proposed types of geophysical equipment which emit sound

Equipment Type	Typical Source Pressure Level (dB re 1 µPa @ 1 m)	Potential for auditory injury?	Typical Frequency Range (kHz)	Potential for a behavioural response?
USBL System	< 220	Potential risk	18-36	Y
USBL Beacons	< 206	Potential risk	19-36	Y
Multi Beam Echo Sounder (MBES)	< 221	Negligible risk	200-455	N
Obstacle Avoidance Sonar (OAS)/Multi Beam Imaging Sonar	< 207	Negligible risk	200-1100	N
Dual Head Scanning Sonar (DHSS)	< 210	Negligible risk	200-2250	N
Doppler Velocity Log (DVL)	< 217	Negligible risk	600 or 1200	N

11.2. Estimated Duration of Work

All work is planned to be carried out between 1st September 2018 and the end of May 2019.

The estimated duration of each of the proposed activities/tasks can be found in Table 11.6 below. It should be noted that activities may be undertaken concurrently.

Table 11.6: The estimated duration of each of the activities proposed to be undertaken

Task	Estimated duration (days) excl. weather/other delays*
Backfill	66
Rock placement	60
Cable replacement works	23
Excavation/burial works	48

**Maximum duration (excluding weather/other non-working days) not anticipated to exceed 200% of estimated durations stated above*

11.3. Summary of Risk Assessment

A full EPS Risk Assessment has been undertaken on the procedures and equipment to be used for the proposed work on the Caithness to Moray cable route in 2018 and 2019 (Document Number 11174549). This risk assessment assessed that during the planned cable lay works for the Caithness to Moray cable route; there is the potential for some European Protected Species of cetacean to be impacted.

To determine potential impacts of the proposed cable lay works, the main activities associated with the works have been identified.

The following potential impacts on EPS likely to be present in the Moray Firth were assessed:

- Increased anthropogenic noise from backfill, rock placement, excavation/burial and cable replacement works;

- Increased anthropogenic noise from geophysical equipment which emits sound;
- Increased vessel noise; and
- Collision with vessels.

The proposed backfill, rock placement, excavation and cable replacement works on the Caithness to Moray HVDC cable interconnector will be undertaken between 1st September 2018 and the end of May 2019.

Following the JNCC *et al.* (2010) guidance (relevant to work on the section of the cable route which occurs in waters beyond the 12 nautical mile limit) it can be concluded that, with mitigation for the USBL systems and beacons (which will reduce the potential for physical and auditory injury to negligible levels), potential impacts from the proposed backfill and rock placement work are unlikely to result in the disturbing, injuring or killing of an EPS as defined under regulation 39(1) of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended) (referred to as the Offshore Regulations).

Following the Marine Scotland and SNH (2014) guidance (relevant to work on the sections of the cable route which occur in waters within the 12 nautical mile limit) it can be concluded that, with mitigation for the USBL systems and beacons (which will reduce the potential for physical and auditory injury to negligible levels), potential impacts from the proposed cable pull in, mass flow excavation, backfill and rock placement work are unlikely to result in the harassment, disturbing, injuring or killing of an EPS as defined under regulation 39(1) of the Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) (referred to as the Habitats Regulations). In relation to regulation 39(2) of the Habitats Regulations, the percentage of the reference population of each species which has the potential to be disturbed by use of the USBL systems and beacons is considered to be negligible (less than 1 % for the three main cetacean species which occur in the Moray Firth) and therefore not detrimental to the maintenance of the population of the species concerned at a FCS.

It is therefore considered that an EPS licence (in order to permit the disturbance of cetacean EPS along the route of the Caithness to Moray HVDC in connection with the use of USBL systems and beacons) is required and is likely to be awarded on the basis of passing the key EPS tests.

11.4. Marine Mammal Mitigation Plan

Operation of the USBL systems and beacons during the backfill, rock placement, excavation/burial and cable replacement works has the potential to cause (1) physical injury at very close range and (2) induce the onset of auditory injury in (low and high frequency) cetacean EPS. Therefore mitigation in the form of pre-work searches will be undertaken prior to use of the USBL systems and beacons during all backfill, rock placement, excavation/burial and cable replacement works in order to reduce the potential for physical and auditory injury to negligible levels.

11.4.1. Pre-Work Searches

The methodology for the pre-work searches (which will be undertaken in order to reduce the potential for marine mammals to occur in close proximity to the USBL systems and beacons prior to their initiation) is based on the recommendations outlined in the JNCC guidelines (2017).

Clear channels of communication between the MMO/PAM operator and relevant crew will be established prior to commencement of any operations. The crew will inform the MMO/PAM operator (or nominated lead) sufficiently in advance of any proposed work so that a full pre-work search can be completed prior to work commencing.

At least one dedicated MMO/PAM operator will be available to undertake pre-work searches of 30 minutes in length. Visual searches of a 500 m radius mitigation zone will be conducted when weather conditions, daylight and sea state allow. During the hours of darkness, or when visual observation is not possible due to weather conditions or sea state, a proven PAM system (and operator) will be used.

If marine mammals are detected within the mitigation zone during a pre-work search (either visually or acoustically), the start of work will be delayed until their passage, or the transit of the vessel, results in them being

outside the mitigation zone. There will be a minimum of 20 minutes from the time of the last detection within the mitigation zone to the commencement of the work.

As per the 2017 JNCC guidelines, unplanned breaks refer to instances where the USBL system/beacons cease pinging unexpectedly during operations. In these instances:

- Work will resume without a pre-work search after unplanned breaks of 10 minutes or less provided that no animals are detected in the mitigation zone during the breakdown period; and
- A full pre-work search will be conducted before work resumes after unplanned breaks of longer than 10 minutes. Any time the MMO/PAM operator has spent observing prior to the breakdown period will contribute to the pre-work search time.

11.4.2. Soft Starts

It is understood that it is not possible to soft start the USBL system or beacons therefore no soft starts will be employed for these pieces of equipment. Where it is possible to do so, soft starts will be employed on other pieces of geophysical equipment. When initiating equipment with a soft start, power should be built up slowly from a low energy start-up over at least a period of 15 – 25 minutes until operational level is reached (as per section 2.1.3 of the JNCC guidelines for geophysical surveys). The soft start will be achieved by ramping up the power in a uniform manner.

11.4.3. Transit Watches

In addition to the mitigation proposed above, the following measures will be adhered to:

- A nominated competent observer on the bridge of all vessels will keep watch for marine mammals and basking sharks during transit to and from the work sites. Any sightings will be communicated to the Master of the vessel as soon as is practicable and the following actions, as per the Scottish Marine Wildlife Watching Code[14], implemented:
  - The Master of the vessel will ensure that marine mammals and basking sharks are avoided to a safe distance (100 m or more) in all possible circumstances; and
  - The Master of the vessel will minimise high powered manoeuvres where this does not impair safety.

[14] which can be downloaded from https://www.nature.scot/professional-advice/land-and-sea-management/managing-coasts-and-seas/scottish-marine-wildlife-watching-code

12.Species Protection Plans

Scottish Natural Heritage (SNH) guidance on SPPs is that they should:

- Build on the results of surveys to look at potential impacts of the development on protected species;
- Describe how those impacts will be mitigated or compensated;
- Identify whether or not offences would otherwise be committed (i.e. whether or not a licence is necessary); and
- Describe how all of the work in relation to protected species (including licensed work) will be undertaken[15].

The Moray Firth is a relatively well-surveyed area, with good occurrence, distribution and absolute/relative abundance information available for most of the marine mammal species present (see Table 10.1 below). The potential impacts of installing the subsea cable have been assessed and mitigation measures and requirements for EPS licences identified and outlined by activity (Table 12.1).

All marine mammal species present in the Moray Firth are protected (see Section 3). However, for the SPPs we have concentrated on those species which commonly occur on a year-round (bottlenose dolphin, harbour porpoise, grey seal and harbour seal) or seasonal (minke whale) basis (Section 3). Species which occur on a more occasional basis are covered by the 'All other cetacean species' row in Table 12.1.

[15] See http://www.snh.gov.uk/protecting-scotlands-nature/species-licensing/forms-and-guidance/species-protection-plan/

Table 12.1: Summary of Species Protection Plan information for the protected marine mammal species present in the Moray Firth

Species	Marine mammal survey information available	Assessment of potential impacts undertaken	Mitigation Planned	EPS licence required	Description of how the work in the development proposal will be undertaken
PRE-LAY GEOPHYSICAL SURVEY					
Minke whale	Y	Y	Y	Y	Y
Bottlenose dolphin	Y	Y	Y	Y	Y
Harbour porpoise	Y	Y	Y	Y	Y
All other cetacean species	Y	Y	Y	Y	Y
Grey seal	Y	Y	Y	N	Y
Harbour seal	Y	Y	Y	N	Y
GEOPHYSICAL AND GEOTECHNICAL (BOREHOLE) SURVEYS AT SPEY BAY TO INFORM HDD WORKS					
Minke whale	Y	Y	Y	Y	Y
Bottlenose dolphin	Y	Y	Y	Y	Y
Harbour porpoise	Y	Y	Y	Y	Y
All other cetacean species	Y	Y	Y	Y	Y
Grey seal	Y	Y	Y	N	Y
Harbour seal	Y	Y	Y	N	Y
OFFSHORE CABLE LAY WORKS					
Minke whale	Y	Y	Y	Y	Y
Bottlenose dolphin	Y	Y	Y	Y	Y
Harbour porpoise	Y	Y	Y	Y	Y
All other cetacean species	Y	Y	Y	Y	Y
Grey seal	Y	Y	Y	N	Y
Harbour seal	Y	Y	Y	N	Y
CAITHNESS HDD WORKS					
Minke whale	Y	Y	Y	N	Y
Bottlenose dolphin	Y	Y	Y	N	Y

Species	Marine mammal survey information available	Assessment of potential impacts undertaken	Mitigation Planned	EPS licence required	Description of how the work in the development proposal will be undertaken
Harbour porpoise	Y	Y	Y	N	Y
All other cetacean species	Y	Y	Y	N	Y
Grey seal	Y	Y	Y	N	Y
Harbour seal	Y	Y	Y	N	Y
MORAY HDD WORKS					
Minke whale	Y	Y	Y	N	Y
Bottlenose dolphin	Y	Y	Y	N	Y
Harbour porpoise	Y	Y	Y	N	Y
All other cetacean species	Y	Y	Y	N	Y
Grey seal	Y	Y	Y	N	Y
Harbour seal	Y	Y	Y	N	Y
OFFSHORE ROCK PLACEMENT WORKS					
Minke whale	Y	Y	Y	Y	Y
Bottlenose dolphin	Y	Y	Y	Y	Y
Harbour porpoise	Y	Y	Y	Y	Y
All other cetacean species	Y	Y	Y	Y	Y
Grey seal	Y	Y	Y	N	Y
Harbour seal	Y	Y	Y	N	Y
JET TRENCHING WORK					
Minke whale	Y	Y	Y	Y	Y
Bottlenose dolphin	Y	Y	Y	Y	Y
Harbour porpoise	Y	Y	Y	Y	Y
All other cetacean species	Y	Y	Y	Y	Y
Grey seal	Y	Y	Y	N	Y
Harbour seal	Y	Y	Y	N	Y
Work Planned for 2018 (including extension)					

Species	Marine mammal survey information available	Assessment of potential impacts undertaken	Mitigation Planned	EPS licence required	Description of how the work in the development proposal will be undertaken
Minke whale	Y	Y	Y	Y	Y
Bottlenose dolphin	Y	Y	Y	Y	Y
Harbour porpoise	Y	Y	Y	Y	Y
All other cetacean species	Y	Y	Y	Y	Y
Grey seal	Y	Y	Y	N	Y
Harbour seal	Y	Y	Y	N	Y

13.Marine Mammal Observer Forms and Report

The MMOs/PAM operators deployed for mitigation purposes will be required to record the information they collect using Marine Mammal Recording Forms developed under a project funded by the Exploration and Production (E&P) Sound and Marine Life Joint Industry Programme (JIP).

A guide to completing the forms is provided at http://jncc.defra.gov.uk/marine/seismic_survey (see 'Guide to using Marine Mammal Recording Forms'). To be classed as a trained MMO, individuals must have received formal training on a JNCC recognised course. The course covers reporting requirements including how to complete the recording forms.

The marine mammal recording form (also at http://jncc.defra.gov.uk/marine/seismic_survey) is an Excel spreadsheet and has embedded worksheets named Cover Page, Operations, Effort and Sightings.

A Word document named 'Deckforms' is also available at http://jncc.defra.gov.uk/marine/seismic_survey. MMOs may prefer to use this template when observing, before transferring the details to Excel spreadsheets.

MMO recording forms and Operator Reports will be submitted to SHE Transmission two weeks following completion of marine works.

Data from these forms and reports are analysed by JNCC and should be submitted accordingly. The report should detail how the JNCC guidance was implemented and include any problems or instances of non-compliance with the guidance.

14. References

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ABB Revision Log

Rev.	Section	Description	Date Dept./Init.
A	Whole document	First Issue	2014-08-22/SIS
B	Whole document, general refreshment	Updated according to Employer comments 12.0381-RRR0039 rev00	2014-11-13/SIS
C	Whole document	Updated mainly re. the MMMP for the pre-lay geophysical survey by Natural Power	2015-04-09/NP
D	Whole document	Transferred to Natural Power template; section 3 updated to be consistent with the EPS pre-lay survey risk assessment	2015-04-15/NP
E	Whole document	All sections (except 3 and 4.1) have been updated	2015-04-30/NP
F	Section 2	'Frac-out' plan information added	2015-05-07/NP
G	Whole document	Comments from SHE Transmission (detailed in 12.0381-RRR0241.doc) incorporated	2015-05-26/NP
H	Whole document	Methodological information and sections on the additional geophysical and borehole surveys added	2015-07-17/NP
I	Sections 4, 6 and 8 updated	HDD works at Noss Head and geophysical/geotechnical (borehole) surveys at Spey Bay information added	2015-08-14/NP
J	Section 5 updated	Information added to the offshore cable lay works section	2015-09-18/NP
K	Sections 5, 7 and 8 updated	Cable lay and Moray HDD information added.	2015-10-30/NP
L	Section 8	Moray HDD – 3 m LAT section added	2016-08-16/NP
M	Section 9	Moray – 3 m to – 6 m LAT Sleeve Pipe Installation section added	2016-10-14/NP
N	Section 9	Moray Works Between -3 m to -6 m LAT section updated with new method statement and geophysical and UXO survey	2016-10-27/NP
O	Section 5	Cable Lay Works – section updated with new methodologies provided	2016-11-03/NP
P	Section 5	Cable Lay Works – section updated with new geophysical equipment and vessel numbers	2016-11-25/NP
Q	Section 5	SHET Comments on Section 5 addressed in line with RRR accepted with comments status (Rev P)	2017-02-02/NP
R	Sections 8 and 9	Removed as per the comments from SHET in line with RRR (Rev Q)	2017-03-16/NP
S	Section 8 added	Rock Placement section added and Table 9.1 updated with information from the EPS Risk Assessment (Natural Power document number 1143732). Second paragraph of section 2 (re. porpoise SACs) also updated.	2017-06-14/NP
T	Section 9 added	Jet Trenching section added	2017-06-27/NP
U	Section 8	Rock Placement section amended as per SHETs comments	2017-07-05/NP

Rev.	Section	Description	Date Dept./Init.
V	Section 9	Jet trenching section updated in line with SHET comments	2017-07-05/NP
W	Section 8	Updated following Noss Head CEMP	2017-08-11/NP
X	Section 9	9.1.4. Updated to take account of programme changes	2017-08-25/NP
Y	Section 10	Added to address activities in 2018	2017-11-21/NP
Z	Section 10	10.2 Estimated Duration Of Work Proposed To Be Undertaken In 2018 updated	2017-11-28/NP
AA	Section 2 Section 11	2: Update to legislation and marine mammal presence 11: Section added to accompany the extension to the works in 2018/2019	2018-07-18/NP
AB	Section 11	11.2 Duration of works updated	2018-07-23/NP
AC	Section 2 Section 11	2: Updated SAC information 11: Amended as per client comments	2018-07-26/NP

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