



SSE Renewables Developments (UK) Ltd

# Geotechnical Survey Campaign- HDD Nearshore Cable Corridor Technical Note

**ASSIGNMENT**    A302605-S10  
**DOCUMENT**     A-302605-S10-A-TECH-002



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A03	30/06/2022	Issued for Use	NG	EG	EG	DW
A02	29/06/2022	Issued for Use	EC	NG	NG	DW
A01	22/06/2022	Issued for Use	EC	NG	EG	DW
R01	02/06/2022	Issued for Review	EC	NG	NG	DW
REV	DATE	DESCRIPTION	ISSUED	CHECKED	APPROVED	CLIENT



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## ACRONYMS

ACRONYM	EXPANDED ABBREVIATION
AfL	Agreement for Lease
BGS	British Geological Society
BWM	Ballast Water Management
CES	Crown Estate Scotland
CNS	Central North Sea
DECC	Department of Energy and Climate Change
DTI	Department of Trade and Industry
EPS	European Protected Species
EUNIS	European Union Nature Information System
GW	Gigawatt
ICES	International Council for Exploration of the Sea
IMO	International Marine Organisation
IRPCS	International Regulations for the Prevention of Collision at Sea
JNCC	Joint Nature and Conservation Committee
km	Kilometres
km <sup>2</sup>	Kilometres Squared
kW/m	Kilo-Watt per Metre
LAT	Lowest Astronomical Tide
m	Metre
m <sup>2</sup>	Metres Squared
m <sup>3</sup>	Metres Cubed
m/s	Metres per Second
MARPOL	Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MEPC	Marine Environmental Protection Committee
MHWS	Mean High Water Springs
mm	Millimetre
MPA	Marine Protected Area
NLB	Northern Lighthouse Board
NMPi	National Marine Plan Interactive



ACRONYM	EXPANDED ABBREVIATION
NNMS	Non-Native Marine Species
PMF	Priority Marine Feature
pMPA	Proposed Marine Protected Area
pSPA	Proposed Special Protection Area
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SEPA	Scottish Environment Protection Agency
SMWWC	Scottish Marine Wildlife Watching Code
SOLAS	International Regulations for the Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plans
SPA	Special Protection Area
SSE	Scottish and Southern Energy
SSER	Scottish and Southern Energy Renewables
SSSI	Site of Special Scientific Interest
TCE	The Crown Estate
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
USBL	Ultra-Short Baseline
WFD	Water Framework Directive



# 1 INTRODUCTION

## 1.1 Document Purpose

This technical note has been prepared to inform consultation associated with the proposed survey activities due to take place at the Branxton landfall area. This document details the upcoming survey requirements located between the Mean High Water Springs (MHWS) and -15 m Lowest Astronomical Tide (LAT) at the export cable landfall at Branxton. The geotechnical survey will commence as early as the 1<sup>st</sup> August with the aim to inform the development of the Berwick Bank Wind Farm. The estimated completion date is the 4<sup>th</sup> September 2022. This date is applied for in order to allow for any unforeseen operational and/or weather delays.

## 1.2 Project Background

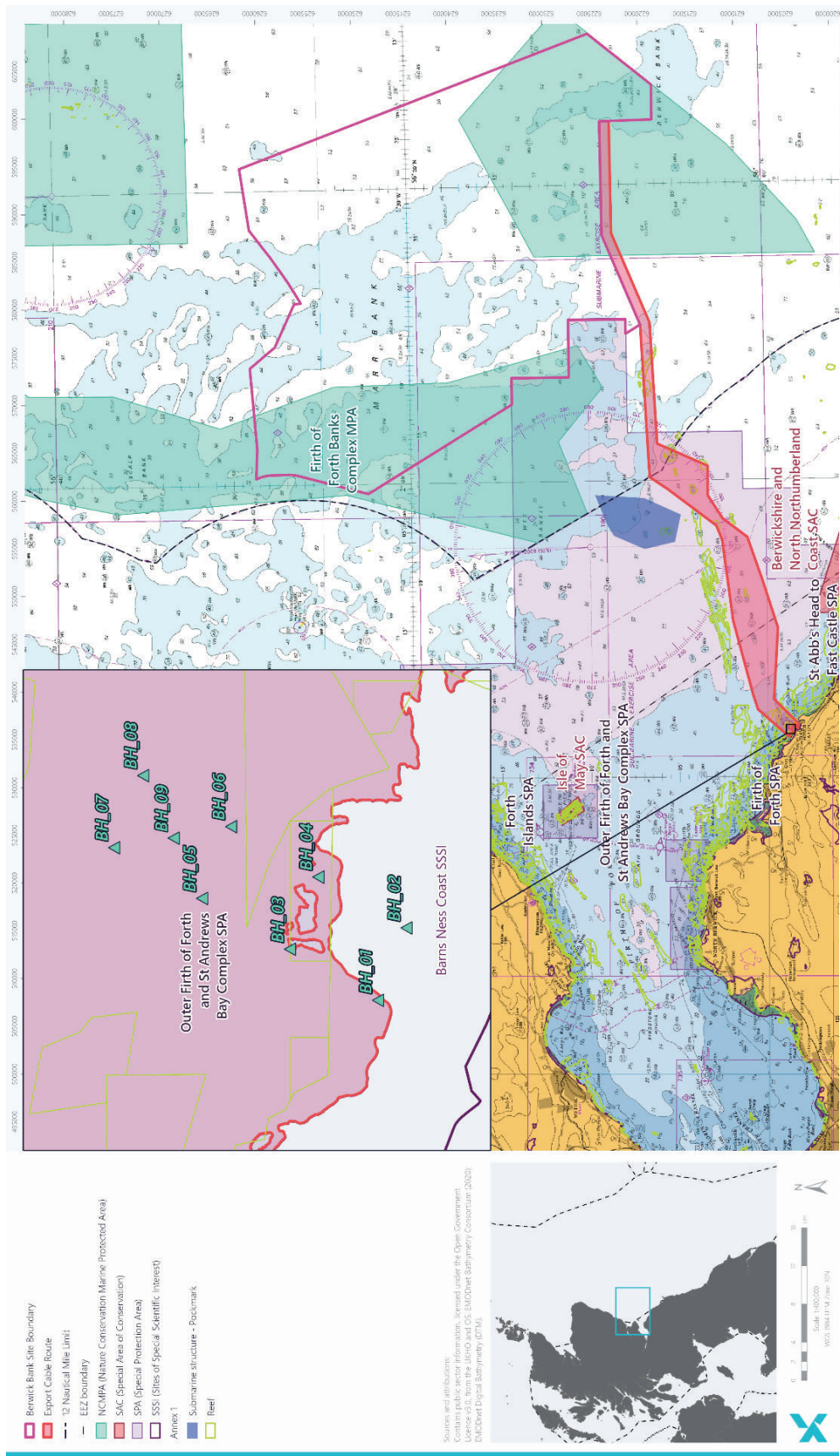
Scottish and Southern Energy Renewables (SSER) are developing the Firth of Forth Zone and wish to progress with the investigation and development of the Berwick Bank Wind Farm located off the east coast of Scotland. The site is located approximately 40 km from the East Lothian coastline (see Figure 1-1). This site has the potential to deliver around 4.1 GW of installed capacity, making it Scotland's largest wind farm.

The site was awarded exclusive development rights by The Crown Estate (TCE) for the Firth of Forth Zone of the United Kingdom's (UK's) Round 3 offshore wind farm development programme.

It should be noted that previous survey works were undertaken within the Berwick Bank Wind Farm array area. However, the scope covered under this document includes conducting surveys within part of the proposed export cable corridor near to the shore. The cable corridor is shown in Figure 1-1 as reference.



Figure 1-1 Nearshore Exploratory Borehole Locations Set in the Context of the Wider Wind Farm Array Area and Cable Corridor







## 2 SITE INVESTIGATIONS

SSER is developing the Berwick Bank Wind Farm and wish to further investigate and develop the area which includes the export cable route. As a part of this investigation, SSER plan to undertake a nearshore geotechnical survey. The aim of the geotechnical survey will be to investigate the distribution, thickness and geotechnical properties of the upper 30 m of the seabed to provide a better understanding of the geological and geotechnical characteristics across the site.

This document has been compiled to cover the scope of works anticipated to be undertaken at the export cable landfall at Branxton (just north of Torness). The survey is expected to commence as early as the 1<sup>st</sup> August 2022.

The survey will be conducted within the nearshore area located between the MHWS and -15 m LAT. This survey is anticipated to take between 14 – 21 days to conduct and will be undertaken by a jack-up vessel (i.e., the survey vessel). The estimated completion date is the 4<sup>th</sup> September 2022. This date is applied in order to allow for any unforeseen operational and/or weather delays. A tugboat will be used to tow the jack-up to and from the site. The jack-up will move between borehole locations using a stern thruster. A guard vessel will also be on site to guard the area and to check for fishing activities in the vicinity of the survey works.

The geotechnical survey will involve boreholes only. It is expected that as a worst-case, there will be a maximum of nine boreholes undertaken to maximum depth of 30 m below the seafloor. The boreholes will collect soil samples within a 101 mm diameter core. Maximum soil sample volume at each of the borehole locations is 0.240 m<sup>3</sup>. Boreholes will be advanced through a combination of piston/push/hammer sampling switching to drilling at rock head where required.

The borehole samples will be collected using the jack-up survey vessel which will feature four circular legs approximately 0.76 m in diameter, with the legs penetrating the seabed at each borehole location. This will give rise to an impacted area of 1.815 m<sup>2</sup> at each location, resulting in a collective impact of 16.335 m<sup>2</sup>.

All nine boreholes will be backfilled using a mixture of bentonite (a swelling clay mineral) and cement<sup>1</sup>, which are added to water to form a grout material. The grout is made up in a mixing pan on the deck of the jack-up and then pumped down the borehole to a maximum depth of 1 m below seafloor. The top 1 m of the borehole is left to fill naturally with marine sediments. There are six boreholes which will be drilled to 30 m below the seafloor and three boreholes that will be drilled to 15 m below the seafloor. Therefore, the total meterage will be 225 m with an expected total volume of grout deposited reaching approximately 3.32 m<sup>3</sup>.

There is also a requirement to use packer testing at borehole locations BH\_01, BH\_03 and BH\_05. Packer testing is an in-situ geo-hydraulic test with the specific aim of empirically measuring the hydraulic conductivity of a target strata. The principle of packer testing is based upon sealing off a section of a borehole using packers; these are units which expand either pneumatically or mechanically to sit against the borehole walls. Water is injected by use of a pump at the surface and via the rods, to the section under test. Analysis of the pressures within the test section along with flow rates allows for calculation of the hydraulic conductivity of the strata in question. The discharge of the water into the sea is not likely to cause any effect as it will be untreated (i.e., potable water). Moreover, as this activity will be conducted within the borehole itself, no further impacts are expected from the use of packer testing.

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<sup>1</sup> The use of bentonite cement pellets are not subject to permitting due to being exempt from the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regulations.



It should be noted that, for the jack-up, providing weather conditions allow (i.e., safe moving limits) SSER could move the jack-up within 1 to 2 hours. This includes the time it would take to pull the drill casing and move off the borehole location.



## 3 ENVIRONMENTAL CONSIDERATIONS

### 3.1 Bathymetry and Seabed Conditions

#### 3.1.1 Summary of Baseline

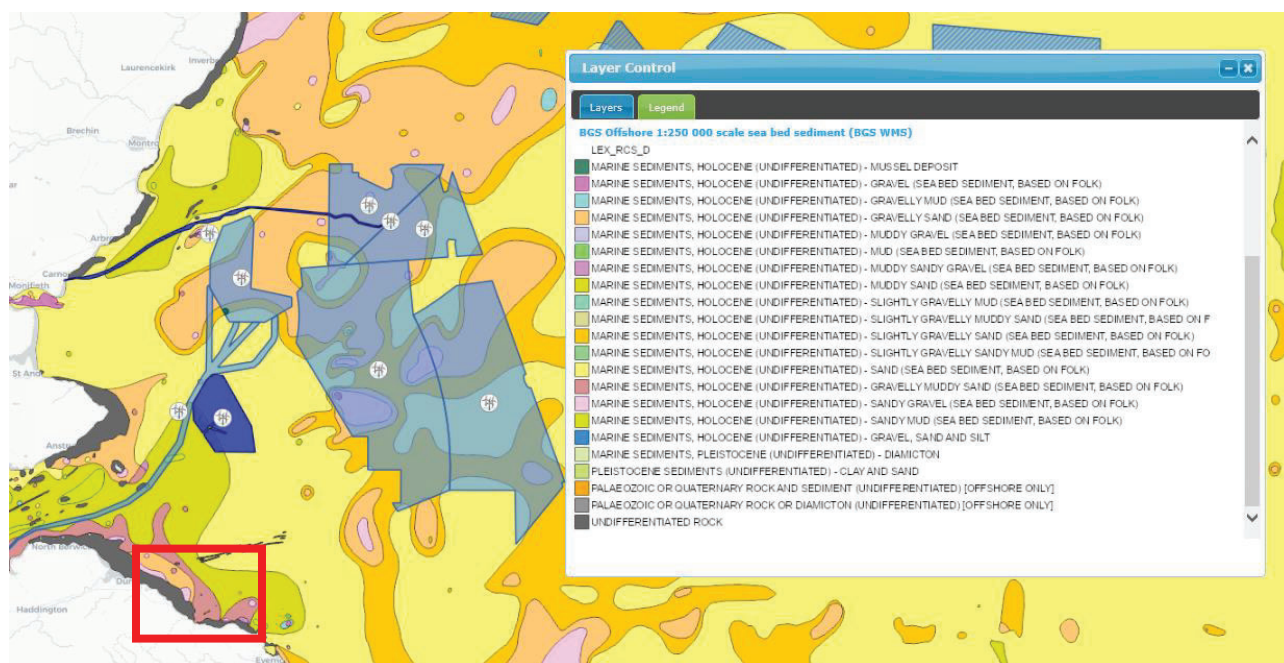
Nearshore tidal current velocities in the region are between 0.01-1.0 m/s during mean spring tides (DECC, 2016). The mean residual current surrounding the proposed nearshore exploratory borehole survey area is approximately 0.01 m/s (Wolf *et al.*, 2016).

According to the National Marine Plan interactive (NMPi) tool (2022), the annual mean wave height in the region of the proposed nearshore exploratory borehole survey area is between 0.91 – 1.20 m and the annual mean wave power is 0.1 – 6.0 kW/m.

The Firths of Tay and Forth are major features, formed during the inundation of the land by the sea at the end of the last glaciation. Much of the shoreline is composed of exposed rock platforms with deposits of glacial drift. There are large areas of sand dunes on the outer coast, including the Fife promontory with sheltered inlets holding extensive mud and sand flats (DECC, 2016). DECC (2009; 2016) reports that sand and slightly gravelly sand covers much of the seabed of the CNS region and occurs within a wide range of water depths from the shallow coastal zone to 110 m in the north and to below 120 m in isolated depths. Sediments may have a significant mud content, particularly in basins and in deeper waters to the north (NMPi, 2022). Coastal areas in the region support a more varied range of intertidal and seabed habitats (DTI, 2004) with sediments data from the British Geological Society (BGS), as reported in the NMPi tool (2022), reporting that the proposed nearshore exploratory borehole survey area is dominated by sand, slightly gravelly sand, gravelly sand, sandy gravel and gravel (Figure 3-1).



Figure 3-1 BGS Sediments in the Vicinity of Proposed Nearshore Exploratory Borehole Survey Area (NMPI, 2022)



### 3.1.2 Assessment of Potential Effects

Potential effects on sediments during the proposed nearshore exploratory borehole survey may arise from direct physical disturbance to the seabed and habitat loss or alteration. As stated in Section 2, seabed disturbance will occur from the nine boreholes and four vessel legs. Collectively, the boreholes will impact a volume of 2.16 m<sup>3</sup> and the vessel legs collectively will impact an area footprint of 16.335 m<sup>2</sup>. The depositing of the grout will occur within the boreholes, therefore, there will be no additional impacts. There is little quantitative information on the likely recovery time from the physical disturbance although indications are available from studies carried out on seabed disturbance by towed fishing gear (as reviewed by Løkkeborg, 2005). These suggest that it is likely that some level of recovery will occur in the sediments. The longevity of the physical scars or depressions in the seabed is dependent on the type and energy of the local benthic environment. Scars in high energy sandy and shallow environments may disappear within days or months of the initial disturbance, whilst those in quiescent silty and deeper areas may still be visible after 18 months.

The majority of sediments identified at the proposed nearshore exploratory borehole survey site exhibit good potential to recover from physical disturbance, particularly as proposed works will be localised and short-term. In addition, the borehole will be filled in with grout and up to 1 m below the seafloor leaving the remainder to back fill naturally. Some more disturbed areas may be slower to recover than others, but it is anticipated that all areas will recover over time. It is therefore considered that the impact of direct physical disturbance of sediments during the proposed nearshore exploratory borehole survey will be of negligible significance.



## 3.2 Benthic Ecology

### 3.2.1 Summary of Baseline

The NMPi (2022) shows the broad scale habitat of the proposed nearshore exploratory borehole survey area as European Union Nature Information System (EUNIS) biotope complex MC3 'Circalittoral coarse sediment', MC4 'Circalittoral mixed sediment' and MC6 'Circalittoral mud'. Further details on these sediment types are detailed below (European Environmental Agency, 2022):

- **MC3 sediment types** are coarse sediments in the circalittoral zone including coarse sand, gravel, pebbles, shingle and cobbles which are often unstable due to tidal currents and/or wave action. These habitats are generally found on the open coast or in tide-swept channels of marine inlets. They typically have a low silt content and a lack of a significant seaweed component. They are characterised by a robust fauna including venerid bivalves.
- **MC4 sediment types** are circalittoral habitats with slightly muddy mixed gravelly sand and stones or shell. This habitat may cover large areas of the offshore continental shelf although there is relatively little data available. Such habitats are often highly diverse with a high number of infaunal polychaete and bivalve species. Animal communities in this habitat are closely related to offshore gravels and coarse sands and in some areas, populations of the horse mussel *Modiolus modiolus* may develop in these habitats.
- **MC6 sediment types** are mud and cohesive sandy mud in the offshore circalittoral zone where a variety of faunal communities may develop, depending upon the level of silt/clay and organic matter in the sediment. Communities are typically dominated by polychaetes but often with high numbers of bivalves such as *Thyasira* spp., echinoderms and foraminifera.

It should also be noted that there is the potential for Annex I Reefs within the proposed nearshore exploratory borehole survey area. Reefs are rocky marine habitats or biological concretions that rise from the seabed. They are generally subtidal but may extend as an unbroken transition into the intertidal zone, where they are exposed to the air at low tide. Intertidal areas are only included within this Annex I type where they are connected to subtidal reefs. Reefs are very variable in form and in the communities that they support (JNCC, 2022b).

### 3.2.2 Assessment of Potential Effects

Potential effects on benthic ecology during the proposed nearshore exploratory borehole survey may arise from direct physical disturbance and habitat loss or alteration. However, the majority of subtidal species and biotopes identified at the proposed nearshore exploratory borehole survey area exhibit good potential to recover from physical disturbance, particularly as proposed works will be localised and short-term. It is anticipated that the benthic community impacted will recover and species richness, with re-establishment, improved following subsequent spawning and recruitment periods.

Some more disturbed areas may be slower to recover than others, but it is anticipated that all areas will recover over time. It is therefore considered that the impact of direct physical disturbance of benthic species and habitats during the proposed nearshore exploratory borehole survey will be of negligible significance. In addition to this, the Annex I Reefs which are likely to be in the area may be impacted, however the area of disturbance will be relatively small in



comparison to the spread of the Annex I Reef and therefore, significant impacts to this sensitive habitat is not anticipated.

As stated in Section 2, seabed disturbance will occur from the nine boreholes and four vessel legs. Collectively, the boreholes will impact a volume of 2.16 m<sup>3</sup> and the vessel legs collectively will impact an area footprint of 16.335 m<sup>2</sup>. The depositing of the grout will occur within the boreholes, therefore, there will be no additional impacts. It is expected that the disturbance will be negligible due to impacts being localised and short-lived (i.e., taking place over 14 – 21 days). Potentially affected habitats and species are anticipated to recover quickly in the area and are not expected to be impacted at a population level.

### 3.3 Fish and Shellfish

#### 3.3.1 Summary of Baseline

A number of commercially important fish and shellfish species can be found in the vicinity of proposed nearshore exploratory borehole survey.

The proposed nearshore exploratory borehole survey area is located in International Council for the Exploration of the Sea (ICES) rectangle 40E7, in an area of spawning and nursery grounds for several commercially important species. This is summarised below (Coull *et al.*, (1998); Ellis *et al.*, (2012):

- Spawning species found within the area include: herring *Clupea harengus*, lemon sole *Microstomus kitt*, Norway lobster *Nephrops norvegicus*, plaice *Hippoglossoides platessoides* and whiting *Merlangius merlangus*.
- Nursery species found within the area include: anglerfish *Lophius Piscatorius*, blue whiting *Micromesistius poutassou*, cod *Gadus morhua*, herring, lemon sole, Norway lobster, plaice, sandeels *Ammodytes marinus*, sprat *Sprattus sprattus*, spurdog *Squalus acanthias* and whiting.

It should be noted that the rectangle is located within an area experiencing periods of high intensity nursery for cod and whiting (Ellis *et al.*, 2012). Findings from González-Irusta and Wright (2016) as reported on the NMPI (2022) tool, shows that ICES rectangle 40E7 is located in an area of “infrequent” and “occasional” cod spawning.

Of the species listed above, the following are listed as a Scottish Priority Marine Feature (PMF): anglerfish, blue whiting, cod, herring, sandeels, spurdog and whiting (NatureScot, 2020).

Of the species that spawn in ICES rectangle 40E7, only herring and Norway lobster are benthic spawning species.

Herring are demersal spawners, depositing their sticky eggs on coarse sand, gravel, small stones and rock. Shoals of herring gather on the spawning grounds and spawn more or less simultaneously. Each female releases her eggs in a single batch and the resulting egg carpet may be several layers thick and cover a considerable area (DECC, 2016). The drift rate of the larvae is variable, and it is probable that in some years many of them do not reach the nursery areas (Scottish Government, 2017).



Norway lobster are widely distributed on muddy substrata throughout the northeast Atlantic (Sabatini and Hill, 2008), and spawn all year round. Norway lobster construct their burrows in muddy sediments and their range is limited by the availability of suitable sediment, which ranges from sandy mud (70% sand, 30% silt and clay) to very soft mud (100% silt and clay) (Cefas, 2001; Scottish Government, 2017). They spend most of their time in their burrows, only coming out to feed and look for a mate. They carry their brood under their tails until they hatch and disperse as planktonic larvae (Scottish Government, 2017).

The sediment regime in the proposed nearshore exploratory borehole survey area consists of sand, slightly gravelly sand, gravelly sand, sandy gravel and gravel and therefore it is likely that these species may spawn in the area from time to time.

### 3.3.2 Assessment of Potential Effects

The proposed nearshore exploratory borehole survey has the potential to directly affect fish and shellfish ecology in terms of direct disturbance to the seabed and habitat loss along with the subsequent sediment deposition and vessel noise. This in turn may affect associated spawning, nursery, feeding habits and migration.

As discussed in Section 3.1.1, the proposed nearshore exploratory borehole survey area is dominated by sand, slightly gravelly sand, gravelly sand, sandy gravel and gravel. Seabed disturbance has the potential to impact on benthic spawning fish species. As discussed in Section 3.3.1 herring and Norway lobster are benthic spawning species within the area. Although seabed impacts will cause mortality of individuals, impacts to benthic fish species at a population level are not expected given the relatively localised nature of the activities in comparison to the surrounding seabed.

As stated in Section 2, seabed disturbance will occur from the nine boreholes and four vessel legs. Collectively, the boreholes will impact a volume of 2.16 m<sup>3</sup> and the vessel legs collectively will impact an area footprint of 16.335 m<sup>2</sup>. The depositing of the grout will occur within the boreholes, therefore, there will be no additional impacts. It is expected that the disturbance will be negligible due to impacts being localised and short-lived (i.e., taking place over 14 – 21 days). Potentially affected habitats and species are anticipated to recover quickly in the area and are not expected to be impacted at a population level.

## 3.4 Seabirds

### 3.4.1 Summary of Baseline

Much of the North Sea and its surrounding coastline is an internationally important breeding and feeding habitat for seabirds.

According to the seabird density maps provided in Kober *et al.* (2010), the following species have been recorded within the proposed nearshore exploratory borehole survey area, throughout the year: Northern fulmar *Fulmarus glacialis*, sooty shearwater *Puffinus griseus*, max shearwater *Puffinus puffinus*, European storm petrel *Hydrobates pelagicus*, Northern gannet *Morus bassanus*, pomarine skua *Stercorarius pomarinus*, Arctic skua *Stercorarius parasiticus*, great skua *Stercorarius skua*, black-legged kittiwake *Rissa tridactyla*, great black-backed gull *Larus marinus*, common gull *Larus canus*, lesser black-backed gull *Larus fuscus*, herring gull *Larus argentatus*, common



guillemot *Uria aalge*, Arctic tern *Sterna paradisaea*, razorbill *Alca torda*, little auk *Alle alle* and Atlantic puffin *Fratercula arctica*.

### 3.4.2 Assessment of Potential Effects

The presence of vessels in the proposed nearshore exploratory borehole survey area has the potential to impact birds through disturbance and displacement from foraging activities. These could be through direct impact of collision of wading birds and/or indirect impact through the displacement of foraging activities through species/prey disturbances.

As discussed in Section 3.5.1, the Outer Firth of Forth and St. Andrews Bay Complex Special Protection Area (SPA) features within the area of the proposed activities. It is an extensive site off the southeast coast of Scotland which supports a range of important seabird species (JNCC, 2020). It is expected that there will be no likely significant effects on any of the proposed qualifying interests of the Outer Firth of Forth and St Andrews Bay Complex SPA or their supporting habitats – in particular no significant disturbance to birds from any vessel movement. This conclusion was reached based on the limited extent and temporary nature of the proposed activity.

As stated in Section 2, seabed disturbance will occur at nine locations which will include boreholes and four vessel legs from the jack-up at each location. It is expected that the impact will be negligible due to the localised and short-lived (i.e., taking place over 14 – 21 days) nature of the operations. Potentially affected species are anticipated to recover quickly in the area and are not expected to be impacted at a population level.

## 3.5 Protected Areas

### 3.5.1 Summary of Baseline

The proposed location of the nearshore exploratory borehole survey coincides with two protected sites which include the Outer Firth of Forth and St. Andrews Bay Complex SPA and the Barns Ness Coast Site of Special Scientific Interest (SSSI).

The Outer Firth of Forth and St. Andrews Bay Complex SPA is an extensive site off the southeast coast of Scotland. It stretches from Arbroath in the north to St. Abb's Head in the south and encompasses the Firth of Forth, the outer Firth of Tay and St. Andrews Bay. The waters in this SPA attract one of the largest and most diverse marine bird concentrations in Scotland and the site is classified for the protection of a wide range of seabird and waterbird species (JNCC, 2020).

The Barns Ness Coast SSSI is an area of protected land or water defined by the European Union's Habitats Directive as containing unique species or habitats of high scientific value for conservation. This particular site is of interest to Lower carboniferous (*Dinantian namurian*), saltmarshes, sand dunes and shingle. Analysis of this site determined that Lower carboniferous is classified as 'favourably maintained', saltmarshes as 'favourable declining', sand dunes as 'unfavourable recovering' and shingle as 'favourable recovered' (NatureScot, 2021a).

The protected features of these sites are detailed in Table 3-1.





Table 3-1 Protected Sites and Their Features which transect the Proposed Nearshore Exploratory Borehole Survey Area

Site Name	Qualifying Feature of Site	Type of Feature
Barns Ness Coast SSSI	Lower carboniferous	Habitat
	Saltmarsh	Habitat
	Sand dunes	Habitat
	Shingle	Habitat
Outer Firth of Forth and St Andrews Bay Complex SPA	Red-throated diver <i>Gavia stellata</i> Slavonian grebe <i>Podiceps auritus</i>	Annex I waterfowl
	Common eider <i>Somateria mollissima</i> Long-tailed duck <i>Clangula hyemalis</i> Common scoter <i>Melanitta nigra</i> Velvet scoter <i>Melanitta fusca</i> Common goldeneye <i>Bucephala clangula</i> Red-breasted merganser <i>Mergus serrator</i>	Non-breeding migratory waterfowl
	Common tern <i>Sterna hirundo</i> Arctic tern <i>Sterna paradisaea</i> Little gull <i>Larus minutus</i>	Annex I seabirds
	European shag <i>Phalacrocorax aristotelis</i> Northern gannet <i>Morus bassanus</i> Atlantic puffin <i>Fratercula arctica</i> Black-legged kittiwake <i>Rissa tridactyla</i> Manx shearwater <i>Puffinus puffinus</i> Common guillemot <i>Uria aalge</i> Herring gull <i>Larus argentatus</i>	Breeding migratory seabirds
	European shag <i>Phalacrocorax aristotelis</i> Black-legged kittiwake <i>Rissa tridactyla</i> Razorbill <i>Alca torda</i> Black-headed gull <i>Chroicocephalus ridibundus</i> Common gull <i>Larus canus</i>	Non-breeding migratory seabirds



### 3.5.2 Assessment of Potential Effects

There will not be a notable long-term influence on the seabed due to the relatively small scale, temporary and limited nature of the works at each borehole location, especially when set in context of the overall scale of the seabed features and physical process system present. Interactions with benthic communities and seabed features will be limited to the footprint of the survey samples and will be de minimus scale. Any small depressions left following seabed sampling will rapidly infill via natural sedimentary processes. Due to the large size of the Outer Firth of Forth and St Andrews Bay Complex SPA (2,721 km<sup>2</sup>) and the Barns Ness Coast SSSI (approximately 2.5868 km<sup>2</sup>), the limited size of the seabed disturbance from sampling equates to very minimal disturbance of the total protected site areas. It should also be noted that all borehole locations (as shown in Figure 1-1) will be located within the Outer Firth of Forth and St Andrews Bay Complex SPA and only one borehole location (i.e., BH\_02) will be located within the Barns Ness Coast SSSI. Therefore, it can be concluded that there will be no significant effects on the protected features from the seabed survey samples.

As discussed in Section 2, all nine boreholes will be backfilled using a mixture of bentonite (a swelling clay mineral) and cement, which are added to water to form a grout material. Collectively, the boreholes will impact a volume of 2.16 m<sup>3</sup> and the vessel legs collectively will impact an area footprint of 16.335 m<sup>2</sup>. The depositing of the grout will occur within the boreholes, therefore, there will be no additional impacts. In addition, the top 1 m of the borehole is left to fill naturally with marine sediments and therefore is expected to recover quickly in the dynamic coastal environment. The use of bentonite cement pellets are not subject to permitting due to being exempt from the REACH regulations and therefore are not likely to pose a significant risk relating to its use.

Given the nature of the works there is likely to be a release of potable water into the marine environment from the use of packer testing. However, this is untreated and is therefore not likely to pose any impacts from its use. No material or chemicals into the surrounding environment will occur, and therefore water and / or sediment quality will not be compromised.

## 3.6 Marine Mammals

### 3.6.1 Summary of Baseline

#### Cetaceans

The CNS has a moderate to high diversity and density of cetaceans, with a general trend of increasing diversity and abundance with increasing latitude.

The following species have been recorded in the proposed nearshore exploratory borehole survey area (Reid *et al.*, 2003):

- Low densities of Atlantic white-sided dolphin *Lagenorhynchus acutus* have been recorded in the area during March, July and August.
- Low densities of bottlenose dolphin *Tursiops truncatus* have been recorded in the area during November.
- Low to moderate densities of harbour porpoise *Phocoena phocoena* have been recorded in the area during January, February, March, May, July, August, September and October.
- Low to moderate densities of minke whale *Balaenoptera acutorostrata* have been recorded in the area during May, June, July, August, September and October.



- Low densities of white-beaked dolphin *Lagenorhynchus albirostris* have been recorded in the area during January, July, August, September, October and November

## Seals

Two species of seals live and breed in the UK, namely the grey seal *Halichoerus grypus* and the harbour seal *Phoca vitulina* (Jones *et al.*, 2015; DECC, 2016). Both grey and harbour seals are listed under Annex II of the EU Habitats Directive and are PMFs (NatureScot, 2020).

Grey and harbour seals feed in inshore and offshore waters depending on the distribution of their prey, which changes both seasonally and yearly. Both species tend to be concentrated close to shore, particularly during the pupping and moulting season. Seal tracking studies from the Moray Firth have indicated that the foraging movements of harbour seals are generally restricted to within a 40–50 km range of their haul-out sites (Special Committee on Seals, 2020). The movements of grey seals can involve larger distances than those of the harbour seal and tracking of individual seals has shown that most foraging probably occurs within 100 km of a haul-out site although they can feed up to several hundred kilometres offshore (Special Committee on Seals, 2020).

Since the proposed nearshore exploratory borehole survey will be located close to shore, it is very likely that grey and harbour seals will be encountered. This is confirmed by the grey and harbour seal density maps published by the Sea Mammal Research Unit (SMRU), which are provided in the NMPI (2022). The maps report the presence of grey seals in the area as between 10 and 50 per 25 km<sup>2</sup> and harbour seals as between 50 and 100 per 25 km<sup>2</sup>.

It should also be noted that there is a designated seal haul-out site south of the proposed nearshore exploratory borehole survey at Fast Castle. This is >6 km from the nearest borehole location.

## Otters

The European otter *Lutra lutra* is a semi-aquatic mammal, which occurs in a wider range of ecological conditions, including inland freshwater and coastal areas. Populations in coastal areas utilise shallow, inshore marine areas for feeding but also require fresh water for bathing. Historically, European otters occurred over most of the UK, however populations declined significantly in the 1960's and 1970's due to persecution, habitat loss and, more recently, the impact of toxic organochlorine insecticides. At present, the majority of the otter population in the UK occurs in Scotland, with a significant proportion of this number being found in the north and west. The Scottish population has an unusually high proportion (perhaps 50% or more) of coastal-dwelling individuals, which feed almost exclusively in the sea (NatureScot, 2021).

The European otter is listed as European Protected Species (EPS) under Annex IV of the Habitats Directive and are listed as PMFs (NatureScot, 2020). The European otters is also currently protected under Annex II of the EU Habitats Directive. It should be noted that the area around the proposed nearshore exploratory borehole survey area is not significant in terms of otter presence (JNCC, 2022a).



### 3.6.2 Assessment of Potential Effects

Marine mammals in the proposed nearshore exploratory borehole survey area are highly unlikely to be affected by the sampling works directly, with the only possible indirect disturbance from the presence of the guard vessel and jack-up that will be used. Potential disturbance from the guard vessel and jack-up is only likely when they are transiting between borehole locations.

The most likely scenario in relation to the disturbance of marine mammals is that individuals will demonstrate a short-term behavioural response (i.e., avoidance) to vessel presence but will return following the completion of works. It is expected that potential disturbance is anticipated to be negligible and of no concern due to the short-term duration of the works (i.e., taking place over 14 – 21 days) and extensive alternative habitat available for marine mammals to use.

Marine mammals may also be impacted indirectly by their prey source (such as sandeels for harbour porpoise) being potentially impacted by seabed disturbances. As stated in Section 2, seabed disturbance will occur from the boreholes and four vessel legs. Collectively, the boreholes will impact a volume of 2.16 m<sup>3</sup> and the vessel legs collectively will impact an area footprint of 16.335 m<sup>2</sup>. It is expected that the seabed disturbance, when compared to the wider available area is minimal, and therefore impacts to prey sources which could potentially indirectly impact marine mammals is negligible.

In addition, it should be noted that no Ultra-Short Baseline (USBL) will be used as part of the survey.

## 3.7 Other Users of the Sea

### 3.7.1 Summary of Baseline

The proposed nearshore exploratory borehole survey locations are sited in a small area located within ICES rectangle 40E7. ICES 40E7 was almost entirely targeted for shellfish from 2016 to 2020. The total value and live-weight for fish and shellfish species in ICES 40E7 in 2020 was £1,688,655 and 420 tonnes. To put this into context, the number of landings and value within the overall United Kingdom Continental Shelf (UKCS) in 2020 was 518,381 tonnes and £644,655,638, respectively. Therefore, in 2020, ICES 40E7 contributed to 0.08% of landings and 0.26% of value (Scottish Government, 2021). The level of landings and value in the area is relatively low when compared to adjacent ICES rectangles which are of greater importance to fisheries (NMPi, 2022).

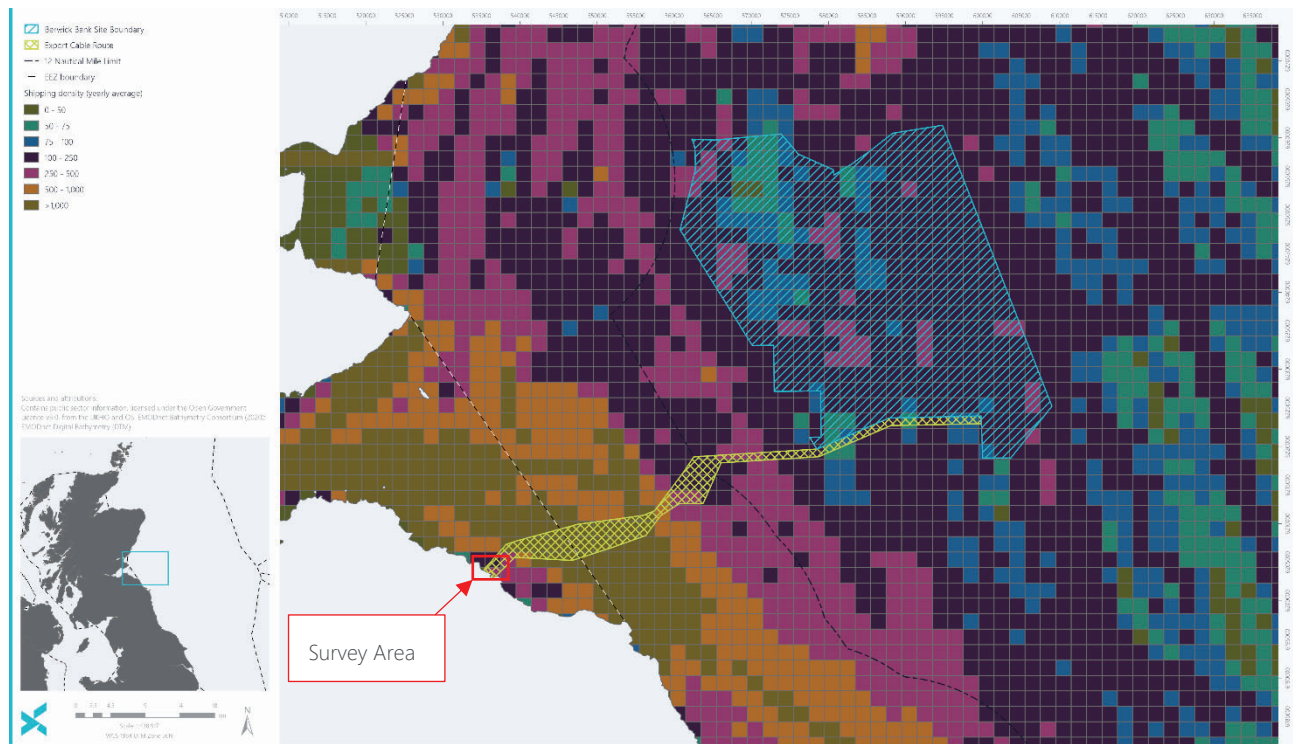
In addition, the presence of the survey vessel for an anticipated period of between 14 – 21 days, is not expected to result in any significant effect on shipping and navigation. The proposed site boundary overlaps with some shipping routes with average yearly density ranging throughout the site. The highest shipping density in the survey area is < 500 vessels per year in certain areas (i.e., closer to shore) (refer to



Figure 3-2).



Figure 3-2 Shipping Densities in the Proposed Survey Area Along the Export Cable Route



### 3.7.2 Assessment of Potential Effects

When considering that the area used for fishing activity is low and shipping densities is moderate, when compared to the wider area, and that the survey vessels will be marked with sufficient lighting to show their positions and the Kingfisher bulletin updated, it is not anticipated that there will be any significant effect on fishing activities as a result of the survey vessel and jack-up being in the area.



## 4 MITIGATION MEASURES

Certain measures are incorporated into the activity requirements as adherence to standard industry best practices or embedded mitigation which is fundamental to how the activities will be executed. Details of the embedded mitigation which SSER are committed to implementing, and hence has been considered by this Technical Note and are presented in Table 4-1.

*Table 4-1 Embedded Mitigation and Best Practice Relevant to the Proposed Activities*

Measure	Details
All project personnel will be trained and informed of their responsibility to implement the applicable environmental and ecological mitigations.	Toolbox talks, inductions, and awareness notices will be used to disseminate this information among all relevant personnel.
Environmental planning.	The borehole locations will limit significant impacts on sensitive environmental features, including Annex I habitats and wrecks where possible.
Scottish Marine Wildlife Watching Code (SMWWC)	All vessels will adhere to the provisions of the SMWWC during the proposed activities. NatureScot developed the Code as part of its duties under the Nature Conservation (Scotland) Act 2004. The Code was first published in 2006 and was revised in 2017. The code aims to minimise disturbance to marine wildlife.
Lighting on board installation vessels will be kept to a minimum	Lighting on-board the vessel will be kept to the minimum level required to ensure safe operations. This will minimise disturbance to seabird species.
Vessels will be travelling at a slow speed.	The slow speed of the survey vessel will minimise the risk of disturbance and injury impacts to marine species.
Control measures and Shipboard Oil Pollution Emergency Plans (SOPEP) will be in place and adhered to under the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex I requirements for all vessels.  In the event of an accidental fuel release occurring appropriate standard practice management procedures will be implemented accordingly.	As per the MARPOL 73/78 requirement under Annex I, all ships with 400 gross tonnage and above must carry an oil prevention plan as per the norms and guidelines laid down by International Maritime Organization under Marine Environmental Protection Committee (MEPC) Act.  Production of this plan will help to ensure that the potential for release of pollutants from activities is minimised.



Measure	Details
Vessels will be equipped with waste disposal facilities (sewage treatment or waste storage) to International Marine Organisation (IMO) MARPOL (International Convention for the Prevention of Pollution from Ships) Annex IV Prevention of Pollution from Ships standards.	Measures will be adopted to ensure that the potential for release of pollutants from installation vessels is minimised.
<p>The Water Framework Directive (WFD) provides the legislative framework for the collection, transport, recovery and disposal of waste, and includes a common definition of waste.</p> <p>The Environment Agency (in England and Wales) and the Scottish Environment Protection Agency (SEPA) (in Scotland) are responsible for administering and enforcing the waste management controls.</p> <p>A Waste Management Strategy Plan documenting and mapping each step in the process (i.e. location and company managing waste) and define individual roles and responsibilities.</p>	A Waste Management Plan will be developed and implemented to ensure the waste hierarchy is followed and all waste is sent onward to recycling or disposal via a licenced waste route.
Ballast water discharges from vessels will be managed under International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (Ballast Water Management (BWM) Convention).	The BWM Convention, adopted in 2004, aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. Measures will be adopted to ensure that the risk of Non-Native Marine Species (NNMS) introduction during the works is minimised.
Notice to Mariners (including local), Kingfisher bulletins, Radio Navigational Warnings, and/or broadcast warnings will be promulgated in advance of any proposed works. The notices will include the time and location of any work being carried out, and emergency event procedures.	Ensure navigational safety and minimise the risk and equipment snagging.





Measure	Details
Compliance with International Regulations for the Prevention of Collision at Sea (IRPCS) (IMO, 1972) and the International Regulations for the Safety of Life at Sea (SOLAS).	<p>IRPCS are the international standards designed to ensure safe navigation of vessels at sea. The survey vessel will adhere to these rules, including displaying appropriate lights and shapes.</p> <p>SOLAS is an international maritime treaty which sets minimum safety standards in the construction, equipment and operation of merchant ships. The convention requires signatory flag states to ensure that ships flagged by them comply with at least these standards. In relation to the activities its compliance will ensure navigational safety.</p>



## 5 CONSULTATION

### 5.1 Licence and Permit Requirements

#### 5.1.1 Marine Licence

As stated in the Sediment Sampling and Scientific Instrument Deployment Guidance (<https://www.legislation.gov.uk/ssi/2011/57/data.pdf>):

Under The Marine Licensing (Exempted Activities) (Scottish Inshore Region) Order 2011 (as amended) and The Marine Licensing (Exempted Activities) (Scottish Offshore Region) Order 2011 (as amended) sediment sampling (i.e. the removal of sediment from the seabed for scientific or investigative purposes) and scientific instrument deployment (i.e. the deposit of any scientific instrument or associated equipment, reagent or chemical or particle tracer for scientific or investigative purposes) are exempt from the requirement for a marine licence subject to certain conditions. With regards to sediment sampling the conditions are:

The exemption for sediment sampling applies to an activity where:

- The volume of sediment removed is less than 1 cubic metre (per grab);
- It is not likely to cause a danger or obstruction to navigation;
- It is a plan or project not likely (either alone or in combination with other plans or projects) to have a significant effect on a European site; a Ramsar site; the protected features of a Marine Protected Area (MPA); or any process on which the conservation of any protected feature of a MPA is dependent.

Under The Marine Licensing (Exempted Activities) (Scottish Inshore Region) Order 2011 (as amended) and The Marine Licensing (Exempted Activities) (Scottish Offshore Region) Order 2011 (as amended) the deposits of material (in this instance grout) and/or use of any chemical (in this instance bentonite), the article applies to the deposit of a 'Marine Chemical Treatment Substance' with conditions set out as per below:

- **Condition 1** is that the substance must be one the use of which is for the time being approved for the purposes of this Order by the Scottish Ministers;
- **Condition 2** is that the substance must be used in accordance with any conditions to which the approval is subject;
- **Condition 3** is that no deposit must be made in an area of the sea of a depth of < 20 metres or within one nautical mile of any such area except with the approval of the Scottish Ministers; and
- **Condition 4** is that no deposit of any substance may be made below the surface of the sea except with the approval of the Scottish Ministers.

Based on the information provided in Section 2 and 3 of this document, it is considered that the proposed geotechnical survey will be exempt according to MS-LOT licensing guidance (MS-LOT, 2021) in relation to the sediment sampling. However, the depositing of the grout material (as discussed in Section 2) requires a Marine Licence.



## 5.1.2 EPS Licence

Due to the extremely limited nature of potential disturbance to marine mammals it is assumed that no EPS Licence is required.

## 5.1.3 Other Licence and Permit Requirements

With regards to other required permits / permissions, the following is assumed:

- No statutory sanction is required from the Northern Lighthouse Board (NLB).

An application for consent under the Nature Conservation (Scotland) Act 2004 to carry out, cause or permit to be carried out, operations likely to damage the natural feature(s) of a SSSI will be applied for to NatureScot. One borehole sample location is within the Barns Ness Coast SSSI, and as the proposed operations will involve extraction of sand (Standard Ref. No. 20 as detailed in Operations requiring consent from NatureScot) SSER have submitted an application for consent.

## 5.2 Stakeholder Consultation

Consultation will be undertaken with the Maritime and Coastguard Agency (MCA), NLB, the Crown Estate Scotland (CES) and NatureScot whereby a draft of this document will be distributed to the following organisations to inform the consultation associated with the survey e.g., with navigational organisations and any permit requirements for the geotechnical survey.

Organisation	Consultation Details / Responses
Marine Scotland LOT	Distribution of this document to: <ul style="list-style-type: none"><li>• Confirm the Marine Licence exemption for sediment sampling;</li><li>• Confirm the requirement and subsequent approval of a Marine Licence regarding the use of grout material; and</li><li>• Confirm an EPS Licence is not required.</li></ul>
NatureScot <sup>2</sup>	Distribution of this document to: <ul style="list-style-type: none"><li>• Confirm the proposed geotechnical survey will <i>"not have a likely significant effect on a Special Area of Conservation ("SAC") Special Protection Area ("SPA"), proposed SPA ("pSPA"), Ramsar site and the activity is not capable of affecting (other than insignificantly) a Marine Protected Area ("MPA") or proposed MPA ("pMPA")."</i></li><li>• Confirm that an EPS Licence is not required; and</li><li>• Confirm that no further licencing for operating within the SSSI is required.</li></ul>
MCA	Distribution of this document to confirm the geotechnical survey will <i>"not cause an obstruction or danger to navigation."</i>

<sup>2</sup> No consultation has been undertaken with Joint Nature Conservation Committee (JNCC) as they delegate the provision of advice on offshore renewables projects to NatureScot.



Organisation	Consultation Details / Responses
NLB	Distribution of this document to confirm the geotechnical survey will <i>"not cause an obstruction or danger to navigation."</i>  Confirm no statutory sanction is required ahead of the geotechnical survey.
CES	Distribution of this document to confirm that works covered under SSER's Agreement for Lease (AFL) and no requirement for CES Small Works Licence.
SEPA	Distribution of this document to confirm that the grouting within the boreholes represent 'good practice' and confirm that activities are in-keeping with the WFD.



## 6 CONCLUSION

The proposed activities are due to commence as early as the 1<sup>st</sup> August 2022 with an expected end date of 4<sup>th</sup> September 2022 to account for any unforeseen delays.

Potential sensitivities include:

- The potential presence of the Annex I Reefs;
- The presence of low to moderate densities of cetaceans (Atlantic white-sided dolphin, bottlenose dolphin, harbour porpoise, minke whale and white-beaked dolphin) and moderate to high densities of seals. Otter are also coastal mammals but are found more within inlet areas and therefore the locations of the boreholes do not sit within an area significant for otters;
- A range of seabird species, some of which are protected by the Outer Firth of Forth and St. Andrews Bay Complex SPA which the proposed works transect; and
- Fish spawning and nursery grounds for a variety of commercially important fish species which include PMF species of anglerfish, blue whiting, cod, herring, sandeels, spurdog and whiting.

Potential impacts associated with the proposed operations are not expected to be significant. The key potential impacts are summarised below.

Grout (bentonite) will be used; however, this is exempt under the REACH guidance and therefore there are no chemical permitting requirements. There is however a requirement to submit a Marine Licence for the deposit of the grout within the boreholes. The assessment concluded that the discharge of chemical grout to sea during the proposed operations is not expected to present a significant impact to the marine environment.

Seabed disturbance will occur from the boreholes and vessel legs. Maximum soil sample volume at each of the borehole locations is 0.240 m<sup>3</sup>. The borehole samples will be collected using the jack-up survey vessel which will feature four circular legs approximately 0.76 m in diameter, giving rise to an impacted area of 1.815 m<sup>2</sup> at each location, resulting in a collective impact of 16.335 m<sup>2</sup>. It is expected that the disturbance will be negligible due to impacts being localised and short-lived. Potentially affected habitats and species are anticipated to recover quickly in the area and are not expected to be impacted at a population level.

The noise from the guard vessel and jack-up is also not expected to pose a significant risk to cetacean species found with the area with the likelihood of cetacean moving away from the sound source for a short-duration.

In light of the low levels of impact predicted from these activities, and the management and control measures that will be in place, it is considered that the activities described in this Technical Note will not have a significant adverse impact on the marine environment.



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## 8 APPENDIX A - CO-ORDINATES

Station	LATITUDE (WGS 84 - Degrees, Minutes, Seconds)	LONGITUDE (WGS 84 - Degrees, Minutes, Seconds)	Easting (WG84)	Northings (WGS84)
BH_01	55° 58' 36.76296736" N	002° 25' 25.35239359" W	535963.2391	6203656.146
BH_02	55° 58' 34.92018151" N	002° 25' 17.17733455" W	536105.4257	6203600.36
BH_03	55° 58' 42.32105202" N	002° 25' 19.47587583" W	536063.6685	6203828.826
BH_04	55° 58' 40.48308753" N	002° 25' 11.32876445" W	536205.3651	6203773.188
BH_05	55° 58' 47.87277496" N	002° 25' 13.64296823" W	536163.3355	6204001.305
BH_06	55° 58' 45.98979553" N	002° 25' 05.53650239" W	536304.335	6203944.273
BH_07	55° 58' 53.42442209" N	002° 25' 07.80959539" W	536263.0025	6204173.784
BH_08	55° 58' 51.54960699" N	002° 24' 59.66663968" W	536404.6281	6204117.013
BH_09	55° 58' 49.63996665" N	002° 25' 06.77783819" W	536281.8694	6204056.937