Spittal-Peterhead HVDC Subsea Link

Addendum to the Marine Environmental Assessment

PREPARED FOR

Scottish and Southern Electricity Networks Transmission (SSENT)

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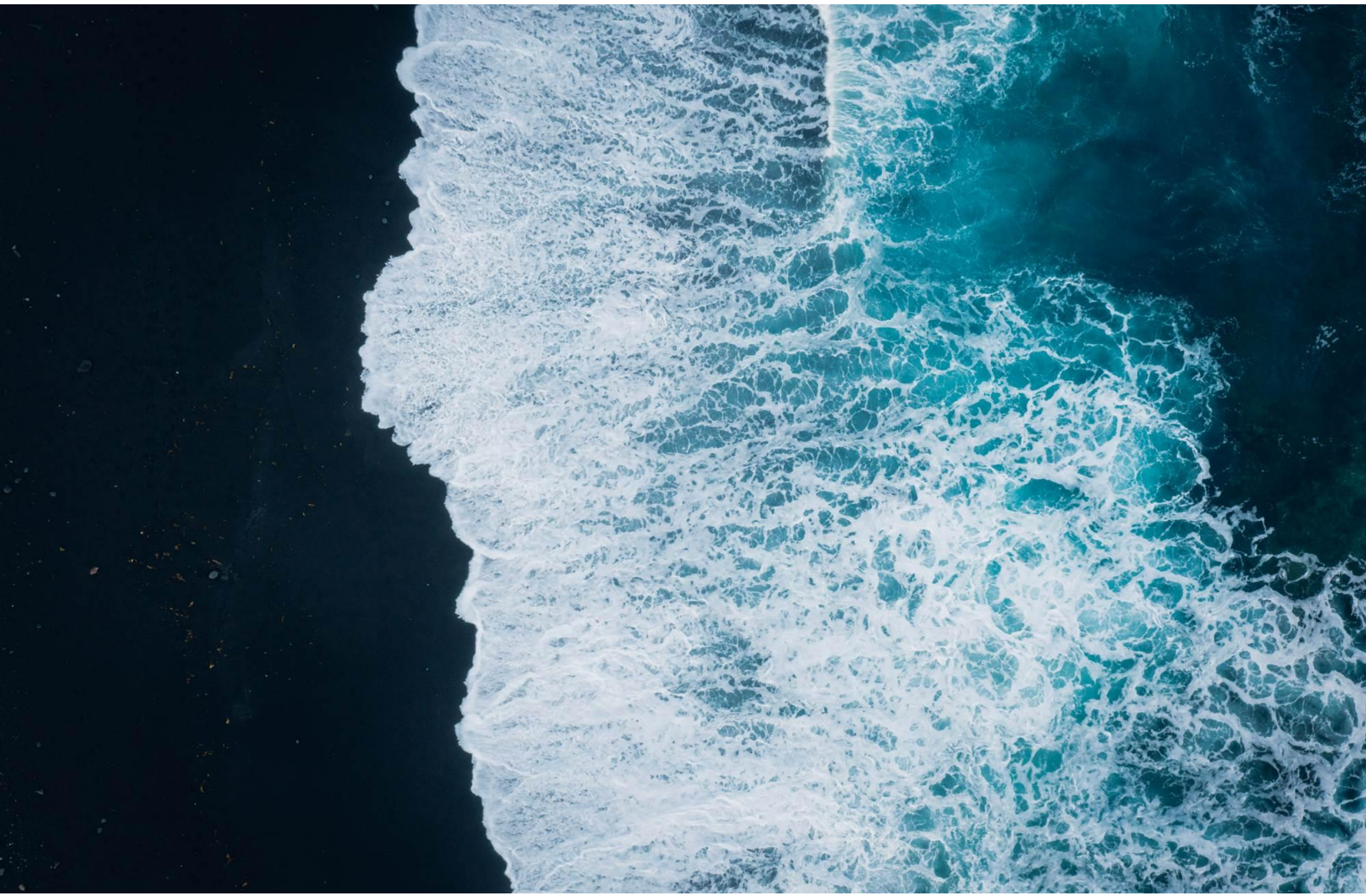

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Spittal-Peterhead HVDC Subsea Link

Addendum to the Marine Environmental Assessment

0818958

[Redacted]

Alex MacCallum
Project Manager

[Redacted]

Holly Scott
Assistant Project Manager

Jonny Lewis
Partner

Yvonne Cronin
Principal Consultant

Environmental Resources Management Limited

2nd Floor, 33 St Mary Axe

London

EC3A 8AA

T: +44(0) 20 3206 5200

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GLOSSARY

Term	Description
Additional Mitigation	Additional mitigation beyond that of the embedded mitigation is suggested on a receptor specific basis to avoid or minimise likely significant effects.
Applicant	Scottish Hydro Electric Transmission plc.
Cable Corridor	A 500 m wide corridor (250 m either side of a centreline) where geotechnical and benthic surveys were undertaken. Note that there is a section of the cable corridor wider than 500m near to Rattray Head to provide some route-engineering choices, due to the existing infrastructure constraints.
Cumulative Impact	Impacts that result from changes caused by other past, present or reasonably foreseeable actions together with the Project.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Embedded Mitigation	Mitigation measures considered to be incorporated within the Project Design.
Habitats Regulations Appraisal (HRA)	A process which helps determine likely significant effects and (where appropriate) assesses adverse impacts on the integrity of European conservation sites and Ramsar sites. The process consists of up to four stages of assessment: screening, appropriate assessment, assessment of alternative solutions and assessment of imperative reasons of over-riding public interest (IROPI) and compensatory measures.
Impact	An impact is considered to be the change to the baseline as a result of an activity or event related to the Project. Impacts can be both adverse or beneficial impacts on the environment and be either temporary or permanent.
Landfall	The generic term applied to the entire landfall area between Mean Low Water Spring (MLWS) tide and 200 m landwards of Mean High Water Spring (MHWS) tide. The landfall locations are Sinclair's Bay (north) and Rattray Head (south).
Marine Environmental Assessment (MEA)	A statutory process, similar to an EIA but less detailed, by which the likely significant effects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of Part 4 of the Marine (Scotland) Act 2010 to obtain a Marine Licence.
Project Design	A description of the range of possible elements that make up the Spittal to Peterhead HVDC Link project design options under consideration. The Project Design is used to define the parameters considered within the MEA.
Residual Effect	The final assessment of the level of significance, after taking into account both embedded and additional mitigation.
Significance of Effect	The overall risk rating, determined on a receptor specific basis, resulting from a combination of the magnitude of impact and receptor sensitivity.

Term	Description
Spittal to Peterhead HVDC Link Project ('the Project')	The HVDC electricity transmission link between Caithness (Spittal) and Aberdeenshire (Peterhead), collectively known as the Spittal to Peterhead HVDC Link Project (also referred to as the Project).
Substation	The New Spittal 400 kV Substation and New Peterhead 400 kV Substation each comprises a compound containing the electrical components for transforming the power supplied from the Spittal to Peterhead HVDC Link Project, and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid.
Realistic Worst-case Parameters	Parameters identified within the Project Design which are expected to result in the 'realistic worst-case scenario' for a receptor based on subject matter expertise.

ACRONYMS AND ABBREVIATIONS

Acronym	Description
AAP	Area of Archaeological Potential
AD	*Anno Domini*
AEZ	Archaeological Exclusion Zone
ALARP	As Low As Reasonably Practicable
AoI	Area of Influence
BP	Before Present
CIA	Cumulative Impact Assessment
CLV	Cable Lay Vessel
CPS	Cable Protection System
DDV	Drop Down Video
DMR	Dedicated Metallic Return
EIA	Environmental Impact Assessment
EQSD	Environmental Quality Standards Directive
ERM	Environmental Resources Management
FeAST	Feature Activity Sensitivity Tool
GNNS	Global Navigation Satellite System
HDD	Horizontal Directional Drilling
HER	Historic Environmental Records
HES	Historic Environment Scotland
HMWB	Heavily Modified Water Body
HRA	Habitats Regulations Appraisal
HVDC	High Voltage Direct Current
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
km	Kilometres
kV	Kilovolt
LAT	Lowest Astronomical Tide
LSE	Likely Significant Effect
m	Metres
MarLIN	Marine Life Information Network
MBES	Multibeam Echo Sounder
MCZ	Marine Conservation Zone
MD-LOT	Marine Directorate Licensing Operations Team
MEA	Marine Environmental Assessment

Acronym	Description
MHWS	Mean High Water Springs
MLA	Marine Licence Application
MLWS	Mean Low Water Springs
mm	Millimetres
MSBL	Mean Seabed Level
MU	Management Unit
NCMPA	Nature Conservation Marine Protected Area
nm	Nautical Miles
NRA	Navigational Risk Assessment
NMPi	National Marine Plan Interactive
ODN	Ordnance Datum Newlyn
PAD	Protocol of Archaeological Discoveries
PDS	Process, Data, and Software
PMF	Priority Marine Feature
PU	Polyurethane
RSL	Relative Sea Level
SAC	Special Area of Conservation
SCANS	Small Cetaceans in the European Atlantic waters and North Sea
SCOS	Special Committee on Seals
SMP	Seabird Monitoring Programme
SMU	Seal Management Unit
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
SSENT	Scottish and Southern Electricity Networks Transmission
TO	Transmission Owner
TSS	Total Suspended Solids
UKHO	United Kingdom Hydrographic Office
VMS	Vessel Monitoring System
WeBS	Wetland Bird Surveys
WFD	Water Framework Directive
WSI	Written Scheme of Investigation

1. INTRODUCTION

Scottish and Southern Electricity Networks Transmission (SSENT, 'the Applicant') is the trading name for Scottish Hydro Electric Transmission plc, part of the SSE plc Group. SSENT is the licensed electricity Transmission Owner (TO) in the north of Scotland and is responsible for the electricity transmission network in this region. SSENT owns and operates >5,000 kilometres (km) of high-voltage underground cables, overhead lines, and subsea cables that provide electricity to people across northern Scotland.

To support the continued growth in onshore and offshore renewables across the north of Scotland and the country's drive towards Net Zero, investment in network infrastructure is needed to connect this renewable power and transport it from source to areas of demand across the country.

The 2-gigawatt (GW) bi-pole, 525 kV high voltage direct current (HVDC) link will consist of:

- A HVDC link, including approximately 172 km of subsea cable bundle;
- A new HVDC Converter Station at Spittal; and
- A new HVDC Converter Station at Peterhead.

To ensure efficiency when connecting into the existing transmission network, the sites of the new HVDC converter stations will be located close to:

- New Spittal 400 kV Substation; and
- New Peterhead 400 kV Substation.

In November 2025, the Applicant gained consent for the construction of the Spittal-Peterhead High Voltage Directional Current (HVDC) Subsea Link ('the Project') through a Marine Licence (MS-00011099) issued under Part 4 of the Marine (Scotland) Act 2010.

1.1 DOCUMENT PURPOSE

Following the refinement of the Project's specifications and design, the Applicant is seeking a variation to the existing Marine Licence for the Project (**Section 1**). The Marine Licence variation request encompasses a series of project modifications and additions, collectively referred to as the 'Project Design Refinements'.

This document serves as an addendum to the original Marine Environmental Assessment (MEA) that supported the Marine Licence application submitted to the Marine Directorate Licensing Operations Team (MD-LOT) in January 2025, hereafter referred to as the 'original MEA' (LT360-SSEN-XX-XX-RP-MC-001). This MEA Addendum describes and evaluates the potential material changes to the findings of the original MEA that may arise from the Project Design Refinements, and it provides supporting evidence for the Applicant's request to MD-LOT for a variation of the Project's Marine Licence.

The scope of this MEA Addendum has been informed through screening the potential impacts of the Project Design Refinements against those assessed in the original MEA. Topics and impact pathways requiring further assessment were identified through this process as those with the potential to be materially affected by the proposed refinements.

This document addresses the marine components of the Project up to Mean High Water Springs (MHWS) at both landfall locations. The onshore elements above MHWS are subject to separate consents and are therefore not considered here. This document should be read in conjunction with the original MEA (LT360-SSEN-XX-XX-RP-MC-001) that informed the determination of the original Marine Licence MS-00011099.

2. PROJECT DESIGN REFINEMENTS

2.1 OVERVIEW

The Project Design Refinements represent the modifications and additions to the consented Project (MS-00011099) that the Applicant is seeking through a Marine Licence variation. A summary of these refinements is presented in **Table 2-1**, providing a clear outline and comparison of the proposed changes requested by the Applicant against the current consented values. Unless explicitly identified as a change within the Refined Additional Value column of **Table 2-1**, the originally consented aspects remain as previously assessed in the original MEA.

TABLE 2-1 PROJECT DESIGN REFINEMENTS

Parameter	Unit	Consented Value	Refined Value
VESSELS			
Guard Vessels	Number	Max. of 17	Max. of 20
CABLES			
Cable Characteristics			
Number of Cables	Number	2 HVDC + 1 Fibre Optic + 1 Dedicated Metallic Return (DMR)	New addition to the cable bundle of 4 temperature monitoring cables only within HDD (2 per HDD)
Installation Characteristics			
Horizontal Directional Drilling (HDD) Pop Out Trench Excavation and Backfill	-	Not previously consented - new addition	Excavation area: 6,775 m^2 Excavated Trench: • Volume: 14,869 metres $(m)^3$ • Length 184.5 m • Width 64 m • Depth 2.2 m Deposit area: 29.4 m (5,424.3 m^2) either side of trench

Parameter	Unit	Consented Value	Refined Value
Cable Protection			
Protection Material	Material Type (including grain size)	• Rock type and grain size – 70 millimetres (mm) based on a rock density of 2,650 kg/m^3 (grading 1-5"); and • Mattresses: (6 x 3 x 0.3 m) or (6 x 3 x 0.5 m).	• Filter Rock Protection Cobbles - Increase of volume and change to 2"-8". ○ (Inside 12 nm: 162,096 t, 98,240 m^3. ○ Outside 12 nm: 97,020 t, 58,799 m^3) • Rock Armour Protection Boulders - Decrease in volume and change of rock grade. New rock grade of LMA 5/40 ○ (Inside 12 nm: 30,645 t, 18,573 m^3) • Large Rock Armour Protection Boulders - New rock grade of LMA 10/60. ○ Inside 12 nm: (81,421 t, 42,853 m^3)
Length of cables requiring cable protection (m) CPS Cast Iron shells (CIS)- PE Uraduct (PU)	m	600 m (3 duct exits x 100 m CIS x 2 HDD = 600 m)	Material change from cast iron shell to PU or similar
Temporary Seabed Deposits	Number	Temporary Deposits: • Ultra-short Baseline (USBL) position transponders.	HDD increased clump weight for buoys (Inside 12 nm: 8 buoys and 8 clump weights). New additions: • Concrete Blocks (Inside 12 nm: 6) - Used as installation aid at each HDD duct. • Lightweight Subsea Support Mats (Inside 12 nm: 9 (4 m x 4 m)).

Parameter	Unit	Consented Value	Refined Value

Permanent Seabed Deposits	-	Substantive Permanent Deposits (for the purposes of this MEA):
		• Rock placement;
		• Concrete mattresses;
		• Rock Reef Cubes;
		• Submarine HVDC Cable;
		• Submarine Fibre Optical;
		• DMR;
		• Rigged Sea joint (cast-iron casing) (7 m x 1.5 m x 1.5 m);
		• CPS including CIS;
		• Bellmouth;
		• Bellmouth cover plate;
		• Clump weights;
		• Chain anchors;
		• Mooring anchor weights;
		• Rock bags; and
		• Grout bags.
		
		Additional Permanent deposits:
		• HDD steel ducts;
		• Fibre Optical Joint;
		• HDD Roxtec Sealing Units; and
		• CPS (PU bending restrictors, bending stiffener), cable installation rigging, shackles (Wire cable stocking).
			• New addition of filter unit bags (Inside 12 nm: no 422, max total. 3,376 t).
			• Increased clump weight and chain (Inside 12 nm: no 20. Outside 12 nm: no 4. Total: 24).
			• HDD Steel Duct Casing Length (Inside 12 nm: 5,072 m (Sinclair's Bay), 6,800 m (Rattray Head)) - Increase in Duct length. Addition included for potential HDD extension. Including end caps.
			
			Increase of size and update of joints.
			
			Omega Joint - Outside 12 nm:
			• 2x HVDC joints:
			  ○ Outer diameter - 0.62 m,
			  ○ Length of rigid section- 4.85 m,
			  ○ Length (inc. bend restrictor) -13.8 m.
			• 1x DMR Joint:
			  ○ Outer diameter - 0.41 m,
			  ○ Length rigid joint - 2.8 m,
			  ○ Length (inc. bend restrictor) - 11.08 m).
			• 3x counterweight casing
			
			Inline Joint - Inside 12 nm:
			• 2x HVDC joints:

Parameter	Unit	Consented Value	Refined Value
			○ Outer diameter - 0.62 m, ○ Length of rigid section- 4.85 m, ○ Length (inc. bend restrictor) -13.8 m. • 1x DMR Joint: ○ Outer diameter - 0.41 m, ○ Length rigid joint - 2.8 m, ○ Length (inc. bend restrictor) - 11.08 m). • 3x counterweight casing

The Project Design Refinements detailed in **Table 2-1** are described in further detail below.

2.1.1 SINCLAIR'S BAY

The Project Design Refinements at Sinclair's Bay landfall involve the excavation of a trench to 2.2 m below Mean Seabed Level (MSBL) at the HDD pop-out, with the removed material temporarily deposited in a designated side cast area adjacent to the trench. The cables will be protected post-installation by the backfilling of the trench with the side-cast excavated material. No cable protection system (CPS) will be required, as the ducts will be installed within this excavated trench, with three ducts containing cables and a potential spare duct for contingency. The exact excavation methodology will be detailed within the Cable Burial Protection Plan, to be submitted for Phase 2 in accordance with the requirements of the licence for MD-LOT approval. An increase in Steel Duct Casing Length is proposed for this potential HDD extension at Sinclair's Bay. This refinement has been proposed to avoid reducing the surrounding water depth by more than 5% above Chart Datum as not to compromise safe navigation through depth reduction, per condition 3.1.13 of the original Marine Licence MS-00011099. Shallow water jet trenching and Controlled Flow Excavation are also being considered as an alternative installation method at Sinclair’s Bay; however, the potential environmental effects associated with these techniques have already been assessed and are appropriately captured within the scope of the original MEA.

FIGURE 2-1 SINCLAIR’S BAY EXCAVATION STUDY AREA

[Redacted]

2.1.2 DEPOSIT LIST

Horizontal Directional Drilling Pop Out Protection

The Project Design Refinements to the cable protection involve a material change from cast-iron shells to PE Uraduct (PU), or similar, as detailed in **Table 2-1**.

Rock Protection

Following the further review of available metocean data, the consented standard berm design is now considered insufficient for the local conditions; therefore, a project-specific berm design change is proposed. This refinement results in an increased volume of rock protection due to the use of larger rock grades; however, the total tonnage of rock placement required has decreased. As the environmental assessment within the original MEA was undertaken based on the rock protection footprint, rather than the volume or tonnage of material placed, the relevant assessment parameter remains unchanged. The refinement remains within the design envelope and Project parameters assessed in the original MEA. Accordingly, there is no exceedance of the assessed worst-case footprint, no new or materially different environmental effects, and no change to the conclusions of the original MEA.

Three rock grading types have been selected to withstand conditions and optimise procurement by the Principal Contractor to simplify offshore handling and placement, while still ensuring compliance with the stability requirements along the cable corridor:

- Filter stone (cobbles) – refinement to proposed grade and increase in volume, as per **Table 2-1**;
- Armour cover (boulders) – refinement to proposed grade and decrease in tonnage and volume, as per **Table 2-1**; and
- Large rock armour (boulders) – refinement to proposed grade, as per **Table 2-1**.

The proposed berm design change required a reassessment of the HDD Pop-Out Safety Justification at Rattray Head (**APPENDIX A:**) in accordance with the requirements of the marine licence and relevant navigational safety guidance. The reassessment considered the revised berm footprint, evaluating potential effects on navigable depths, under-keel clearance, and established vessel movement patterns, consistent with Maritime and Coastguard Agency (MCA) MGN654 guidance. It was concluded that the revised berm design would not result in any additional hazard or unacceptable risk to safe navigation.

Filter Unit Bags

The Project Design Refinements include the addition of filter unit bags (rock bags), as detailed in **Table 2-1**. These rock bags will be utilised for cable pinning and will ultimately form part of the rock berm, therefore, having no additional footprint.

Clump Weight for Buoys

The Project Design Refinements include the addition of buoys and clump weights for use in the HDD installation, as detailed in **Table 2-1**. These will be temporary, acting as an installation aid and will only be installed with National Lighthouse Board approval in accordance with condition 3.1.9 of the original Marine Licence MS-00011099.

Out of Service Crossings

The Project Design Refinements include an increase in the number of clump weights to be used to pin Out of Service crossings. The details of these refinements are provided in **Table 2-1**.

Joints

Two joints are proposed within the Project Design Refinements: one omega joint to connect the two offshore cable bundles and an inline joint to connect the cable bundle to DMR and HVDC bundles. This is an increase in the once-rigid sea joint casing currently consented. Details of the proposed refinements are provided in **Table 2-1.**

Temperature Monitoring

The Project Design Refinements propose a total of four temperature monitoring cables within the consented HDD ducts and will not exceed the pop-out. These cables are proposed at both Sinclair's Bay and Rattray Head, as detailed in **Table 2-1.**

Concrete Block

The addition of a concrete blocks has been included in the Project Design Refinements. The purpose of this deposit is to hold the winch wire in place until the Cable Lay Vessel (CLV) arrives. This deposit is therefore temporary and will be removed post-lay.

Lightweight Subsea Support Mattress

Additional deposits of mattresses are proposed as part of the Project Design Refinements. At the Rattray Head landfall, one mattress will be placed outside of the HDD pop-out location, excluding the spare HDD. At Sinclair's Bay, two mattresses will be placed outside each HDD pop-out location, excluding the spare HDD. These deposits are an installation aid and are therefore temporary, with removal taking place post-cable installation.

2.2 IMPACT ASSESSMENT METHODOLOGY

This MEA Addendum assesses whether the Project Design Refinements are likely to result in any significant impacts on the environment, beyond those identified in the previous Project assessment in the original MEA. The impact assessment methodology uses the same standardised approach as in the original MEA to assess the environmental risk of the activities associated with the Project Design Refinements. This is across all topics/receptors scoped into the assessment and aligns with best practice rationale and underpinning principles for an Environmental Impact Assessment (EIA):

- Avoidance: consider options that will avoid harm to ecological features;
- Potential environmental impacts: identify significant effects which could result from the Project;
- Mitigation: significant effects will be avoided or minimised through mitigation measures that are either designed into the Project or are later applied;
- Assessment of the level of significance of residual effects: significant effects will be assessed taking account of committed mitigation measures; and
- Compensation: where there are residual significant effects despite mitigation measures in place, compensatory measures will be implemented.

Although an EIA is not required alongside this Marine Licence variation, this MEA addendum has been carried out using similar EIA terms and definitions for clarity and simplicity. A detailed impact assessment methodology is outlined in the original MEA that informed the determination of the original Marine Licence MS-00011099.

3. MARINE ENVIRONMENTAL ASSESSMENT

3.1 PHYSICAL ENVIRONMENT

3.1.1 INTRODUCTION

This section characterises the baseline Physical Environment within the Physical Environment Study Area. The baseline characterisation is used to inform the Physical Environment Marine Environment Assessment to account for changes in the Project Design Parameters from the original MEA. This chapter has been informed by a desk-based literature review, which has included collation and review of open-source bathymetric and geology data, as well as analysis of site-specific geophysical and geotechnical data collected to inform the engineering and environmental aspects of the Project and Project Design Refinements, as described in **Section 2.1**. The Physical Environment includes the bathymetry, regional geology, superficial sediments, hydrodynamic processes, sediment transport, coastal characteristics, and designated nature conservation sites designated for geological or geomorphological features.

3.1.2 PHYSICAL ENVIRONMENT STUDY AREA

The Project is located within the Moray Firth, which is a large inlet opening into the northern North Sea. For this report, the Physical Environment Study Area covers the north landfall site for the Spittal to Peterhead cable corridor: the Sinclair's Bay Study Area plus a minimum 1 km buffer (below MHWS) to account for hydrodynamic pathways and effects. Henceforth, the Sinclair's Bay Physical Environment Study Area will be referred to as the SBPE Study Area. No Project Design Refinements for the Rattray Head landfall site are required to be assessed in this addendum, as the new rock protection parameters do not exceed the footprint of the original design parameters covered in the original MEA.

3.1.2.1 PUBLICLY AVAILABLE DATA SOURCES

Table 3-1 summarises key publicly available Physical Environment data sources used to characterise the baseline environment.

TABLE 3-1 SITE-SPECIFIC SURVEY REPORTS AND STUDIES

Source	Report no.	Reference
SSEN Transmission Spittal to Peterhead Habitat Assessment and Environmental Baseline Report (and associated data)	REACH-7506-SR-EBS-02	Reach Subsea, 2024a
SSEN Transmission Spittal to Peterhead Marine Cable Route Survey Geophysical Interpretation Report (and associated data)	REACH-7506-SR-001	Reach Subsea, 2024b
SSEN Transmission Spittal to Peterhead Integrated Report	REACH-7506-SR-002 Integrated Report_Rev2	Reach Subsea, 2024c
SSEN Transmission Spittal to Peterhead Geotechnical Laboratory Test Report	REACH-7506-SR-004-02	Reach Subsea, 2024d

Source	Report no.	Reference
SSEN Transmission Spittal to Peterhead Geotechnical Results Report	REACH-7506-SR-003-R01	Reach Subsea, 2024e
Spittal-Peterhead HVDC Subsea Link Sediment Mobility Assessment	0689726	ERM Ltd, 2024a
Spittal to Peterhead Cable Burial Risk Assessment	0689726	ERM Ltd, 2024b
Spittal to Peterhead Marine Link Burial Assessment Study	0689726	ERM Ltd, 2024c

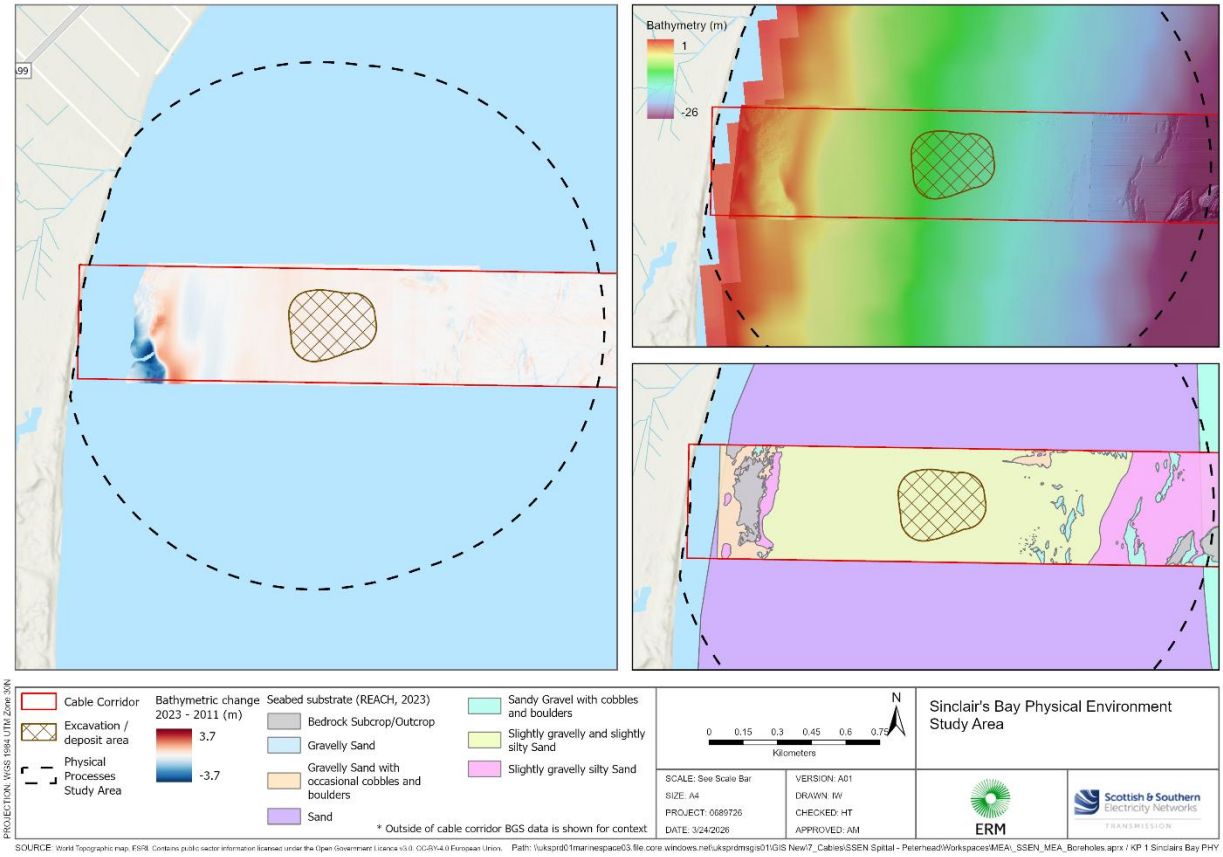
3.1.3 BASELINE ENVIRONMENT

3.1.3.1 BATHYMETRY

Within the SBPE Study Area, the bathymetry ranges between approximately 0-26 m below Lowest Astronomical Tide (LAT) (**Figure 3-1**).

The seabed deepens away from the coastline, with the deepest points corresponding to scoured depressions at the offshore edges of the SBPE Study Area. A comparison of the site-specific data with the UKHO HI710 bathymetry undertaken in the Sediment Mobility Assessment (ERM Ltd, 2024a) showed that these scour patches appear to be active, changing in form and dimensions. Generally, changes were within ±1 m over 11 years. However, at the nearshore limit of the data, there was significant erosion of up to 3 m in 2.5 years. Beyond the depression, a mound has formed, with a more gradual slope on the eastward slope.

FIGURE 3-1 SEAFLOOR BATHYMETRY; BATHYMETRIC CHANGE BETWEEN 2021-2023; ANDSEABED SUBSTRATE AT THE SINCLAIR'S BAY LANDFALL (SOURCE: EMODNET, 2020; REACH SUBSEA, 2024C)



3.1.3.2 REGIONAL GEOLOGY

Bedrock Geology

The bedrock geology in the Moray Firth predominantly consists of interbedded sedimentary units. The bedrock beneath the SBPE Study Area is Devonian Mudstone and Siltstone (BGS, 2023).

Quaternary Geology

The Quaternary evolution of the Inner Moray Firth Basin is linked to a complex interplay between climatic variation, ice-sheet dynamics, and sea-level change. Thick Quaternary deposits reflect early deltaic sedimentation, followed by predominantly glacial and glaciomarine conditions. These are buried by a thin cover of Holocene sediments. Across most of the SPBE Study Area, the Quaternary thickness is 5-20 m (BGS, 2022).

Superficial Sediments

The seafloor within the SPBE Study Area predominantly consists of Holocene sediments, whose distribution reflects the area's glacial and sea-level history, as well as the present hydrodynamic regime. The primary source of seabed sediments is the reworking of offshore Pleistocene deposits, with negligible sediment input from the land (Andrews *et al.*, 1990).

According to BGS (2023), seabed sediments within the SPBE Study Area range from sand to sandy gravel. The seabed sediments and geology identified by the project-specific survey

(REACH Subsea, 2024c) include slightly gravelly and slightly silty sand, gravelly sand with occasional cobbles and boulders, and sandy gravel with cobbles and boulders (**Figure 3-1**). At the SBPE Study Area, the project-specific data indicate the presence of slightly gravelly and slightly silty sand, slightly gravelly silty sand, gravelly sand with occasional cobbles and boulders, gravelly sand with occasional cobbles and boulders, and bedrock outcrop/subcrop (**Figure 3-1**).

3.1.3.3 HYDRODYNAMICS

Tidal Currents

The tidal environment within the Moray Firth is semi-diurnal. Mean spring peak flows are greatest near landfall; up to approximately 0.9 m/s near the Sinclair's Bay landfall site (ABPmer *et al.*, 2008). The spring tidal range is approximately 2.87 m at Sinclair's Bay (UHKO, 2023). The tidal axis (the long-axis orientation of the tidal ellipse) within the SBPE Study Area is generally aligned approximately north to south, almost parallel to the adjacent coastline (ABPmer *et al.*, 2008). This results in a generally southerly flood tide and northerly ebb tide.

Storm surges

Storm surges occur when high winds build up a wall of water and are exacerbated by the effects of atmospheric pressure (Prichard, 2013). Storm surge propagation has been extensively studied in the North Sea and is generally well understood. The estimated extreme sea level (generated by storm surge and astronomical tides), with a 10-year return period, is 2.71 m above Ordnance Datum Newlyn (ODN) near Sinclair's Bay (EA, 2018).

Waves

Waves within the Study Area are a combination of those generated locally by wind and those generated elsewhere in the North Sea. Long-term hindcast records of wave data have been derived from ABPmer's SEASTATES model (ABPmer, 2018).

At Sinclair's Bay, the mean wave height is 0.9 m and the predominant wave directions are from the northeast and southeast (each >30% of the time). Mean wave height generally increases with distance from the coast.

3.1.3.4 SEDIMENT TRANSPORT

Tidal and wind-driven currents in the Moray Firth region induce a sufficiently high shear stress to exceed the critical bed stress and initiate sediment movement. At a regional scale, there is a general net sediment transport to the southwest, towards the inner Moray Firth (Holmes *et al.,* 2004). Bedforms offshore of the Sinclair's Bay landfall are consistent with a net southerly sediment transport direction.

Greater complexity in sediment transport exists near Sinclair's Bay due to the effects of local currents. The sediment mobility report highlighted notable bathymetric changes in the SBPE Study Area between bathymetric data acquired in different years (ERM, 2024a). The bathymetric changes were associated with active scour patches that varied in form and dimensions between surveys. Generally, changes in the nearshore area are within ±1 m over 11 years. The most notable exception is at the nearshore limit of the survey data, where there has been significant erosion up to 3 m in 2.5 years. Seaward of this, a mound has formed with a more gradual gradient on the eastward slope. Between 2021 and 2023, the scour patch has extended southwards, encompassing more of the cable corridor, and increased in depth. Given

the short timestep (2 years) between bathymetry datasets, it is not possible to assess whether this is a continuous or storm-driven process, or whether the shoreline recovers to a baseline over time.

3.1.3.5 COASTAL CHARACTERISTICS

The coastline included in the Physical Environment Study Areas is approximately 1 km long. The coastline included in the SBPE Study Area comprises a long stretch of beach, where the proposed northern landfall site is located. The beach in the SBPE Study Area narrows significantly to the north. The beach includes dune environments, which become less extensive to the south. Development has occurred in the vicinity of the dunes as part of the Subsea7 pipeline launch facility in Westerloch, Wick. The facility fabricates and launches sections of pipeline up to 7.7 km long, with indications that there will be numerous pipeline bundle launches planned for between 2025-2028.

There are some sea defences, indicating this coastline is subject to erosion. Additionally, World War II coastal defences are collapsing onto the beach as the sand dunes around the structures are eroded. According to the Dynamic Coast research, at the northern landfall site (Sinclair's Bay), the MHWS moved ~30 m landwards between the 1890s and 1970s (Dynamic Coasts, 2024).

3.1.3.6 DESIGNATED SITES

There are no nationally and internationally designated nature conservation sites which overlap with the SBPE Study Area.

3.1.4 MARINE ENVIRONMENTAL ASSESSMENT

The Project Design Refinements could result in some effects on the Physical Environment. It is noted that in most cases, the Physical Environment is not, in itself, a receptor. Physical Environment changes are, instead pathways that have the potential to indirectly impact other environmental receptors. The magnitudes of these pathways are considered in this section. The sensitivity of associated (non-Physical Environment) receptors to these changes, and the determination of the significance of those effects, are not assessed in this section, but are addressed in the relevant, receptor-specific sections of the MEA Addendum.

Effects and impacts are often used interchangeably, but for the purpose of this report, they have different meanings; an effect is a physical change resulting from project activities, and an impact is the resultant change on a receptor. Therefore, an effect does not result in an impact if there is no sensitive receptor. The relevance of these potential effects is assessed against the baseline conditions expected to occur if no development took place.

The following potential effects that may affect the marine Physical Environment have been assessed:

- Change in wave regime and tidal currents (pathway);
- Increase in suspended sediment concentration (SSC) (pathway);
- Change to sediment transport system (pathway); and
- Change in coastal morphology (receptor).

The potential effects have been assessed based on the realistic worst-case parameters outlined within the Project Description (**Section 1**).

The main refinements that require consideration are updates to the cable protection methodology at Sinclair's Bay. At Sinclair's Bay, the Project Design Refinements involve open-cut trenching of ~185 m in length with an excavated footprint of 6,775 m^2.

3.1.4.1 CHANGES IN WAVE REGIME AND TIDAL CURRENTS

At both the landfall sites, HDD will be undertaken, with the HDD punching out to an open-cut trench (which will be backfilled) at Sinclair's Bay. No excavation is planned for Rattray Head. The HDD exit is proposed to be at 10 m LAT at Sinclair's Bay.

Temporary infrastructure in the intertidal/shallow subtidal areas (such as jack-up barges or flat-bottom vessels) during the construction phase may result in indirect changes to the physical environment, causing blockages of waves, tides, and sediment transport processes and potentially causing localised scour. The Project and Project Design Refinements plan to use HDD at both landfall sites; however, open-cut trenching is now also planned at Sinclair's Bay. No cofferdams are planned during the operation, which have the potential to cause blockages for waves and tides. The trench will subsequently be backfilled so the bathymetry is consistent with the baseline, and no rock protection will be required. This Project Design Refinement is proposed to avoid decreasing the water depth more than 5% (which may be the case using a rock berm). As such, it is unlikely that the changes in bathymetry will result in measurable changes to waves or tides. The magnitude of effect on the hydrodynamic regime during the construction phase is considered **Low**, since any effects are highly localised and small-scale.

3.1.4.2 CHANGE IN SUSPENDED SEDIMENT CONCENTRATION

The Project and Project Design Refinements involve laying and burying the cable within the seabed substrate, resulting in direct physical disturbance of the seabed from construction activities. Sediment dispersion modelling studies were not deemed necessary as part of this assessment or as part of the original MEA assessment. The seabed substrate in the SBPE Study Area is 'slightly gravelly and slightly silty Sand'. The sand and coarse sediment will likely fall out of suspension immediately adjacent to the areas of seabed disturbance. The finer material may be transported further, but likely only a few hundred metres. Therefore, potential effects are highly localised and small-scale, so the magnitude of change is **Negligible**.

3.1.4.3 CHANGE IN SEDIMENT TRANSPORT SYSTEM

Temporary seabed deposits in the intertidal/shallow subtidal areas may result in indirect changes to the physical environment, including the blockage of waves, tides, and sediment transport processes. The material excavated from the trench will initially be deposited within 29.4 m on either side of the trench, before backfilling the trench after the cable is laid with the same material . This sediment deposition associated with the excavation and backfilling is temporary and is unlikely to have long-term effects on sediment transport in the SBPE Study Area.

Cable protection methods can block sediment transport, potentially resulting in scour. The Project Refinements will result in less cable protection on the seafloor at Sinclair's Bay, which will reduce possible alterations to the sediment transport regime. While the potential effects may last the duration of the Project, the overall magnitude of changes in the sediment transport system is assessed as **Low**.

3.1.4.4 CHANGE IN COASTAL MORPHOLOGY

Changes in coastal morphology may arise from changes in the sediment transport regime and as a result of trenching at landfall. Trenching will cause localised areas of abrasion, and changes may occur to the seabed as a result of sediment settling and/or the compaction of seabed strata. Berms on either side of the trench may persist, even after the trench has been backfilled; however, every effort will be made to reinstate the seabed to original profile. The worst-case footprint of the additional trenching as part of the Project Design Refinements is 6,775 m^2 at Sinclair's Bay. Trenching activities may result in changes to the seabed compared to the baseline conditions, as different bedforms may develop following the infill of the trench. However, the area affected will be localised, and the changes will be largely temporary, with pre-installation conditions likely to return through natural sediment transport processes. Changes in coastal morphology resulting from potential changes in sediment transport are considered unlikely due to the low magnitude of changes in sediment transport. As such, the magnitude of changes in coastal morphology is considered to be **Low**.

3.1.5 ASSESSMENT SUMMARY

Physical Environment changes are generally pathways that have the potential to indirectly impact other environmental receptors. The coast, however, is a receptor that may be sensitive to changes in these pathways. The magnitude of effect on these pathways and the coastal morphology has been considered in this section, and overall, the Physical Environment assessment has concluded **Negligible** and **Low** magnitudes for all effects on physical process pathways and impacts on the coastline, as a result of the construction, operation, and decommissioning phases of the Project.

The sensitivity of associated non-Physical Environment receptors to these changes, and the determination of the significance of those effects, have not been assessed in this section, but are instead addressed in the following, receptor-specific sections of this MEA Addendum.

3.2 BENTHIC ECOLOGY

3.2.1 INTRODUCTION

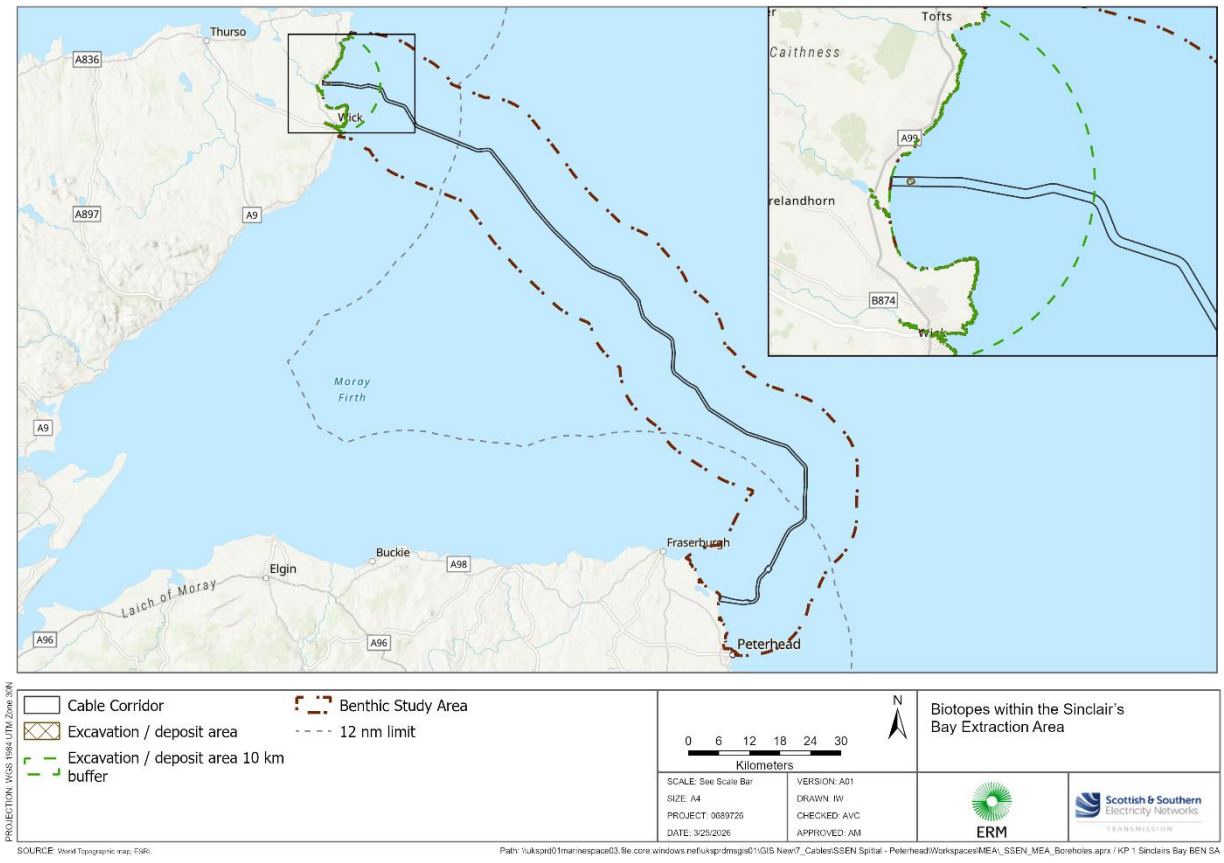
This section provides details on benthic and intertidal habitats and species within and in proximity to the proposed Project Design Refinements along the proposed cable corridor. An assessment of potential impacts on key sensitive habitats and species is presented in **Section 3.2.4** to assess the likely expected effects resulting from the Project Design Refinements.

3.2.2 BENTHIC ECOLOGY STUDY AREA

The Benthic Ecology Study Area associated with the original MEA (Benthic and Intertidal Ecology Study Area) comprises the cable corridor (near-field), and a 10 km buffer around the proposed cable corridor (far-field) (**Figure 3-2**).

The Benthic Ecology Study Area described in this MEA Addendum also comprises the Sinclair's Bay Excavation Study Area (near-field), and the adjacent area that may be affected by indirect effects (far-field) (**Figure 3-2**). The far-field is defined as the area around the proposed excavation area where suspended sediment plumes may be advected. This area has been defined in a precautionary manner by a 10 km buffer around the proposed excavation footprint.

FIGURE 3-2 BENTHIC ECOLOGY STUDY AREA, INCLUDING THE SINCLAIR'S BAY EXCAVATION STUDY AREA (NEAR-FIELD) AND THE ASSOCIATED 10 KM BUFFER (FAR-FIELD; GREEN DASH)



3.2.3 BASELINE ENVIRONMENT

Subtidal baseline surveys to inform the original MEA were conducted by Benthic Solutions Ltd (BSL, 2024a-e). The objective of the surveys was to characterise the benthic habitats throughout the proposed subsea cable corridor. The offshore subsea cable corridor was divided into Blocks 1 to 8, from Sinclair's Bay to Rattray Head, with Blocks 1 and 8 representing the nearshore, and Blocks 2 to 7 representing the offshore region. The baseline environment within the Benthic and Intertidal Ecology Study Area are detailed in the original MEA. In summary, the following sensitive features were identified as present:

- Bedrock Reefs (Annex I habitat);
- Stony Reefs (Annex I habitat);
- Biogenic (*Sabellaria spinulosa*) Reefs (Annex I and OSPAR threatened and/or declining habitat);
- Biogenic (*Modiolus modiolus*) Reefs (Annex I habitat and OSPAR threatened and/or declining habitat);
- Burrowed Mud (Priority Marine Habitat (PMF);
- Sea pen and burrowing megafauna communities (OSPAR threatened and/or declining habitat);
- Offshore Subtidal Sands and Gravels (PMF);
- Kelp Beds (PMF); and
- Ocean Quahog (*Arctica islandica*) (PMF and OSPAR threatened and/or declining species).

These sensitive features were grouped into the following receptor groups[1]:

- Geogenic Reefs (Bedrock and Stony Reefs)[2];
- Biogenic (*Sabellaria spinulosa*) Reefs;
- Biogenic (*Modiolus modiolus*) Reefs;
- Burrowed Mud (Burrowed mud and sea pen and burrowing megafauna habitats)[3];
- Offshore Subtidal Sands and Gravels;
- Kelp Beds; and
- Ocean Quahog.

The Sinclair's Bay Excavation Study Area overlaps with Block 1. As such, for the purposes of this MEA Addendum, the environmental baseline for the nearshore Block 1 is presented.

3.2.3.1 CHARACTERISTICS OF THE STUDY AREA

Biological Environment

The nearshore waters of Sinclair's Bay (Block 1) consisted mostly of sandy sediments characterised by the polychaetes *Leiochone*, *Owenia*, *Scoloplos armiger*, and *Sthenelais limicola*, the amphipods *Ampelisca brevicornis* and *Bathyporeia elegans*, the molluscs *Abra prismatica*, *Antalis entalis*, and *Euspira nitida*, and the pea urchin *Echinocyamus pusillus*.

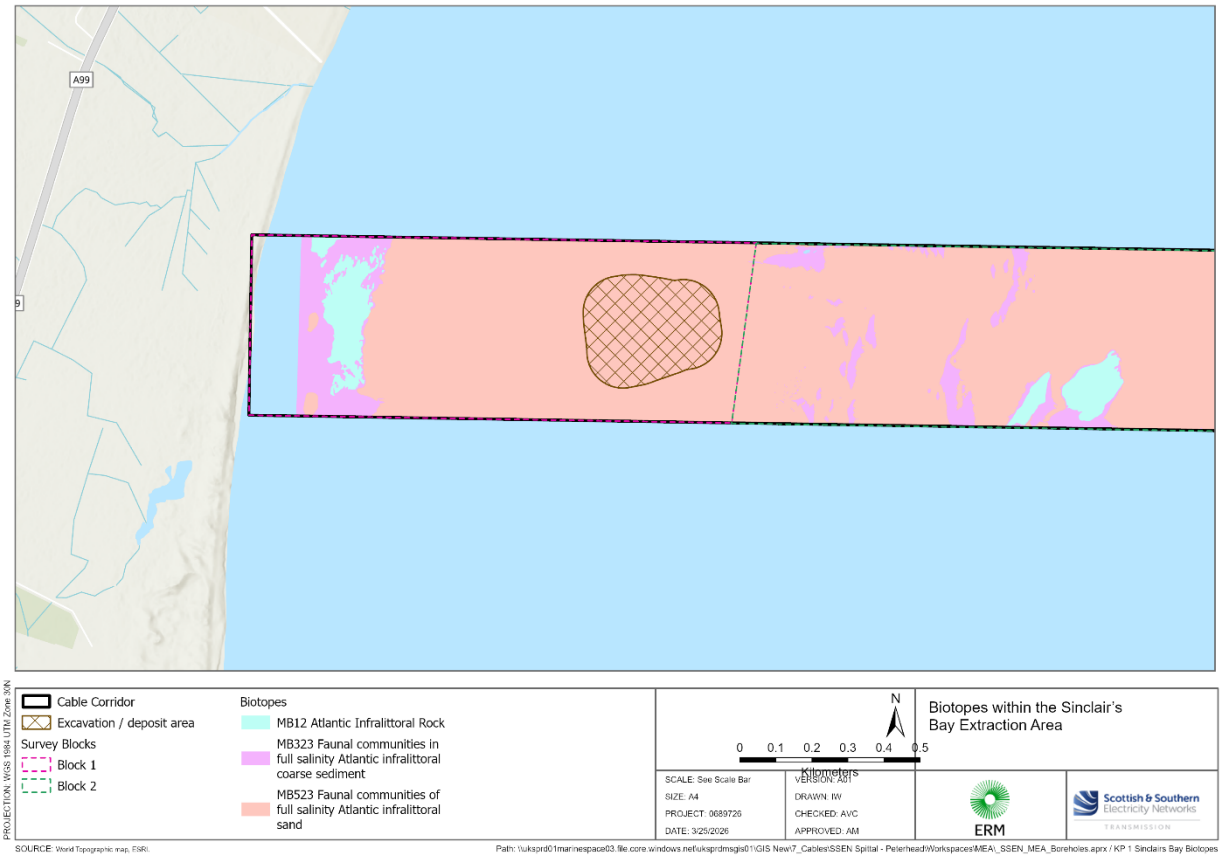
[1] Receptor group names vary slightly from the original MEA, though the groupings remain the same.
[2] Annex I Bedrock Reefs and Annex I Stony Reefs are expected to have similar sensitivities as they are both represented by similar biotopes
[3] OSPAR sea pen and burrowing megafauna habitat can occur within PMF burrowed mud, as such both habitats have been grouped together.

Biotope Mapping

The nearshore waters of Sinclair's Bay (Block 1) are mostly characterised by MB523 'Faunal communities of full salinity Atlantic infralittoral sand', with small areas of MB323 'Faunal communities in full salinity Atlantic infralittoral coarse sediment' and MB12 'Atlantic infralittoral rock' scattered throughout (**Figure 3-3**). Ground truthing using Drop Down Video (DDV) across Block 1 identified the biotope MB5233 '*Nephtys cirrosa* and *Bathyporeia* spp. in Atlantic infralittoral sand'. The Sinclair's Bay Excavation Study Area consists entirely of biotope MB523 (**Figure 3-3**).

Although *Arctica islandica* was not recorded from grab samples in Block 1, it was determined on a precautionary basis that there is potential presence of *A. islandica*.

FIGURE 3-3 SPATIAL DISTRIBUTION OF BIOTOPES WITHIN THE SINCLAIR'S BAY EXCAVATION STUDY AREA



3.2.4 MARINE ENVIRONMENTAL ASSESSMENT

There will be direct interaction between the activities associated with the Project Design Refinement and the benthic sedimentary habitats within the Sinclair's Bay Excavation Study Area.

The following potential impact relevant to Benthic Ecology is assessed in association with the proposed activities at Sinclair's Excavation Study Area:

- Temporary localised disturbance of seabed habitats.

Furthermore, a change in the number of guard vessels associated with the Project Design Refinements will interact with the benthic habitats throughout the Benthic and Intertidal

Ecology Study Area. As such, the additional potential impacts relevant to Benthic Ecology are assessed:

- Impact on habitats or species as a result of pollution or accidental discharge; and
- Increase risk of introduction and spread of marine invasive non-native species (INNS).

These potential impacts have been assessed based on the details of the Project Design Refinements, as described in **Section 1**. For Benthic Ecology, these parameters are outlined in **Table 3-2**.

Temporary disturbance via increased SSCs and associated deposition has not been assessed, as the refined parameters remain within the range previously evaluated in the original MEA (see **Table 3-2** and **Figure 3-2**). Consequently, the refined parameters are not expected to alter the original MEA conclusion for this pressure.

TABLE 3-2 ORIGINAL AND REFINED PARAMETERS FOR BENTHIC ECOLOGY

Potential Impact	Phase	Original MEA Parameters	Refined Parameters	Receptors
Temporary localised disturbance of seabed habitats	Construction, Decommissioning	Total potential area of seabed disturbance: **1,755,126 m² (1.76 km²)**	• Sinclair's Excavation Study Area: **98,115 m²** • Minus area already included in the original assessment: 184.5 m (cable length within the study area) × 10 m (installation tool width) = **1,845 m²** • Revised additional disturbance area: 98,115 m² − 1,845 m² = **96,270 m²** • Added to the total original disturbance area: 96,270 m² + 1,755,126 m² = **1,851,396 m²** **Total seabed disturbance = 1,851,396 m² (1.85 km²)** **Total increase in seabed disturbance area = 0.09 km²**	• Offshore Subtidal Sands and Gravels • Ocean Quahog (*Arctica islandica*)
Temporary disturbance via increase Suspended Sediment Concentration (SSC) and associated deposition	Construction, Decommissioning	The far-field Benthic Ecology Study Area encompasses a 10 km buffer from the cable corridor, covering a total area of **3,342 km²** (**Figure 3-2**). This is precautionary for assessment of indirect impacts on benthic ecology from temporary disturbance. It is anticipated that increases in SSC and associated deposition will be predominantly localised. Estimations based on North Sea projects occurring under similar hydrodynamic and	A 10 km buffer around the proposed excavation at Sinclair's Bay falls within the far-field Benthic Ecology Study Area assessed in the original MEA.	• Geogenic Reefs • Biogenic (*Sabellaria spinulosa*) Reefs • Biogenic (*Modiolus modiolus*) Reefs • Burrowed Mud • Offshore Subtidal Sands and Gravels • Kelp Beds • Ocean Quahog (*Arctica islandica*)

Potential Impact	Phase	Original MEA Parameters	Refined Parameters	Receptors
		seabed sedimentary conditions indicate the following transport distances for sediments: • Coarse sediment (>2 mm) = 100 m • Sand (0.062 mm–2 mm) = 700 m • Silt and clay (at a level above 1 mg/l) = up to 2 km		
Impact to habitats or species as a result of pollution or accidental discharge	Construction, Operation, Decommissioning	Maximum **17 guard vessels** Duration: **898 hours (total)**	Maximum **20 guard vessels** Duration: **1,134 hours (total)**	
Increase risk of introduction and spread of marine invasive non-native species (INNS)	Construction, Operation, Decommissioning	Maximum **17 guard vessels** Duration: **898 hours (total)**	Maximum **20 guard vessels** Duration: **1,134 hours (total)**	• Geogenic Reefs • Biogenic (*Sabellaria spinulosa*) Reefs • Burrowed Mud • Offshore Subtidal Sands and • Gravels • Kelp Beds • Ocean Quahog (*Arctica islandica*)

3.2.4.1 TEMPORARY LOCALISED DISTURBANCE OF SEABED SEDIMENTS

Changes in the parameters associated with temporary localised disturbance of seabed sediments are associated with the HDD excavation work located within Sinclair's Bay Excavation Study Area. These works will only overlap with **Offshore Subtidal Sands and Gravels** and, potentially, with **Ocean Quahog** receptors (**Figure 3-3**).

Sensitivity of Receptors

The sensitivity of these receptors is the same as assessed in the original MEA. In summary, Offshore Subtidal Sands and Gravels is considered to have **Medium** sensitivity to temporary localised disturbance of seabed sediments, while Ocean Quahog is determined to have **High** sensitivity.

Magnitude of Effect

The magnitude of temporary localised disturbance of seabed habitats is determined using the maximum extent of seabed footprint associated with the burial of the cable that directly interacts on and/or within the seabed. Additional cable protection and crossings laid on the seabed are considered long-term localised disturbance.

The new total footprint extent of temporary, localised disturbance of seabed habitats is calculated as 1,851,396 m^2 (1.85 km^2), an increase of 5.5% from the footprint assessed in the original MEA.

The total near-field Study Area is 83.2 km^2, and including the far-field, the overall Benthic and Intertidal Study Area is approximately 3,342 km^2.

Therefore, the realistic worst-case construction scenario design would result in the temporary disturbance of 2.22% (an increase from 2.11%) of habitats if only considering the near-field; and 0.06% (an increase from 0.05%) of the entire Study Area.

The installation duration is estimated at 1,134 hours, an increase of 26.3% from 898 hours considered in the original MEA. However, a single particular area will experience only acute, localised disturbance, rather than continuous disturbance from installation.

Offshore Subtidal Sands and Gravels was widely recorded along the proposed subsea cable corridor. However, this feature is present across the wider region. As such, cable burial activities will impact a low proportion of the total extent of the feature.

Only one **Ocean Quahog** was observed along the proposed subsea cable corridor; as such, the likelihood of encountering PMF Ocean Quahog aggregation along the corridor is low. Furthermore, the total area of temporary habitat loss or disturbance is considered to represent a very small percentage loss of the total area of the OSPAR Region II (Greater North Sea) within which PMF Ocean Quahog is listed as being threatened and/or declining.

For these reasons, Magnitude has been considered **Low** for all receptors.

Assessment Conclusion

Offshore Subtidal Sands and Gravels and **Ocean Quahog** are of **Medium** to **High** sensitivity and are subject to a **Low** magnitude of impact. Potential impact from temporary localised disturbance of seabed sediments has been assessed as having a **Minor Adverse** effect. As such, the impact of temporary localised disturbance of seabed sediments on these receptors is considered **Not Significant**.

3.2.4.2 IMPACT TO HABITATS OR SPECIES AS A RESULT OF POLLUTION OR ACCIDENTAL DISCHARGE

Sensitivity of Receptors

Sensitivity of receptors are the same as assessed in the original MEA. In summary, **Geogenic Reefs** have a **Low** sensitivity to pollution or accidental discharge. **Biogenic (*Sabellaria spinulosa*) Reefs**, **Burrowed Mud**, **Offshore Sands and Gravels**, **Kelp Beds** and **Ocean Quahog** are determined to have **Medium** sensitivity to pollution or accidental discharge. Lastly, **Biogenic (*Modiolus modiolus*) Reefs** were determined to have **High** sensitivity to pollution or accidental discharge.

Magnitude of Effect

Considering the level of vessel traffic in the region, including in the operations area, the proposed operations will be unlikely to cause measurable change in the risk of pollution or accidental discharge. The risk will be limited to a restricted period for each individual vessel movement. All vessel movements will occur over a construction duration of 1,134 hours, an increase of 26.3% from 898 hours considered in the original MEA. However, this is still considered a relatively short construction period. Furthermore, in consideration of embedded mitigation, adoption of best practice (as presented in the original MEA) and the relatively strong currents in the region, the magnitude of the impact is assessed to be **Negligible** for all receptors.

Assessment Conclusion

Impacts to all receptors are considered of **Negligible** effect. As such, the impact of pollution and accidental discharge on these receptors is considered **Not Significant**.

3.2.4.3 INCREASE RISK OF INTRODUCTION AND SPREAD OF MARINE INVASIVE NON-NATIVE SPECIES

Sensitivity of Receptors

Sensitivity of receptors are the same as assessed in the original MEA. In summary, **Geogenic Reefs**, **Burrowed Mud**, and **Ocean Quahog** are assessed as having **Low** sensitivity to the introduction and spread of MNNS. **Biogenic (*Sabellaria spinulosa*) Reefs** and **Kelps Beds** are determined to have **Medium** sensitivity. In contrast, **Offshore Subtidal Sands and Gravels** were determined to have **Negligible** sensitivity to the introduction and spread of marine INNS.

Magnitude of Effect

Considering the level of vessel traffic in the region, including in the area of the Works, the proposed operations are unlikely to cause measurable change in the risk of introduction and spread of marine INNS. The risk will be limited to a restricted period for each individual movement. All vessel movements will occur over a construction duration of 1,134 hours, an increase of 26.3% from 898 hours considered in the original MEA. However, this is still considered a relatively short construction period. Furthermore, in consideration of embedded mitigation and adoption of best practice (as discussed in the original MEA), the magnitude of the impact is assessed as **Negligible** for all receptors.

Assessment Conclusion

Impacts to all receptors are considered of **Negligible** effect. As such, the impact of increased risk of introduction and spread of marine INNS on these receptors is considered **Not Significant**.

3.2.5 ASSESSMENT SUMMARY

Table 3-3 shows the receptors that have been assessed as part of the MEA Addendum for Benthic Ecology.

In summary, the impacts assessed were deemed **Not Significant** for the receptor groups that are expected to interact with the Project Design Refinements. As such, no additional mitigation, beyond embedded techniques or monitoring, is required.

TABLE 3-3 SUMMARY OF IMPACTS TO BENTHIC ECOLOGY RECEPTORS FOLLOWING PROJECT DESIGN REFINEMENTS

Potential Impact	Receptor	Sensitivity	Magnitude	Overall Risk	Significance
Temporary (short term) localised disturbance of seabed habitats	Offshore Subtidal Sands and Gravels	Medium	Low	Minor Adverse	Not Significant
	Ocean Quahog	High	Low	Minor Adverse	Not Significant
Impact to habitats or species as a result of pollution or accidental discharge	Burrowed Mud	Medium	Negligible	Negligible	Not Significant
	Offshore Subtidal Sands and Gravels	Medium	Negligible	Negligible	Not Significant
	Kelp Beds	Medium	Negligible	Negligible	Not Significant
	Ocean Quahog	High	Negligible	Negligible	Not Significant
	Geogenic Reefs	Medium	Negligible	Negligible	Not Significant
	Biogenic (*Sabellaria spinulosa*) Reefs	Medium	Negligible	Negligible	Not Significant
	Biogenic (*Modiolus modiolus*) Reefs	High	Negligible	Negligible	Not Significant
Increase risk of introduction and spread of marine invasive non-native species (INNS)	Burrowed Mud	Low	Negligible	Negligible	Not Significant
	Offshore Subtidal Sands and Gravels	Negligible	Negligible	Negligible	Not Significant
	Kelp Beds	Medium	Negligible	Negligible	Not Significant
	Ocean Quahog	Low	Negligible	Negligible	Not Significant
	Geogenic Reefs	Low	Negligible	Negligible	Not Significant
	Biogenic (*Sabellaria spinulosa*) Reefs	Medium	Negligible	Negligible	Not Significant

3.3 FISH AND SHELLFISH ECOLOGY

3.3.1 INTRODUCTION

This section represents an update to the Fish and Shellfish Ecology assessment to account for changes in the Project Design Refinements from the original application. This section, therefore, provides a summary of the baseline information presented in the original MEA (with appropriate cross-references) and updated impact assessments.

Refer to the original MEA for the impact pathways scoped out of the assessment and appropriate justifications. The Project Design Refinements do not introduce additional impact pathways to those scoped in within the original MEA. Furthermore, the Project Design Refinements do not amend any design parameters that could introduce new or greater impacts outside of those already consented.

The following impact pathways that were scoped into the original MEA do not require updating:

- Temporary disturbance via suspended sediment concentration and smothering;
- Long-term localised disturbance of seabed habitats;
- Temporary disturbance via underwater noise and vibration;
- Electromagnetic fields (EMFs) and localised heating;
- Fish aggregation effects; and
- Ghost fishing.

This section will therefore present updated assessments for the following impact pathway(s) (and associated Project phases):

- Temporary localised disturbance of seabed habitats (Construction and Decommissioning phases);

3.3.2 FISH AND SHELLFISH ECOLOGY STUDY AREA

The Project Design Refinements are contained within the Fish and Shellfish Ecology Study Area defined in the original MEA, representing International Council for the Exploration of the Sea (ICES) Rectangles 44E7, 44E8, 45E7, 45E8, 46E6, and 46E7. It is noted that the works in Sinclair's Bay will occur within the southeastern corner of ICES Rectangle 46E6.

3.3.3 BASELINE ENVIRONMENT

Refer to the original MEA for the baseline environment characterisation of the Fish and Shellfish Ecology Study Area, including key elasmobranch, demersal fish, pelagic fish, diadromous fish, and shellfish species. Some of these species are listed as PMFs.

The key species identified in the original MEA with elevated sensitivity to seabed disturbance and increased suspended sediment concentration are sandeel Ammodytidae (PMF), Atlantic herring *Clupea harengus* (PMF), brown crab *Cancer pagurus* (berried females), European spiny lobster *Palinurus elephas* (PMF), fan mussel *Atrina fragilis* (PMF), and horse mussel *Modiolus modiolus* (PMF).

3.3.4 MARINE ENVIRONMENTAL ASSESSMENT

The Project Design Refinements described in **Section 1**, with relevance to the fish and shellfish ecology assessment, are presented in **Table 3-4** below.

The only change relevant to the fish and shellfish ecology assessment is the refinement of the HDD exit excavation area, and subsequent increases in the 'temporary localised disturbance of seabed habitats'. 'Temporary disturbance via increased SSC and associated deposition' will occur within the consented parameters of the original MEA and therefore will not be assessed.

TABLE 3-4 ORIGINAL AND REFINED PARAMETERS FOR FISH AND SHELLFISH ECOLOGY

Potential Impact	Phase	Original MEA Parameters	Refined Parameters	Receptors
Temporary localised disturbance of seabed habitats	Construction, Decommissioning	Total potential area of seabed disturbance: **1,755,126 m² (1.76 km²)**	• Sinclair's Excavation Study Area: **98,115 m²** • Minus area already included in the original assessment: 184.5 m (cable length within the study area) × 10 m (installation tool width) = **1,845 m²** • Revised additional disturbance area: 98,115 m² – 1,845 m² = **96,270 m²** • Added to the total original disturbance area: 96,270 m² + 1,755,126 m² = **1,851,396 m²** **Total seabed disturbance = 1,851,396 m² (1.85 km²)** **Total increase in seabed disturbance area = 0.09 km²**	• All fish and shellfish receptors

3.3.4.1 TEMPORARY LOCALISED DISTURBANCE OF SEABED HABITATS (CONSTRUCTION PHASE)

Sensitivity of Receptors

The proposed works involves trench excavation, the laying and burial of cable within the seabed substrate; thereby resulting in localised disturbance to habitat available to fish and shellfish species within the Primary Impact Zone (PIZ). Temporary direct disturbance will occur within the footprint of the cable-laying equipment in areas of seabed that are not bolstered by cable stabilisation/protection/crossings, where existing habitat is able to recover over time. Temporary indirect disturbance will occur within the footprint of the Secondary Impact Zone (SIZ) surrounding the installed cable. Here, suspended sediments may settle on existing habitats, resulting in a temporary shift in dominant substrate type that is expected to return to baseline conditions within the short term.

Elasmobranch species are tolerant of, and adaptable to, temporary localised disturbance of seabed habitats, as they have high mobility and a varied diet. Within their home range, elasmobranchs will encounter a variety of benthic habitats and, as such, the likelihood of secondary impacts, such as a reduction in prey availability, occurring to individuals is reduced. Therefore, elasmobranch species are considered to have a **Low** sensitivity to temporary localised disturbance of seabed habitats.

Most pelagic and diadromous fish species are not considered sensitive to temporary disturbance of seabed habitat due to their ability to relocate or avoid disturbance events, and lack of association with the seabed. Atlantic herring have a greater sensitivity, given their demersal spawning strategy (Kyle-Henney *et al*., 2024) and will be assessed separately below. Sensitivity of pelagic and diadromous fish to temporary localised disturbance of seabed habitats is considered **Low**.

Demersal fish species are considered to have a generally lower tolerance of disturbance than pelagic and diadromous fish species due to their greater dependence on seabed habitats. Sandeel (Ammodytidae) have a greater sensitivity due to their burying nature, dependent on specific sediment type (Reach *et al*., 2024) and will be assessed separately below. Adaptability is considered moderate due to the availability of suitable seabed habitats in the region, and recoverability is high due to the ability of most species to quickly return to the disturbed area. Sensitivity of demersal fish to temporary localised disturbance of seabed habitats is considered **Low**.

Shellfish are reliant upon the seabed when settling following their pelagic larval stage. Some crustacean species are less mobile during breeding seasons, such as female brown crab (Neal and Wilson, 2008; Last *et al*., 2011); furthermore, many shellfish species are sessile. As such, the habitats used by these species can be disturbed or damaged by construction. However, most of the shellfish receptors are considered to be more tolerant of temporary localised disturbance of seabed habitats due to high rates of fecundity and fast growth rates. As such, the adaptability and recoverability of these species is considered to be high. Sensitivity of shellfish species to temporary localised disturbance of seabed habitats is considered **Low**.

Atlantic herring

Atlantic herring, whilst primarily a pelagic species, has demersal spawning strategy. Eggs and hatching larvae remain associated with the seabed and therefore at risk of impact from temporary disturbance of seabed habitat (Kyle-Henney *et al*., 2024).

The proposed works are expected to occur within an area of medium-high potential spawning grounds at the approaches to the landfall sites. Atlantic herring is considered to have a moderate adaptability to temporary disturbance due to the availability of moderate-high potential spawning habitat within the region outside of the SIZ. Recoverability is considered moderate, as cable-laying activities may occur within one spawning season and, therefore, recovery of seabed habitat to pre-construction conditions will enable spawning to continue in future seasons. Sensitivity of Atlantic herring to temporary localised disturbance of seabed habitats is considered **Medium**.

Sandeel

Sandeel are considered of high ecological value as they act as an 'umbrella species' by linking primary production to higher trophic levels (e.g. larger fish, seabirds, and marine mammals) (Reach *et al*., 2024). Sandeel inhabit burrows within the seabed and are therefore considered at greater risk of impact through temporary disturbance of seabed habitat than other demersal fish species. For the purposes of this assessment, it is assumed that sandeel may be present within burrows year-round. Sandeel prefer a wide range of sand-dominated sediment types present in the region and are therefore expected to have a moderate recoverability.

The footprint of the cable corridor will overlap with low-medium potential spawning habitat for sandeel, which is widespread within the Study Area. Sensitivity to temporary localised disturbance of seabed habitats during construction activities is, therefore, considered **Low**.

Priority Marine Features

The PMFs, excluding Atlantic herring and sandeel, which have been assessed above, potentially impacted by temporary localised disturbance of seabed habitats include European spiny lobster, fan mussel, and horse mussel.

European spiny lobster creates burrows where berried females take shelter; these may be disrupted or damaged by construction activities, potentially reducing the fecundity of a few individuals during a single breeding event. While individual lobsters may be more sensitive to seabed disturbances in their immediate surroundings, the extensive habitat available to the UK population suggests that the population-level sensitivity is **Low**. Fan mussel and horse mussel have a low tolerance, adaptability, and recoverability by virtue of their restricted ranges in eastern Scottish waters. Consequently, PMFs are considered to have **High** sensitivity to temporary localised disturbance of seabed habitats.

Magnitude of Effect

The magnitude of temporary localised disturbance of seabed habitats is determined using the maximum extent of seabed footprint associated with the burial of the cable that directly interacts on and/or within the seabed (1,755,126 m^2, as consented within the original MEA), plus the excavation area for the HDD trench excavation backfill (6,775 m^2). Additional cable protection and crossings laid on the seabed are considered long-term localised disturbance. As such, the total footprint extent of temporary localised disturbance of seabed habitats is **1,851,396** m^2 (1.85 km^2).

Compared to the extent of similar habitat available within the region, 1.85 km^2 is considered highly localised, and the duration of cable installation and protection will be minimised as much as possible (see **Section 6.4.1**, **Table 6-5** of the original MEA for the full list of embedded mitigation measures).

Disturbed fish and shellfish populations are expected to recover quickly (<1 year), whereas biogenic habitats (e.g. horse mussel beds) are expected to recover in short-medium timescales (1-5 years) if disturbed. No horse mussel beds were identified in the benthic survey (BSL, 2024c-d). As such, the magnitude of effect is considered **Low**.

Assessment Conclusion

As a result of the low sensitivity of pelagic fish, demersal fish (including sandeel), diadromous fish, and shellfish, combined with the low magnitude of impact, temporary localised disturbance of seabed habitats has been assessed as having a **Negligible** effect. As such, the impact of temporary localised disturbance of seabed habitats on pelagic fish, demersal fish (including sandeel), diadromous fish, and shellfish is considered **Not Significant**.

As a result of the medium sensitivity of Atlantic herring, combined with the low magnitude of impact, temporary localised disturbance of seabed habitats has been assessed as having a **Minor Adverse** effect. As such, the impact of temporary localised disturbance of seabed habitats on Atlantic herring is considered **Not Significant**.

As a result of the high sensitivity of PMFs, combined with the low magnitude of impact, temporary localised disturbance of seabed habitats has been assessed as having a **Minor Adverse** effect. As such, the impact of temporary localised disturbance of seabed habitats on PMFs is considered **Not Significant**.

3.3.4.2 TEMPORARY LOCALISED DISTURBANCE OF SEABED HABITATS (OPERATION PHASE)

Sensitivity of Receptors

Similar to the construction phase, temporary seabed habitat loss during the operational phase through any necessary routine surveys may reduce resource and spawning/nursery ground availability within the subsea cable corridor, which could have a detrimental impact on fish and shellfish species.

Elasmobranchs, pelagic, demersal, and diadromous fish are considered to have a **Low** sensitivity. The exceptions are Atlantic herring, which have a **Medium** sensitivity, and PMFs, which have a **High** sensitivity to temporary localised disturbance of seabed habitats.

Magnitude of Effect

The magnitude of temporary localised disturbance to seabed habitats is expected to be less than that of the construction phase, being limited to any routine surveys. Any impacts from remedial works during the operation phase are to be assessed separately from the original MEA and this addendum. Emergency inspection and repair to cables are exempt from marine licensing; however, approval must be sought from the Scottish Ministers (see Article 32 of the Marine Licensing (Exempted Activities) (Scottish Inshore Region) Order 2011 and Article 23 of the Marine Licensing (Exempted Activities) (Scottish Offshore Region) Order 2011).

Assessment Conclusion

As the sensitivity of receptors is not expected to vary between the construction phase and operation phase, but the magnitude of potential effect is reduced, temporary localised disturbance of seabed habitats is considered to have a **Minor Adverse** effect, which is **Not Significant**.

3.3.4.3 DECOMMISSIONING PHASE

Impacts associated with the decommissioning phase of the Project are expected to mirror impacts associated with the construction phase. However, the magnitude of effects are expected to be lower than those during the construction phase. For example, if it is determined that infrastructure such as cable protection is to be left *in situ*, there will be a notable reduction in the potential for seabed habitat disturbance during the decommissioning phase.

3.3.5 ASSESSMENT SUMMARY

Overall, the Fish and Shellfish assessment concluded **No Significant Effects** throughout the construction and decommissioning phases of the proposed Spittal to Peterhead Cable. As a result of the assessment concluding **No Significant Effects** to fish and shellfish receptors, no additional mitigation is proposed.

It is noted that the assessment conclusions do not differ from the original MEA. Please refer to **Table 7-17** of the original MEA to show a summary of the assessment conclusions per receptor group.

3.4 MARINE MAMMALS AND OTHER MEGAFAUNA ECOLOGY

3.4.1 INTRODUCTION

The baseline environment is defined as the present nature of the marine mammal communities within the vicinity of the proposed Project, relative to the likely expected and/or predicted changes resulting from the Project.

3.4.2 MARINE MAMMAL STUDY AREA

The Marine Megafauna Study Area is defined as the area where the Project Design Refinements are expected: Sinclair's Bay Excavation Study Area (**Section 2.1.1**), as well as the wider area predefined in the original MEA. Effects from the proposed changes are expected to be localised, occurring within the SCANS-IV survey block CS-K (Gilles *et al*., 2023)[4]. However, as marine mammals are highly mobile in nature, the wider Study Area is defined for each receptor species separately, per the original MEA, by the Management Unit (MU) for that receptor species (IAMMWG, 2023).

3.4.3 BASELINE ENVIRONMENT

The baseline environment has been re-reviewed and the baseline as presented in the original MEA has been updated where required. This is due to the localised nature of the Project Design Refinements and associated Study Area. A desk-based review of literature and existing data sources has been undertaken, with the following data sources covering the area of the Project:

- Scientific advice on matters related to the management of seal populations (SCOS, 2025)[5];
- Orkney Isles and Pentland Firth Important Marine Mammal Area (IMMA) (IUCN-MMPATF, 2024)[1];
- Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys (Gilles *et al.*, 2023);
- Hebridean Whale and Dolphin Trust (HWDT) sightings information (HWDT, 2026)[1]; and
- Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt *et al.*, 2019).

3.4.3.1 PINNIPEDS

Two species of pinnipeds are residents in the UK: harbour seal *Phoca vitulina* and grey seal *Halichoerus grypus*. The refined project Study Area is located within Seal Management Unit (SMU) 6 (Moray Firth), as classified by the Special Committee on Seals (SCOS) (SCOS, 2025).

Data from the most recent August surveys conducted between 2019-2023 indicate that harbour seal numbers have declined since the original MEA was drafted (SCOS, 2025). The haulout count in SMU 6 identified 983 individuals. For grey seal, the latest August haulout counts indicate populations have remained stable since the previous counts. Surveys recorded 1,354 individuals in SMU 6.

Both pinniped species will be considered in this MEA Addendum assessment.

[4] SCANS = Small Cetaceans in the European Atlantic waters and North Sea.
[5] Certain sources have provided updated reviews of the area since the original MEA was drafted. These have been updated in this baseline, but the baseline characterisation remains the same.

3.4.3.2 CETACEANS

Seven species of cetacean are determined to be either occasional or common visitors to the area around Sinclair's Bay (Gilles *et al.*, 2023; IUCN-MMPATF, 2024; HWDT, 2026). These are as follows:

- Harbour porpoise *Phocoena phocoena*;
- White-beaked dolphin *Lagenorhynchus albirostris*;
- Risso's dolphin *Grampus griseus*;
- Orca *Orcinus orca*;
- Common minke whale *Balaenoptera acutorostrata*;
- Humpback whale *Megaptera novaeangliae*; and
- Fin whale *Balaenoptera physalus.*

The Project Design Refinements are located within SCANS block CS-K (Gilles *et al.*, 2023). The original MEA also included blocks NS-E and NS-D, which will also be considered within this addendum. Abundance and density estimates for block CS-K, where the majority of refinements are proposed, are presented in **Table 3-5**. Species which were not sighted during SCANS-IV but are known to be present in the area have no displayed density or abundance. **Table 3-5** also provides details on the site use and seasonality of the species present within and around the Marine Megafauna Study Area to further inform sensitivity and magnitude assessment.

All species will be considered in this MEA Addendum assessment.

TABLE 3-5 MARINE MAMMAL SPECIES RECORDED IN THE SINCLAIR'S BAY AREA (GILLES *ET AL.*, 2023; IAMMWG, 2023; IUCN-MMPATF, 2024; HWDT, 2026) (N/A = NOT APPLICABLE)

Species	Abundance in SCANS-IV block CS-K	Species density (animals/km^2) in SCANS-IV block CS-K	Abundance by UK portion of Management Unit (MU)	Site use	Seasonality
Harbour porpoise *Phocoena phocoena*	11,357	0.2813	159,632 (North Sea)	Aggregations, reproduction	All year, particularly summer and autumn
White-beaked dolphin *Lagenorhynchus albirostris*	5,460	0.1352	34,025 (Celtic and Greater North Seas (CGNS))	Transient	Populations in the area are declining; sporadic presence
Risso's dolphin *Grampus griseus*	1,519	0.0376	8,687 (CGNS)	Aggregations	Summer
Orca *Orcinus orca*	N/A	N/A	N/A	Aggregations, feeding	All year
Common minke whale *Balaenoptera acutorostrata*	467	0.0116	10,288 (CGNS)	Aggregations, feeding	All year, particularly late summer
Humpback whale *Megaptera novaeangliae*	N/A	N/A	N/A	Transient	Spring and autumn
Fin whale *Balaenoptera physalus*	N/A	N/A	N/A	Vulnerable population, aggregations	Spring and summer

3.4.3.3 OTHER MARINE MEGAFAUNA

Basking shark *Cetorhinus maximus* are the largest fish species found in UK waters (Rigby *et al.*, 2023). Characteristics of their presence are unchanged from the original MEA, and due to the overlap of sightings with the revised Study Area, will be considered within this addendum assessment.

3.4.4 MARINE ENVIRONMENTAL ASSESSMENT

There will be direct interaction between the works associated with the Project Design Refinement and marine mammals and other megafauna identified to be present within and around the marine mammal Study Area. There is potential for disturbance and injury due to the proposed works.

The following potential impacts determined to be relevant to marine mammals and megafauna are assessed:

- Temporary disturbance via underwater noise and vibration; and
- Risk of collision with guard vessels.

Temporary disturbance via SSC was assessed in the original MEA. The refined parameters do not cause a substantial change to this potential impact from the original MEA, and as such, it is not expected that the original MEA conclusion will be altered.

These potential impacts have been assessed based on the Project Design Refinements, as described in **Section 1**. Realistic worst-case parameters are outlined within **Table 3-6**.

TABLE 3-6 ORIGINAL AND REFINED PARAMETERS FOR MARINE MAMMAL AND MEGAFAUNA RECEPTORS

Potential Impact	Original MEA Parameters	Refined Parameters
Temporary disturbance via underwater noise and vibration	Maximum: **17 guard vessels** Ultra-short baseline (USBL) operating on vessels causing Temporary Threshold Shift (TTS) or Permanent Threshold Shift (PTS) on pipelayer trencher.	Maximum: **20 guard vessels**
Risk of collision with guard vessels	Maximum: **17 guard vessels**	Maximum: **20 guard vessels**

3.4.4.1 TEMPORARY DISTURBANCE VIA UNDERWATER NOISE AND VIBRATION

Sensitivity of Receptors

Sensitivity of receptors are the same as assessed in the original MEA. Pinnipeds and cetaceans have **Low** sensitivity. Basking sharks have **Negligible** sensitivity to temporary disturbance from underwater noise and vibration.

Magnitude of Effect

Any effects on the receptor are expected to be minor and fall within the bounds of natural variability, given the number of individuals using the area and the nature of the impact. Accounting for the typical vessel activity in the region, including within the revised Study Area, the proposed operations are not anticipated to result in a meaningful increase in underwater

noise relative to existing baseline conditions. The magnitude of impacts is therefore considered **Low**.

Assessment Conclusion

Pinnipeds and cetaceans are **Low** sensitivity, with **Low** magnitude of effect. Basking shark are **Negligible** sensitivity and **Low** magnitude of effect. The potential impact for temporary disturbance via underwater noise and vibration is assessed as **Negligible** for all receptors, which is considered **Not Significant**.

3.4.4.2 RISK OF COLLISION WITH GUARD VESSELS

Sensitivity of Receptors

Sensitivity of receptors differs from that assessed in the original MEA. Pinnipeds and basking shark have **Low** sensitivity. Of the cetacean species present, harbour porpoise, white-beaked dolphin, Risso's dolphin, orca, and common minke whale also have **Low** sensitivity. Humpback whale and fin whale, as much larger species, are at higher risk of ship strike (Panigada *et al.*, 2006; Williams and O'Hara, 2010; Robbins *et al.*, 2026) and are therefore determined to have **Medium** sensitivity.

Magnitude of Effect

Any impact on the receptor is expected to remain within natural variability, given the number of individuals using the area, the mobile nature of receptors, and the likelihood of habituation to vessel activity. In the context of existing vessel activity in the region, the proposed installation works are unlikely to cause any measurable increase in vessel-related disturbance beyond current baseline levels. Embedded measures, such as compliance with the Basking Shark Code of Conduct, will further reduce the potential for displacement and minimise collision risk, consistent with the commitments set out in the original MEA. The magnitude of impacts is therefore considered **Low**.

Assessment Conclusion

Grey seal, harbour seal, harbour porpoise, white-beaked dolphin, Risso's dolphin, common minke whale, and basking shark have **Low** sensitivity. Humpback whale and fin whale have **Medium** sensitivity. All receptors have **Low** magnitude of effect. The potential impact for risk of collision with guard vessels is **Minor Adverse** for humpback and fin whale, and **Negligible** for all other receptors, which is **Not Significant** for all receptors.

3.4.5 ASSESSMENT SUMMARY

The assessment found that interactions between the Project Design Refinements and identified receptor groups would be **Not Significant**. As a result, no additional mitigation or monitoring measures are proposed.

A summary of the receptors and conclusions considered within the MEA Addendum for Marine Mammals and Megafauna is provided in **Table 3-7**.

TABLE 3-7 SUMMARY OF IMPACTS TO MARINE MAMMAL AND MEGAFAUNA RECEPTORS

Potential Impact	Receptor	Sensitivity	Magnitude	Overall Risk	Significance
Temporary (short term) disturbance via underwater noise and vibration	Grey seal	Low	Low	Negligible	Not Significant
	Harbour seal	Low	Low	Negligible	Not Significant
	Harbour porpoise	Low	Low	Negligible	Not Significant
	White-beaked dolphin	Low	Low	Negligible	Not Significant
	Risso's dolphin	Low	Low	Negligible	Not Significant
	Orca	Low	Low	Negligible	Not Significant
	Common minke whale	Low	Low	Negligible	Not Significant
	Humpback whale	Low	Low	Negligible	Not Significant
	Fin whale	Low	Low	Negligible	Not Significant
	Basking shark	Low	Low	Negligible	Not Significant
Vessel displacement and collision risk	Grey seal	Low	Low	Negligible	Not Significant
	Harbour seal	Low	Low	Negligible	Not Significant
	Harbour porpoise	Low	Low	Negligible	Not Significant
	White-beaked dolphin	Low	Low	Negligible	Not Significant
	Risso's dolphin	Low	Low	Negligible	Not Significant
	Orca	Low	Low	Negligible	Not Significant
	Common minke whale	Low	Low	Negligible	Not Significant
	Humpback whale	Medium	Low	Minor Adverse	Not Significant
	Fin whale	Medium	Low	Minor Adverse	Not Significant
	Basking shark	Low	Low	Negligible	Not Significant

3.5 ORNITHOLOGY

3.5.1 INTRODUCTION

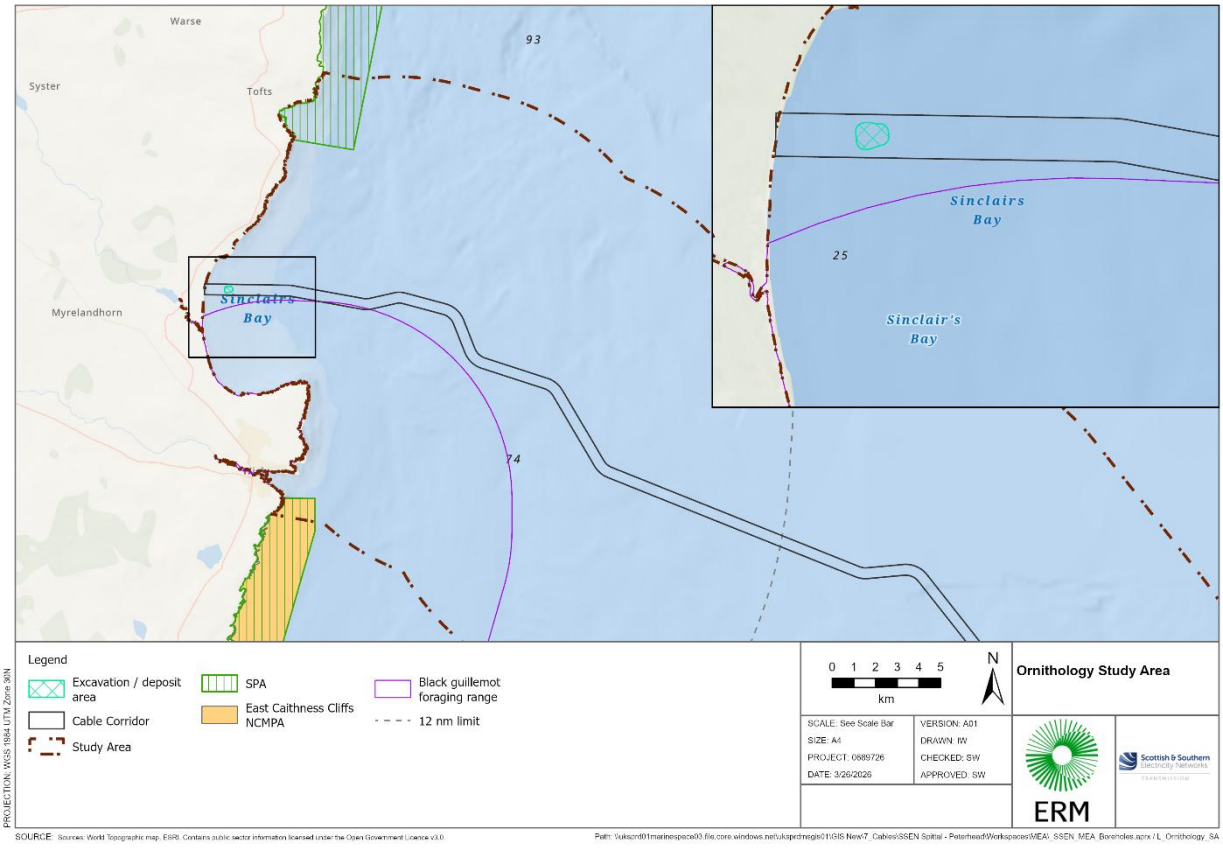
This section describes the baseline for Ornithology within a defined Ornithology Study Area. This has been informed by a desk-based literature review using a range of data sources, including published literature and reports, as well as data collected through the Seabird Monitoring Programme (SMP) and the Wetland Bird Surveys (WeBS). The baseline has been used to inform the Ornithology MEA in **Section 3.5.4.**

3.5.2 ORNITHOLOGY STUDY AREA

The Ornithology Study Area in this MEA Addendum is defined as the landfall site at Sinclair's Bay, where the Project Design Refinements will be taking place (**Section 2.1.1**). As a result of the highly mobile nature and variable distribution of seabirds, species that use the Moray Firth are also considered, as they may also interact with the Project during transit. Furthermore, as a result of the differences in species presence and usage of the marine area and the intertidal, landward of Mean Low Water Springs (MLWS, up to MHWS, is also covered by the Ornithology Study Area.

Figure 3-4 presents the extent of the Ornithology Study Area. This figure also shows designated sites with classified populations/designated bird features that have the potential to interact with impact pathways associated with the proposed development.

FIGURE 3-4 THE ORNITHOLOGY STUDY AREA (DESIGNATED SITES SHOWN HAVE SEABIRD FEATURES WITH THE POTENTIAL TO INTERACT WITH IMPACT PATHWAYS BEING ASSESSED)



3.5.3 BASELINE ENVIRONMENT

The baseline environment has been rereviewed and remains unchanged from the original MEA. A desk based review of literature and existing data sources has been undertaken, with the following data sources covering the area of the Project, seabird abundance, and distribution modelling studies:

- SMP data collected from 2015 to 2021 (Burnell *et al.*, 2023);
- Production of Seabird and Marine Mammal Distribution Models for the East of Scotland (Paxton *et al.*, 2022);
- Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt *et al.*, 2019);
- An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine Special Protection Areas (SPAs) (Kober *et al.*, 2010);
- Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping (Cleasby *et al.*, 2020);
- Breeding density, fine-scale tracking, and large-scale modelling reveal the regional distribution of four seabird species (Wakefield *et al.*, 2017); and
- SiteLink (NatureScot, 2024) combined with seabird foraging ranges (Woodward *et al.*, 2019).

Through a review of the data sources presented above, the key receptors within the Ornithology Study Area are:

- Black-legged kittiwake *Rissa tridactyla*, hereafter referred to as 'kittiwake';
- European herring gull *Larus argentatus*, hereafter referred to as 'herring gull';
- Terns, to include:
  - Common tern *Sterna hirundo*;
  - Arctic tern *Sterna paradisaea*;
- Auks, to include:
  - Common guillemot *Uria aalge*, hereafter referred to as 'guillemot';
  - Black guillemot *Cepphus grylle*;
  - Razorbill *Alca torda*;
  - Atlantic puffin *Fratercula arctica*, hereafter referred to as 'puffin';
- Northern fulmar *Fulmarus glacialis*, hereafter referred to as 'fulmar';
- Northern gannet *Morus bassanus*, hereafter referred to as 'gannet'; and
- European shag *Gulosus aristotelis*, hereafter referred to as 'shag'.

3.5.4 MARINE ENVIRONMENTAL ASSESSMENT

There will be a direct interaction between the works associated with the Project Design Refinement and the ornithological foraging habitats within the Ornithology Study Area. There is potential for displacement, disturbance, and loss of foraging habitat due to seabed disturbance.

The following potential impacts relevant to Ornithology are assessed:

- Vessel-related disturbance and displacement; and

- Short-term habitat loss (e.g. via cable burial), where the seabed type will remain similar.

These potential impacts have been assessed based on the Project Design Refinements, as described in **Section 1**. For Ornithology, these realistic worst-case parameters are outlined within **Table 3-8**.

TABLE 3-8 ORIGINAL AND REFINED PARAMETERS FOR ORNITHOLOGY

Potential Impact	Phase	Original MEA Parameters	Refined Parameters
Vessel-related disturbance and displacement	Construction and Decommissioning	Maximum: **17 guard vessels**	Maximum: **20 guard vessels**
Short-term habitat loss (e.g. via cable burial), where the seabed type will remain similar	Construction and Decommissioning	Total potential area of short-term habitat loss: **1,755,126 m² (1.76 km²**)	• Sinclair's Excavation Study Area: **98,115 m²** • Minus area already included in the original assessment: 184.5 m (cable length within the study area) × 10 m (installation tool width) = **1,845 m²** • Revised additional disturbance area: 98,115 m² – 1,845 m² = **96,270 m²** • Added to the total original disturbance area: 96,270 m² + 1,755,126 m² = **1,851,396 m²** **Total seabed disturbance = 1,851,396 m² (1.85 km²)** **Total increase in seabed disturbance area = 0.09 km²**

3.5.4.1 VESSEL-RELATED DISTURBANCE AND DISPLACEMENT

Disturbance during the excavation of the trench due to vessel presence and activity may temporarily displace birds from the area, resulting in a loss of habitat. Vessel movements can directly disturb and displace birds from their foraging areas. This can result in a reduction in foraging success and an associated increase in energy expenditure in order to access alternative foraging areas. For the Project Design Refinements, the disturbance will be restricted to Sinclair's Bay and the immediate vicinity of the Project guard vessels when they are operating. The effects are considered to last only for the duration of the cable installation and excavation at any single location, and therefore will be direct, temporary, reversible and short-term in nature. Once the cable installation and excavation are complete and vessel activity ceases at that location, birds are likely to return to these areas.

Sensitivity of Receptors

The sensitivity of bird receptors are the same as assessed in the original MEA. Terns, fulmar, and gannet are considered to have **Negligible** sensitivity to vessel related disturbance and displacement, while kittiwake and herring gull are considered to have **Low** sensitivity, and auks and shags are considered to have **Medium** sensitivity.

Magnitude of Effect

Vessel-related disturbance and displacement as a result of the installation of the cable and the excavation will be highly localised in the context of the Ornithology Study Area, and will be a short-term, temporary activity. Increases in vessel traffic is unlikely to be measurable against background levels, as a maximum of 20 guard vessels will be working during the operations, and there is already a level of vessel traffic in the region. As such, the magnitude of vessel-related disturbance and displacement is considered **Low**.

Assessment Conclusion

A **Negligible** sensitivity for terns, fulmar, and gannet, and a **Low** sensitivity for kittiwake and herring gull, along with **Low** magnitude means that risk of vessel-related disturbance and displacement is **Negligible**.

A **Medium** sensitivity for auks and shags and **Low** magnitude means that risk of vessel-related disturbance and displacement is **Minor Adverse**.

Overall, the assessment concludes **No Significant Effect** from vessel-related disturbance and displacement.

3.5.4.2 SHORT-TERM HABITAT LOSS , WHERE THE SEABED TYPE WILL REMAIN SIMILAR

The proposed HDD excavation at Sinclair's Bay, which may cause short-term habitat loss, or alteration of benthic and fish communities in areas where the cable will be buried, e.g. potentially leading to loss or disruption of fish spawning grounds. This can indirectly affect the foraging success of birds by limiting prey resources, leading to a reduction in foraging success and increased energy expenditure as birds may need to access alternative foraging areas.

These potential impacts are largely considered to represent a realistic worst-case scenario, as the seabed will generally remain similar to baseline conditions after the works are completed.

Sensitivity of Receptors

The sensitivity of bird receptors are the same as assessed in the original MEA. Kittiwake, herring gull, fulmar, and gannet are considered to have **Negligible** sensitivity to short-term habitat loss, while terns and shag are considered to have **Low** sensitivity, and auks are considered to have **Medium** sensitivity.

Magnitude of Effect

Short-term habitat loss as a result of the excavation activities will be highly localised in the context of the Ornithology Study Area and will be a short-term, temporary process. As such, the magnitude of short-term habitat loss is considered **Low**.

Assessment Conclusion

A **Negligible** sensitivity for kittiwake, herring gull, fulmar, and gannet, and a **Low** sensitivity for terns and shag, along with **Low** magnitude, means that risk of short-term habitat loss is **Negligible**.

A **Medium** sensitivity for auks and **Low** magnitude mean that risk of short-term habitat loss is **Minor Adverse**.

Overall, the assessment concluded **No Significant Effect** from short-term habitat loss.

3.5.4.3 DECOMMISSIONING PHASE

Impacts associated with the decommissioning phase of the Project are expected to mirror impacts associated with the construction phase. However, the magnitude of effects are expected to be lower than those during the construction phase. For example, if it is determined that infrastructure such as cable protection is to be left *in situ*, there will be a notable reduction in the potential for seabed habitat disturbance during the decommissioning phase.

3.5.5 ASSESSMENT SUMMARY

In summary, the impacts assessed were deemed **Not Significant** for the receptor groups that are expected to interact with the Project Design Refinements. As such, no additional mitigation, beyond embedded techniques or monitoring, is required.

Table 3-9 shows the receptors that have been assessed as part of the MEA for Ornithology.

TABLE 3-9 SUMMARY OF IMPACTS TO ORNITHOLOGY RECEPTORS

Potential Impact	Receptor	Sensitivity	Magnitude	Overall Risk	Significance
Vessel-related disturbance and displacement	Auks	Medium	Low	Minor Adverse	Not Significant
	Fulmar	Negligible	Low	Negligible	Not Significant
	Gannet	Negligible	Low	Negligible	Not Significant
	Herring gull	Low	Low	Negligible	Not Significant
	Kittiwake	Low	Low	Negligible	Not Significant
	Shag	Medium	Low	Minor Adverse	Not Significant
	Terns	Negligible	Low	Negligible	Not Significant
Short-term habitat loss (e.g. via cable burial), where the seabed type will remain similar	Auks	Medium	Low	Minor Adverse	Not Significant
	Fulmar	Negligible	Low	Negligible	Not Significant
	Gannet	Negligible	Low	Negligible	Not Significant
	Herring gull	Negligible	Low	Negligible	Not Significant
	Kittiwake	Negligible	Low	Negligible	Not Significant
	Shag	Low	Low	Negligible	Not Significant
	Terns	Low	Low	Negligible	Not Significant

3.6 OTHER MARINE USERS

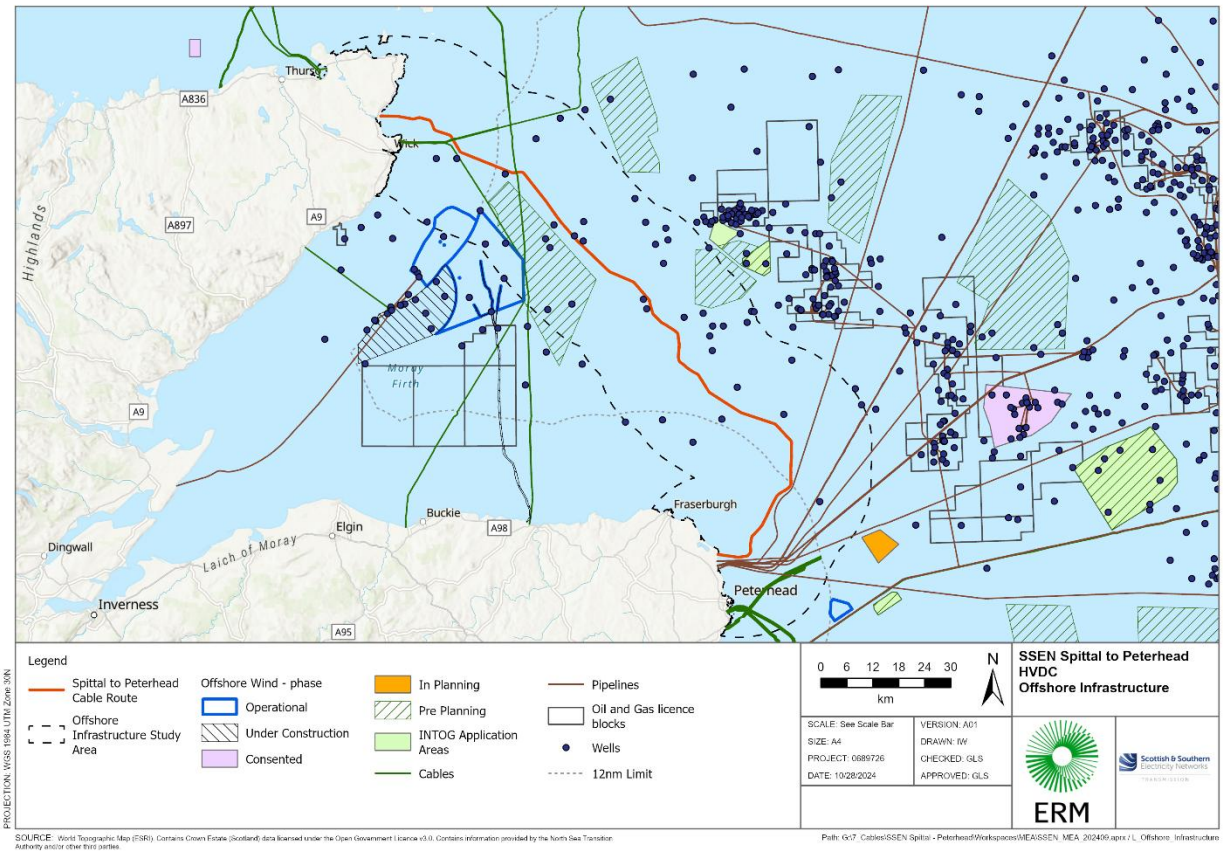
3.6.1 INTRODUCTION

This section presents the baseline environment and assessment of potential impacts as a result of the proposed Project Design Refinements to Other Marine Users, including infrastructure, commercial fisheries, and shipping and navigation.

3.6.2 OTHER MARINE USERS STUDY AREA

As per the original MEA, the Other Marine Users Study Area encompasses a distance of 10 nautical miles (nm), up to MHWS, surrounding the Project and is presented in **Figure 3-5**, along with other offshore infrastructure. This area encompasses the 5 nm Shipping and Navigation Study Area and Commercial Fisheries Study Area presented in the original MEA.

FIGURE 3-5 OTHER MARINE USERS STUDY AREA AND OFFSHORE INFRASTRUCTURE



3.6.3 BASELINE ENVIRONMENT

A summary of the baseline environment for Other Sea Users is presented in the following sections. As the majority of the Project Design Refinements are focused on the landfall location at Sinclair's Bay, the baseline environment presented is also focused on this area. A full description of the baseline environment is presented within the original MEA in **Section 7.6 Commercial Fisheries, Section 7.7 Shipping and Navigation,** and **Section 7.9 Offshore Infrastructure.**

3.6.3.1 OFFSHORE INFRASTRUCTURE

The Central North Sea region is a highly developed area for oil and gas, and renewable energy development. The Project does not intersect any hydrocarbon fields or licensed oil and gas blocks. Furthermore, no pipelines or active subsea cables are identified in proximity to the northern cable landfall at Sinclair's Bay.

The Project does not intersect any operational, consented, or proposed Offshore Wind Farm (OWF) lease areas. However, the Ayre OWF, which submitted an offshore application in December 2025, proposes a landfall location at Sinclair's Bay (Scottish Government, 2026).

The Subsea7 site at Wick is a pipeline fabrication facility, located 1 nm from the northern cable landfall at Sinclair's Bay and within the Other Marine Users Study Area (NASH Maritime, 2024). The Applicant has engaged with Subsea7 to gain a mutual understanding of both organisation's planned operations to minimise any impacts.

3.6.3.2 COMMERCIAL FISHERIES

High activity, mixed commercial fisheries are present within the Other Marine Users Study Area, which are dominated by Scottish trawling vessels >10 m (MMO, 2023).

Vessel Monitoring System (VMS) data indicates potting vessels <10 m targeting shellfish species like crab and lobster are largely present in the inshore regions (within 6 nm) of the Other Marine Users Study Area. Approximately 66% of potting vessels in the inshore area at the northern landfall, Sinclair's Bay, are <10 m and yielded a regional landed value of £27 million between 2016 and 2022 (MMO, 2023).

Mobile gears, including demersal trawls, otter trawls, demersal seine netters, and dredge vessels >10 m primarily operate within offshore regions (beyond 6 nm) of the Other Marine Users Study Area and target species such as haddock, whiting, mackerel, and scallops. Haddock, mackerel, crab, scallop, and lobster also make up the most commercially important species in terms of landed values (MMO, 2023). In particular, VMS data illustrate that otter trawls (>10 m) focus fishing efforts in the northern and southern regions of the Other Marine Users Study Area, which overlap the Project. Otter trawls are most active from June onwards, with peaks in catches seen in August, September, and October.

3.6.3.3 SHIPPING AND NAVIGATION

Overall, the Other Marine Users Study Area experiences low to moderate offshore vessel activity, apart from a high-density route between Aberdeen and the Pentland Firth (NASH Maritime Ltd, 2024).Low-density vessel activity is exhibited around the northern cable landfall at Sinclair's Bay, except for a small area of high-density vessel activity adjacent to Wick Harbour.

Cargo vessel routes account for the majority of transit routes through the Other Marine Users Study Area and are generally used by large vessels <150 m in length. Tankers are also known to follow similar routes to cargo vessels and can be up to 91 m in length.

Passenger vessels, primarily operated by NorthLink Ferries, accounted for the second-highest number of transits through the Other Marine Users Study Area.

Recreational vessel activity is generally focused on the coast, particularly within 5 nm of the northern cable landfall site at Sinclair's Bay, and in the south at Rattray Head, with little recreational vessel activity present within offshore areas of the Other Marine Users Study Area.

Key fishing ports in the region with the highest fishing efforts are Peterhead and Fraserburgh, adjacent to the southern cable landfall site at Rattray Head; however, Wick Harbour is a notable fishing port towards the northern cable landfall site at Sinclair's Bay. There is also a commercial fishing transit route in a northwest/southeast direction between the Orkney Islands and Peterhead/Fraserburgh, which intersects the Other Marine Users Study Area.

Other vessels, like tugboats, oil and gas service vessels, and dredge and survey vessels, are also known to be present within the Other Marine Users Study Area.

A Navigational Risk Assessment (NRA) by NASH Maritime Ltd. (2024) was conducted for the original MEA. The NRA concluded all collision hazards to be Low Risk - Broadly Acceptable, based on a collision event being extremely unlikely (NASH Maritime Ltd, 2024). The risk of fishing vessels snagging subsurface infrastructure due to towed gears or anchoring was assessed as Medium Risk – Tolerable (if As Low As Reasonably Practicable (ALARP)) (NASH Maritime Ltd, 2024). The infrequent nature of snagging events, along with measures such as cable burial, marking on nautical charts, and Notice to Mariners, will ensure the risk of snagging remains ALARP. No hazards are assessed to be high risk and unacceptable.

3.6.4 MARINE ENVIRONMENTAL ASSESSMENT

Potential impacts as a result of the Project Design Refinements only are assessed below and are based on the realistic worst-case parameters outlined in **Table 3-10**. This assessment follows the same methodology as provided within **Section 6 Impact Assessment Methodology** of the original MEA and also considers embedded mitigation measures highlighted in **Section 7.6 Commercial Fisheries, Section 7.7 Shipping and Navigation,** and **Section 7.9 Offshore Infrastructure** of the original MEA to inform this assessment.

TABLE 3-10 REALISTIC WORST-CASE PARAMETERS BASED ON THE PROJECT DESIGN REFINEMENTS FOR OTHER MARINE USERS

Receptor	Potential Impact	Realistic Worst-Case Parameters based on the Project Design Refinements
Construction and Decommissioning		
Other Marine Users associated with Offshore Infrastructure	Temporary loss of access to Other Marine Users during cable installation/ decommissioning.	**HDD:** Excavation area: **6,775 m²**. **Cable:** Change in cable protection rock grade to: Inside 12 nm • **Filter rock protection cobbles** • **Rock armour protection,** and • **Large rock armour protection boulders** Outside 12 nm • **Filter rock protection cobbles** **Temporary Seabed Deposits:** Total number HDD clump weights inside 12 nm = 8 Total number concrete blocks inside 12 nm = 6 Total number lightweight subsea support mats inside 12 nm = 9. **Project Guard Vessels:** Increase in maximum number of guard vessels from 17 to **20**.

Receptor	Potential Impact	Realistic Worst-Case Parameters based on the Project Design Refinements
Shipping and Navigation	Vessel to vessel collision risk	**Project Guard Vessels:** Increase in maximum number of guard vessels from 17 to **20**.
Shipping and Navigation	Vessel routing	As per the realistic worst-case scenario for impacts relating to collision risk during construction and decommissioning.
Commercial Fisheries	Temporary loss of access to fishing grounds and displacement of fisheries	As per the realistic worst-case scenario for impacts relating to temporary loss of access to Other Marine Users during cable installation/ decommissioning during construction.
Commercial Fisheries Shipping and Navigation	Snagging risk	**Cable:** Change in cable protection rock grade to: Inside 12 nm • **Filter rock protection cobbles** • **Rock armour protection,** and • **Large rock armour protection boulders** Outside 12 nm • **Filter rock protection cobbles** **Temporary Seabed Deposits:** Total number HDD clump weights inside 12 nm = 8 Total number concrete blocks inside 12 nm = 6 Total number lightweight subsea support mats inside 12 nm = 9.
Operation		
Commercial Fisheries Shipping and Navigation	Cable Snagging risk	**Cable:** Change in cable protection rock grade to: Inside 12 nm • **Filter rock protection cobbles** • **Rock armour protection,** and • **Large rock armour protection boulders** Outside 12 nm • **Filter rock protection cobbles**
Commercial Fisheries	Permanent loss of access to fishing grounds and displacement of fisheries	As per the realistic worst-case scenario for impacts relating to cable snagging risk during operation.

3.6.4.1 OFFSHORE INFRASTRUCTURE

Construction and Decommissioning

Temporary loss of access to Other Marine Users during cable installation/ decommissioning

There is potential for temporary loss of access to Other Marine Users, such as vessels associated with offshore infrastructure, due to the HDD excavation area, the change in rock protection material, and temporary seabed deposits proposed in the Project Design Refinements. Temporary loss of access may occur as a result of the increase in the number of Project guard vessels proposed to be on site at any one time and associated exclusion zones.

The change in rock protection material and the HDD excavation area is considered to be highly localised and occurs over a small spatial extent at Sinclair's Bay. Furthermore, an increase in three Project guard vessels on site at any one time is not expected to significantly alter the magnitude of impact previously assessed in the original MEA. In line with embedded mitigation measures highlighted in the original MEA, it is considered that the Project Design Refinements will not result in a significant change in the magnitude of impact. As such, the magnitude is considered to remain **Low**.

The sensitivity of Other Marine Users associated with offshore infrastructure to temporary loss of access is considered to be the same as highlighted in the original MEA. As such the sensitivity is **Medium** for the Subsea7 site and **Low** for vessels servicing pipelines, subsea cables, OWFs and other infrastructure.

Based on the considerations above , it is considered that there will be no change to the assessment outcomes presented within the original MEA. Temporary loss of access to Other Marine Users associated with offshore infrastructure will remain **Minor Adverse, Not Significant** for the Subsea7 site and **Negligible, Not Significant** for all Other Marine Users receptors.

3.6.4.2 COMMERCIAL FISHERIES

Construction and Decommissioning

Snagging Risk and Temporary loss of access to fishing grounds and displacement of fisheries

There is potential for temporary loss of access to fishing grounds, leading to displacement of fisheries due to the HDD excavation area, the change in rock protection material, and temporary seabed deposits proposed in the Project Design Refinements. Temporary loss of access may occur as a result of the increase in the number of Project guard vessels proposed to be on site at any one time and associated exclusion zones. There is also a potential snagging risk associated with temporary seabed deposits during construction. The change in rock protection material, temporary seabed deposits, and the HDD excavation area is considered highly localised and occurs over a small spatial extent. Furthermore, an increase in three Project guard vessels on site at any one time is not expected to significantly alter the magnitude of impact previously assessed in the original MEA. In line with embedded mitigation measures highlighted in the original MEA, it is considered that the Project Design Refinements will not result in a significant change in the magnitude of impact. As such, the magnitude of impact is considered to remain **Low**.

The sensitivity of commercial fisheries receptors to temporary loss of access is considered the same as that highlighted in the original MEA. As such, the sensitivity is **High** for dredgers, **Medium** for otter trawlers, pots and traps and demersal trawlers, and **Low** for demersal seine netters.

The sensitivity of commercial fisheries receptors to snagging is considered the same as that highlighted in the original MEA. As such, the sensitivity is **Medium** for otter trawlers, demersal trawlers, dredgers, and demersal seine netters and **Negligible** for pots and traps.

Based on the considerations above, it is considered that there will be no change to the assessment outcomes presented within the original MEA. Temporary loss of access to fishing grounds and displacement of fisheries during construction will remain **Minor Adverse, Not Significant** for otter trawlers, pots and traps, dredgers, and demersal trawlers and **Negligible, Not Significant** for demersal seine netters.

Snagging risk during construction will remain **Minor Adverse, Not Significant** for otter trawlers, demersal seine netters, dredgers, and demersal trawlers and **Negligible, Not Significant** for pots and traps.

Operation

Snagging Risk and Permanent loss of access to fishing grounds and displacement of fisheries

The Project has committed to cable burial where possible. However, an increase in permanent seabed deposits is proposed within the Project Design Refinements, which has the potential to increase the risk of snagging for commercial fishing receptors. It is expected that fishing will be able to resume along the cable corridor where it is safe to do so; however, the perceived risk associated with potential areas of shallow buried cable, cable exposures and/or cable protection could lead to parts of the cable corridor being perceived as a fishing risk, therefore, resulting in loss of access to fishing grounds during operation.

Permanent seabed deposits and the change in rock protection material are considered to be highly localised and occur over a small spatial extent. Furthermore, in consideration of the embedded mitigation measures highlighted in the original MEA, it is considered that the Project Design Refinements will not result in a significant change in the magnitude of impact. As such, the magnitude of impact is considered to remain **Low**.

The sensitivity of commercial fisheries receptors to snagging and permanent loss of access is considered the same as highlighted in the original MEA. As such, the sensitivity is **Medium** for otter trawlers, demersal trawlers, dredgers, and demersal seine netters and **Negligible** for pots and traps.

Based on the above considerations, it is considered that there will be no change to the assessment outcomes presented within the original MEA. Snagging risk and permanent loss of access to fishing grounds and displacement of fisheries will remain **Minor Adverse, Not Significant** for otter trawlers, demersal seine netters, dredgers, and demersal trawlers and **Negligible, Not Significant** for pots and traps.

3.6.4.3 SHIPPING AND NAVIGATION

Construction and Decommissioning

Vessel routing and vessel to vessel collision risk

The presence of Project guard vessels has the potential to alter vessel routing and presents a collision risk to shipping receptors. The maximum number of Project guard vessels on site at any one time is proposed to increase from 17 to 20 within the Project Design Refinements. In line with embedded mitigation measures highlighted in the original MEA, an increase of three Project guard vessels on site at any one time is not expected to alter the magnitude of impact of vessel routing or collision risk for receptors of shipping and navigation. As such, the magnitude of impact is considered to be the same as assessed in the original MEA and is considered to remain **Low**.

The sensitivity of shipping and navigation receptors to vessel routing and collision risk is considered the same as highlighted in the original MEA. As such, the sensitivity is **Low** for commercial vessels, ferries, and small craft.

Based on the above considerations, it is considered that there will be no change to the assessment outcomes presented within the original MEA. Vessel routing and collision risk will remain **Negligible, Not Significant** for all shipping and navigation receptors.

Snagging risk

As highlighted above for impacts to commercial fisheries (**Section 3.6.4.2**), there is a risk of snagging to shipping and navigation receptors due to temporary seabed deposits and the change in rock protection material proposed within the Project Design Refinements, which could impact vessel anchoring during construction. No designated or customary anchorages were identified in the Other Marine Users Study Area, with the exception of the chartered anchorage in proximity to Sinclair's Bay (NASH Maritime Ltd, 2024). Temporary seabed deposits and the change in rock protection material are considered to be highly localised and occur over a small spatial extent. Furthermore, in consideration of the embedded mitigation measures highlighted in the original MEA, it is considered that temporary seabed deposits and the change in cable protection material will not result in a significant change in the magnitude of impact. As such, the magnitude of impact is considered to remain **Negligible**.

The sensitivity of shipping and navigation receptors to snagging is considered to be the same as highlighted in the original MEA. As such, the sensitivity is **Low**.

Based on the above considerations, it is considered that there will be no change to the assessment outcomes presented within the original MEA. Snagging risk during construction will remain **Negligible, Not Significant** for all shipping and navigation receptors.

Operation

Snagging risk

As highlighted for impacts to shipping and navigation impacts during construction and for impacts to commercial fisheries (**Section 3.6.4.2**), there is a risk of snagging to shipping and navigation receptors due to permanent seabed deposits and the change in rock protection material proposed within the Project Design Refinements. This could impact vessel anchoring during operation. The risk of snagging during operation to shipping and navigation receptors is

considered the same as that assessed above for construction, given the highly localised, small spatial extent of permanent seabed deposits and the change in rock protection material. As such, the magnitude of impact is considered to remain **Negligible**.

The sensitivity of shipping and navigation receptors to snagging is **Low**.

Based on the above considerations, it is considered that there will be no change to the assessment outcomes presented within the original MEA. Snagging risk during operation will remain **Negligible, Not Significant** for all shipping and navigation receptors.

3.6.5 ASSESSMENT SUMMARY

Overall, the Other Marine Users assessment concluded **No Significant Effects** throughout the construction, operation, and decommissioning phases of the proposed Spittal to Peterhead Cable. Potential impacts arising from the Proposed Design Refinements are not anticipated to increase the significance of effect beyond that already assessed within the original MEA. As such, no additional mitigation measures are proposed for Other Marine Users.

3.7 MARINE ARCHAEOLOGY AND CULTURAL HERITAGE

3.7.1 INTRODUCTION

Maritime Archaeology is the study of past cultures' interactions with waterbodies. Such study may, logically, include submerged archaeological sites, hereafter referred to as assets. However, it may also include assets located in the intertidal zone, or even onshore assets related to activities, transport, and trade by sea, such as lighthouses and pill boxes (Scottish Government, n.d.). This section describes the amended baseline for Marine Archaeology and Cultural Heritage within a defined Marine Archaeology and Cultural Heritage Study Area at the Sinclair's Bay excavation/deposit area. This has been informed by a desk-based analysis and survey results. A full Marine Archaeology and Cultural Heritage assessment of the Rattray Head and Sinclair's Bay landfalls and cable corridor can be found in the original MEA**, Appendix E, Marine Archaeology Technical Appendix.** This section concludes with an appraisal of the potential effects introduced by the Project at Sinclair's Bay excavation/deposit area on Marine Archaeology and Cultural Heritage.

Effects on setting have been scoped out of this assessment, as there is no infrastructure above MHWS for the Project; therefore, this MEA only considers impacts below MHWS.

3.7.2 MARINE ARCHAEOLOGY AND CULTURAL HERITAGE STUDY AREA

The Sinclair's Bay Study Area, as set forth in **Section 2.1.1**, was defined by SSENT and involves excavation of a 2.2 m deep trench. The cables will be protected post-installation by the backfilling of the trench with the excavated material to avoid decreasing water depth. The Marine Archaeology and Cultural Heritage Study Area include a 1 km buffer of the excavation/deposit area up to the MHWS, as shown in **Figure 3-6**.

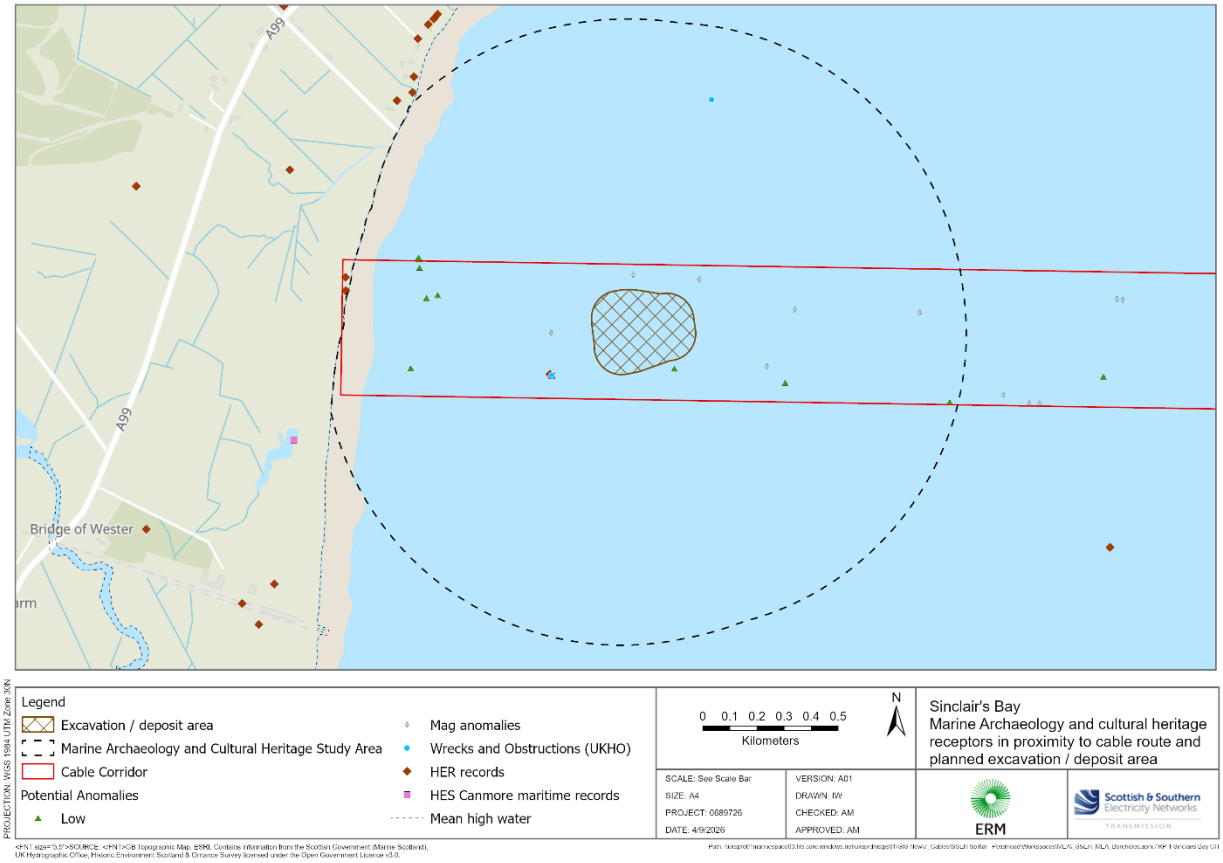


FIGURE 3-6 MARINE ARCHAEOLOGY AND CULTURAL HERITAGE SINCLAIR'S BAY STUDY AREA

3.7.3 BASELINE ENVIRONMENT

3.7.3.1 PREHISTORY TO HISTORIC

An in-depth discussion of the prehistoric era can be found in **Section 7.8.3** of the original MEA The prehistoric period in Scotland spans from the Palaeolithic Period to the arrival of the Romans in 78 AD (*Anno Domini*). The environment of the Marine Archaeology and Cultural Heritage Study Area changed dramatically during this period, which greatly affected the habitable areas and, in turn, the potential to identify remains from these settlements.

There are uncertainties around the Relative Sea Level (RSL) after the Last Glacial Maximum, with a complex interplay between sea levels and isostatic rebound, meaning a difference in model outputs of RSL. Within the Marine Archaeology and Cultural Heritage Study Area, the Main Late Glacial Shoreline has been modelled at between -10-15 m Ordnance Datum (OD) (i.e. 10-15 m below OD); to up to ~15 m OD, or more (Shennan *et al.*, 2018; Brooks *et al.*, 2018). Between c. 8,000 to 2,000 years Before Present (BP), during a highstand phase, the RSL may have been up to +5 m OD. From 2,000 BP onwards, the RSL tends to closely correlate with that of the present day.

3.7.3.2 AVIATION AND CONFLICT ARCHAEOLOGY

An in-depth discussion of aviation and conflict in the region can be found in **Section 7.8.3** of the original MEA**.** During the 20th century, the two World Wars had a significant impact on the character and heritage of the eastern coast of Scotland. This was established through the installation of military infrastructure and the transformation of commercial docks, ports, and similar facilities to military use (Scott, 2023). Sinclair's Bay was fortified to protect against foreign incursion and also used as the drop location for the Royal Air Force to test highballs or 'bouncing bombs'.

In addition to military infrastructure being present in the area, there is also the possibility of aircraft wreckage or abandonment.

3.7.3.3 MARINE ARCHAEOLOGY AND CULTURAL HERITAGE RECEPTORS

All prehistoric, marine, aviation/conflict, and historic archaeological assets have been summarised, where present. The results of the geophysical assessment (MSDS, 2024) have been included in the identification of receptors. Full descriptions of assets and anomalies can be found in the original MEA, **Appendix E, Marine Archaeology Technical Appendix**.

No designated assets are located within the Marine Archaeology and Cultural Heritage Study Area of the Sinclair's Bay excavation/deposit area. They are all located on land above the MHWS and, as such, they are not assessed for impacts in this MEA. Instead, they will be assessed separately in the onshore environmental assessment for the landfall areas, as discussed in more detail in the original MEA**.**

Non-designated assets are outlined in detail in **Table 3-11**, and include the following:

- Marine Archaeology and Cultural Heritage Study Area;
  - 2 assets were identified within the wider 1 km Marine Archaeology and Cultural Heritage Study Area; and
  - 15 remotely sensed contacts of low potential anomalies and magnetic contacts;
- Sinclair's Bay excavation/deposit area;
  - 1 asset has an unknown potential to extend into the excavation/deposit area but is currently mapped within the Marine Archaeology and Cultural Heritage Study Area.

The archaeological assessment of the 2023 survey did not corroborate the locations of any previously identified archaeological sites in the UKHO, Canmore, HER, or Historic Environment Scotland (HES) datasets within the cable corridor where the excavation/deposit area is located. Therefore, the record locations can be interpreted as indicative of potential rather than physically confirmed sites.

TABLE 3-11 SUMMARY OF BASELINE ASSETS (N/A = NOT APPLICABLE)

Project Location	Site Type	Within excavation/ deposit area[6]	Wider Study Area[7]	Comments (where deemed necessary)
Sinclair's Bay excavation/deposit area	Marine	0	1 dead shipwreck location *Star of Victory* (MHG14772/Canmore 101902; and UKHO 917); 1 unclassified location (UKHO 98618).	N/A
	Aviation/Conflict	0	0	20th century conflict sites all located above MHWS on land and, as such, will not be impacted.
	Prehistoric		1 open peat bank (MHG2016/Canmore 9127) (HER and Canmore).	Open peat bank (MHG2016) location is a buffered area, but its exact boundaries are uncertain and has an unknown potential to extend into the excavation/deposit area.
	Low potential remotely sensed contacts	0	6 magnetic contacts (B1_M006, B1_M002, B1_M004, B1_M007, B1_M005, B2_M003) 9 potential debris or geological anomaly (SPTL_001, SPTL_002, SPTL_003, SPTL_004,SPTL,_005, SPTL_006, SPTL_007, SPTL_008, SPTL_011).	N/A

[6] All non-designated except when specified
[7] All non-designated except when specified

3.7.4 MARINE ENVIRONMENTAL ASSESSMENT

3.7.4.1 OVERVIEW

The proposed works have the potential to result in environmental impacts on the receptor groups described in **Section 3.7.3** and in **Table 3-11** that are located below or extend into the MHWS.

3.7.4.2 SCOPING OF POTENTIAL IMPACTS

The potential impacts outlined in **Table 3-12** below have been identified as relevant to each receptor group described in **Section 7.8.3** of the original MEA and form the basis for assessment within this MEA.

TABLE 3-12 POTENTIAL IMPACTS ASSOCIATED WITH THE PROJECT

Topic	Impact	Project Phases	Scoped In/Out
Marine Archaeology	Direct physical impact via disturbance of the seabed on the archaeological/heritage features	Construction and Decommissioning	Scoped In
	Indirect physical impact via changes in hydrodynamics, sediment transport and suspended sediment concentrations (plumes)	Construction and Decommissioning	Scoped In
	Impact to settings	-	Scoped out

3.7.4.3 MARINE ARCHAEOLOGY IMPACTS

Impacts to marine archaeology are generally defined as

- Direct physical impacts from seabed disturbance;
- Indirect physical impacts from changes in hydrodynamics, sediment transport, and suspended sediment (plumes); and
- Direct changes to setting (limited to above the waterline, therefore scoped out).

As there is no planned Project infrastructure above the waterline, there are no proposed impacts to settings of any intertidal assets. Further assessment of onshore assets will be completed as part of an onshore assessment.

Direct and indirect physical impacts are not limited to the Construction phase of the Project, although the majority of the potential impacts occur within this phase. The potential for impact from asset removal is present during the Decommissioning phase. Therefore, there remains the potential for impacts to marine archaeological assets across the Project lifecycle.

For the direct physical impacts, these are currently anticipated to be limited to the excavation/deposit area. For heritage assets, direct physical impacts will be permanent and irreversible. However, indirect impacts such as changes to sedimentation may be reversible or subject to alteration following cessation of activity. Any loss of sediment and erosion of heritage assets will not be reversible, but where heritage assets are protected by the accumulation of deeper sediment, this may be considered a reversible change.

The nature of the marine archaeological resource is such that there is a high level of uncertainty concerning remains on the seabed. Often, data regarding the nature and extent of sites are limited or out of date, and, as such, the precautionary principle is applied to all

aspects of archaeological impact assessments, and a conservative assessment of risk is applied.

3.7.4.4 IMPACT ASSESSMENT THROUGH THE PROJECT LIFE CYCLE

Table 3-13 below identifies the receptors that have the potential to be impacted by the Project, summarises the impact type, provides the suggested mitigation measures, and determines the residual impact following the implementation of mitigation.

For further information on these assets, see **Appendix E, Marine Archaeology Technical Appendix**.

TABLE 3-13 MITIGATION AND RESIDUAL IMPACTS OF THE PROJECT

Name	Impact Pathway	Location	Sensitivity	Magnitude	Mitigation measures	Overall Residual Risk	Significance
Direct Physical Impacts – Seabed Disturbance							
Boundary Bank, Reiss Links (MHG2016)	Direct	Sinclair's Bay excavation/deposit area	Medium	Medium	Area of Archaeological potential	Negligible	Not Significant
Unknown assets and features of archaeological potential	Direct	Sinclair's Bay excavation/deposit area	Unknown	High	Review of any further geophysical and geotechnical data, WSI and PAD to manage and monitor assets	Negligible	Not Significant
Boundary Bank, Reiss Links (MHG2016)	Indirect	Sinclair's Bay excavation/deposit area	Medium	Low	Area of Archaeological potential	Negligible	Not Significant
Unknown assets and features of archaeological potential	Indirect	Sinclair's Bay excavation/deposit area	Unknown	Medium	Review of any further geophysical and geotechnical data, WSI and PAD to manage and monitor assets	Negligible	Not Significant

Name	Impact Pathway	Location	Sensitivity	Magnitude	Mitigation measures	Overall Residual Risk	Significance
Unknown assets and features of archaeological potential	Indirect	Sinclair's Bay excavation/deposit area	Unknown	Negligible	Review of any further geophysical and geotechnical data, WSI and PAD to manage and monitor assets	Negligible	Not Significant

Direct physical impact - Seabed disturbance

Seabed disturbance due to the excavation of the trench and the subsequent deposit, and any anchoring, is the most likely source of direct physical impacts to known and unknown Marine Archaeology and Cultural Heritage assets, with the potential to damage, partially or wholly remove these assets.

The sensitivity of these known and unknown assets is variable and depends on their archaeological potential and value; see **Table 3-13**. Direct physical impacts have the potential to be one-off, non-reversible, and permanent, equating to a **High** magnitude of effect. The only exception to this is from direct physical impacts on known and potential palaeogeographical receptors, where the rating of magnitude is lower, as the features are generally spatially more extensive and, therefore, the scale of the impact is relatively small.

Where mitigation is proposed, and the principle of avoidance is adopted in the first instance, through survey, assessment, and identification, these mitigation measures will significantly reduce the predicted residual effect of this impact on the cultural heritage. Further details are provided in **Table 3-13**.

Indirect physical impact - Changes in hydrodynamics, sediment transport and plumes

Changes in hydrodynamics or sediment transport and the creation of sediment plumes are the main causes of indirect physical impact to known and unknown Marine Archaeology and Cultural Heritage assets.

The sensitivity of these assets varies depending on the archaeological interest and value, see **Table 3-13**. Changes in hydrodynamics and sediment transport have the potential to destabilise any assets, causing potentially continued, non-reversible and, in the realistic worst-case, permanent damage. As a result of these processes, the asset may move out of its original context and association, or be damaged in this process, or be removed/dispersed (for smaller items or palaeolandscape features). With mitigations in place, the changes are proposed to be localised and of negligible effect. However, given the sensitivity, without mitigation, these may equate to a Moderate Adverse Effect.

However, if a sediment plume is created, the area where the sediment settles may create an additional layer of protection over a cultural heritage asset and may, potentially, be recorded as a beneficial impact.

3.7.4.5 MITIGATION

Mitigation recommendations should be robust, but proportional. Proactive mitigation of impacts to the historic environment, using industry-standard guidance, can limit direct and indirect physical impacts to any known or unknown Marine Archaeology and Cultural Heritage assets (see **Section 6.4.1**, **Table 6-5** of the original MEA for the full list of embedded mitigation measures).

An Area of Archaeological Potential (AAP) is recommended for a known potential prehistoric asset of high archaeological potential, although the full extent of the feature is not confirmed at present (**Table 3-14**).

TABLE 3-14 MARINE ARCHAEOLOGY EXCLUSION ZONES (AEZS)

ID	Location	Description	Record	Type	AEZ
MHG2016	Sinclair's Bay excavation /deposit area	A peat-bank 7.8 m N-S by about 0.4 m deep, with 2.25 m of sand overburden. Located at the beach head [dry, top end of the beach] under shingle cover and exposed [by wave action] during [only] abnormally high tides.	HER; Canmore	Non-designated; Prehistoric	Area of Archaeological Potential (Point buffer, 50 m, from Canmore position)

Operational Awareness is recommended for magnetic anomalies with no surficial representation identified within the geophysical assessment (potential known assets) - a total of 15 were identified within the Marine Archaeology and Cultural Heritage Study Area. Further details are provided in **Appendix E, Marine Archaeology Technical Appendix**.

Within the records across the Marine Archaeology and Cultural Heritage Study Area, many non-designated assets have been identified, some as close as 27 m from the Sinclair's Bay Study Area. However, the position of the assets may not always be accurate and may be indicative, or an estimate based on information at the time.

Given the potential for unknown archaeology, including buried assets within the excavation/deposit area and proximity to known archaeology, a Protocol of Archaeological Discoveries (PAD) has be issued for approval by the local authority, through Marine Directorate Licensing Operations Team (MD-LOT) as required, and enforced before installation commences. This ensures that any identified archaeology can be suitably assessed and reported through the identified pathways to the local authority, with any further mitigation agreed where necessary.

3.7.5 ASSESSMENT SUMMARY

As archaeological receptors cannot adapt, tolerate, or recover from physical impacts caused by a proposed development, for assessment purposes, the sensitivity of each asset is quantified by its value.

The nature of the marine archaeological resource is such that there is a high level of uncertainty concerning remains on the seabed. Often, data regarding the nature and extent of sites are limited or out of date; as such, the precautionary principle is applied to all aspects of archaeological impact assessments, and a conservative assessment of risk is applied.

Overall, the Marine Archaeology assessment concludes **Negligible** Risk and **No Significant** Effects throughout the construction and decommissioning phases of the proposed Spittal to Peterhead Cable, following the mitigation proposed in **Table 3-14**.

Table 3-13 shows the receptors that have been assessed as part of the MEA for Marine Archaeology.

Any overall risk determined to be **Negligible** or **Minor** is **'Not Significant'**, i.e. no significant impact results. Any overall risk determined to be **Moderate** or **Major** is **'Significant'** has mitigation(s) to be implemented to minimise or remove the significance of impact to become **'Not Significant'**.

3.8 HABITATS REGULATIONS ASSESSMENT

3.8.1 INTRODUCTION

This section provides an update to the Habitats Regulations Appraisal (HRA) assessment to reflect changes in the Project Design Refinements from the original application. This section, therefore, provides a summary of the baseline information presented within the original MEA (with appropriate cross-references) and updated impact assessments.

Refer to the original MEA for the legislation, guidance, and methodology associated with the assessment. The Project Design Refinements do not present additional impact pathways to those scoped in within the original MEA. Furthermore, the Project Design Refinements do not amend any design parameters, which could introduce new or greater impacts outside of those already consented.

3.8.2 STAGE 1 SCREENING OF STATUTORY DESIGNATED SITES AND FEATURES

3.8.2.1 APPROACH TO SCREENING FOR LIKELY SIGNIFICANT EFFECT

To maintain an approach that encompasses the potential footprint of effects associated with the Project, while also ensuring screening and assessment remain proportionate to the scale and magnitude of the Project, screening buffers have been applied to the HRA process. Sites outside of these screening buffers are considered sufficiently distanced from the project that it is reasonable to conclude No Likely Significant Effect (No LSE). A summary of the approach used for each receptor group is provided in **Table 3-15**.

TABLE 3-15 BUFFERS ADOPTED FOR LIKELY SIGNIFICANT EFFECT SCREENING

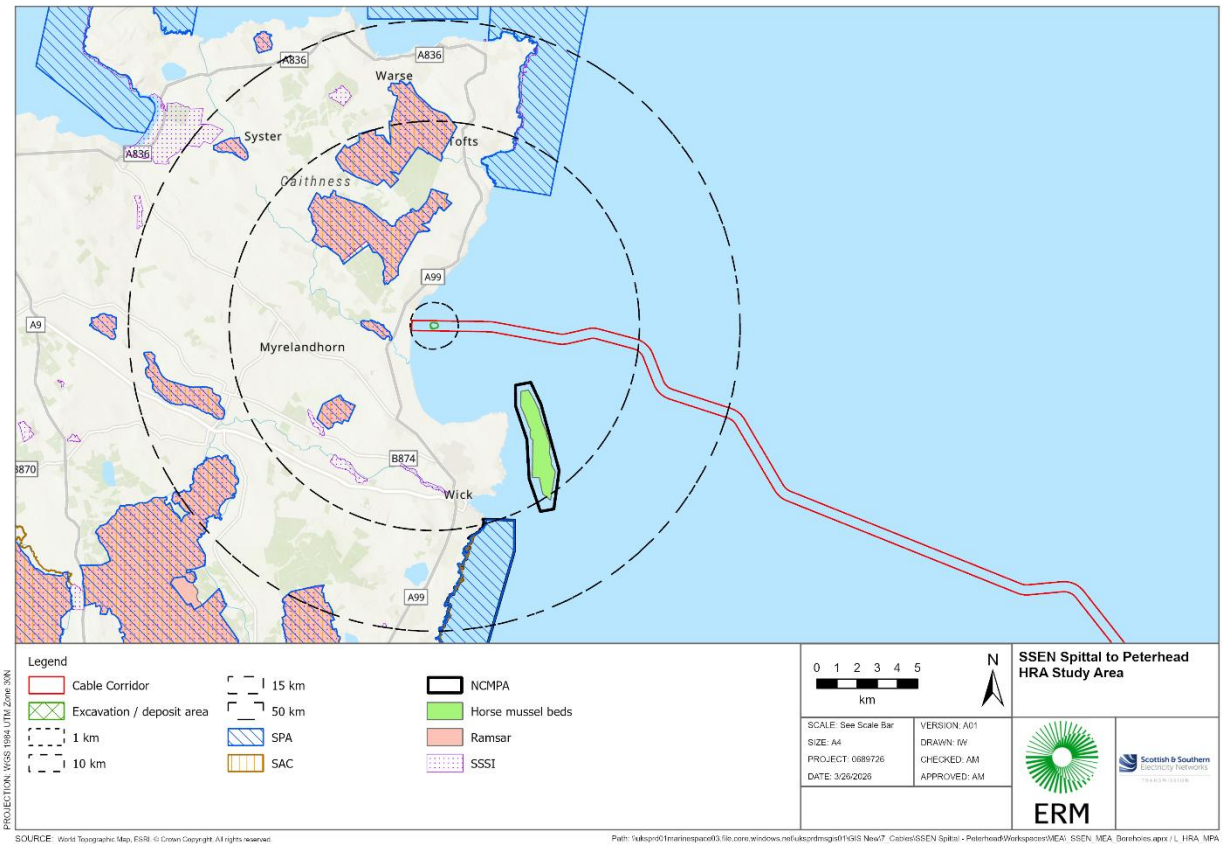
Receptor	Screening Methodology
Annex I Benthic Habitats (Special Areas of Conservation; SACs)	**1 km** screening buffer. This buffer has been set in recognition of the small scale and nature of the proposed works and limited potential for any sediment plume effects (suspended sediment, deposition, and smothering) to extend beyond immediately local benthic habitats and species.
Annex II Migratory Fish (SACs)	**10 km** screening buffer. This buffer is considered sufficient to ensure that there is no measurable habitat loss or barrier to species movement arising from the project activities.
Annex II Marine Mammals (SACs)	**50 km** screening buffer. This buffer is applied to encompass foraging and movement of mobile marine mammal features outside of the boundaries of the SACs of which they are a qualifying feature.
Special Protection Area (SPA) Classified Bird Populations and Ramsar Sites	**50 km** screening buffer for breeding features. Although this buffer is smaller than the species-specific foraging ranges presented by Woodward *et al.* (2019), it is considered sufficient to encompass all important foraging and supporting habitats at nearby SPAs. **15 km** screening buffer for non-breeding features. If an SPA supports breeding (Annex I seabirds, with a buffer of 50 km) and non-breeding (Annex I seabirds with a buffer of 15 km), the area is screened based on the 50 km buffer, covering both types of features and No Likely Significant Effect (No LSE).

Receptor	Screening Methodology
	0 km screening buffer for terrestrial features. Features that do not make use of the marine environment are only screened in where there is direct overlap between the Project and the SPA (this can only occur at landfall locations). Where an SPA is classified for terrestrial and marine features, No LSE is concluded for all terrestrial features if there is no direct overlap.

For sites that are within the distance buffers presented in **Table 3-15** above, feature-specific sensitivity to pressures associated with the proposed activity is considered. NatureScot's 'FeAST' (Feature Activity Sensitivity Tool) has been used, where possible (FeAST, 2025). However, it should be noted that sensitivity assessments were not available for all qualifying features.

Figure 3-7 presents the location of Special Areas of Conservation (SACs), SPAs, and Ramsar Sites considered within the assessment, in relation to Sinclair's Bay Study Area and the relevant buffer regions. Eight SPAs and 2 Ramsar Sites are situated within the screening distances.

FIGURE 3-7 SINCLAIR'S BAY STUDY AREA, HABITATS REGULATIONS APPRAISAL SCREENING BUFFER ZONES (1 KM, 10 KM, 15 KM, AND 50 KM), AND THE SPECIAL AREAS OF CONSERVATION, SPECIAL PROTECTION AREAS, AND RAMSAR SITES WITHIN SCREENING DISTANCE



3.8.3 SCREENING OUTCOMES

3.8.3.1 PROJECT ALONE ASSESSMENT

Screening has been undertaken on a two-stage iterative basis, where, initially, screening distances (**Table 3-15**) have been used to identify sites within the vicinity of the Project. Following this, sites within screening distance were assessed in greater detail.

The screening distances laid out in **Table 3-15** identified the following European sites, which are taken forward for further consideration within the screening process:

SACs Designated for Annex I Benthic Habitats:

- No sites are located within the 1 km screening threshold distance;

SACs Designated for Annex II Migratory Fish Species:

- No sites are located within the 10 km screening threshold distance;

SACs Designated for Annex II Marine Mammal Species:

- No sites are located within the 50 km screening threshold distance;

SPAs with Classified Bird Populations:

- North Caithness Cliffs SPA (UK9001181);
- East Caithness Cliffs SPA (UK9001182);
- Hoy SPA (UK9002141);
- Scapa Flow SPA (UK9020321);
- Moray Firth SPA (UK9020313);
- Copinsay SPA (UK9002151);
- Caithness Lochs SPA (UK9001171) and Ramsar Site (8413); and
- Caithness and Sutherland Peatlands SPA (UK9001151) and Ramsar Site (8412).

Table 3-16 presents the results of the screening assessment for the sites listed above. The qualifying features of each site are presented alongside the assessment and justification for the determination of LSE.

Where applicable, assessment of feature sensitivity is based on the FeAST (FeAST, 2023), However, the tool does not yet include assessments for any marine bird species, other than black guillemot *Cepphus grylle*. It is understood that 36 sensitivity assessments for marine birds have been conducted (Rogerson *et al.*, 2021). However, at the time of drafting this assessment, it is unclear if these sources have been published. Therefore, where appropriate, the methodology report (Rogerson *et al.*, 2021) and references therein have been used alongside alternative published reports and studies to determine whether features are likely to be sensitive to pressures associated with the project.

As detailed in **Table 3-16**, **No LSE is concluded for all sites and qualifying features**. This is primarily due to the small and highly localised scale and magnitude of the project. In addition, it is noted that where effects do occur, there will be rapid recovery following cessation of activities. No qualifying features were assessed as having greater than negligible sensitivity to the proposed works.

TABLE 3-16 SCREENING FOR LIKELY SIGNIFICANT EFFECT (LSE) CONCLUSIONS

Site Name and Code	Qualifying Features* * No Likely Significant Effect (LSE) is concluded for all terrestrial features.	Distance from Study Area (km)	Screening for Likely Significant Effect (LSE)
Special Protection Areas (SPAs) and Ramsar Sites			
Caithness Lochs SPA (UK9001171) and Ramsar Site (8413)	Non-breeding populations of: • Greylag goose *Anser anser*; • Greenland white-fronted goose *Anser albifrons flavirostris*; and • Whooper swan *Cygnus cygnus*.	1.9	Caithness Lochs SPA and Ramsar Site is located 1.9 km from the Sinclair's Bay Study Area. The designated features are geese and swans that make very limited use of the marine environment. These roost either inland or on the coast and forage in the intertidal zone, such as on mudflats or the strandline. As such, there is limited to no potential for interaction between the geese and swan designated features of the Caithness Lochs SPA and Ramsar Site and the project. **No Likely Significant Effect (LSE) alone** is determined.
Caithness and Sutherland Peatlands SPA (UK9001151) and Ramsar Site (8412)	Breeding populations of: • Wigeon *Mareca penelope*; • Common scoter *Melanitta nigra*; • Golden plover *Pluvialis apricaria*; • Dunlin *Calidris alpina*; • Wood sandpiper *Tringa glareola*; • Greenshank *Tringa nebularia*; • Greylag goose; • Red-throated diver *Gavia stellata*; • Black-throated diver *Gavia arctica*; • Golden eagle *Aquila chrysaetos**; • Hen harrier *Circus cyaneus**; • Short-eared owl *Asio flammeus**; and • Merlin *Falco columbarius**.	2.8	Caithness and Sutherland Peatlands SPA and Ramsar Site is located 2.8 km from the Sinclair's Bay Study Area. Some of the designated features are shorebirds or ducks and geese that make very limited use of the marine environment, roosting either inland or on the coast, and foraging in the intertidal zone, such as on mudflats or the strandline. As such, there is limited to no potential for interaction between the shorebird, duck, and geese designated features of the Caithness and Sutherland SPA and Ramsar Site and the Project. **No LSE** is determined for the wigeon, common scoter, golden plover, dunlin, wood sandpiper, greenshank, and greylag goose designated features. **No LSE alone** is also determined for the terrestrial features of the site: golden eagle, hen harrier, short-eared owl, and merlin. Divers, including red-throated diver, are known to be displaced by visual stimuli such as operational vessels, initiating a stress response and flushing behaviour, at distances up to 2 km away (Norman and Ellis, 2005; Fliessbach *et al.*, 2019). There will only be a small increase in the total maximum number of vessels in operation (from 17 to 20). Furthermore, breeding adults are strongly associated with their nesting waterbodies and may not forage at sea during incubation and chick-rearing,

Site Name and Code	Qualifying Features* * No Likely Significant Effect (LSE) is concluded for all terrestrial features.	Distance from Study Area (km)	Screening for Likely Significant Effect (LSE)
			instead feeding within or immediately adjacent to breeding areas (Eriksson and Sundberg, 1991). In relation to above water noise, no detailed modelling has been undertaken; however, a simple spherical relationship (Lr=Lsource-20log10(r)) suggests that construction noise of 105 dB would attenuate to approximately 48 dB at 700 m, and approximately 39 dB at 2 km. Given that red-throated diver have auditory thresholds of approximately 60 to 90 dB re 20 µPa (Crowell *et al.*, 2015), behaviour effects are unlikely unless individuals are within 20 m of the noise source. 20 m is well within the project footprint and distant from the SPA and Ramsar Site. As such, any population-level effects within the SPA and Ramsar Site would be undetectable. Therefore, **No LSE alone** is determined for the diver-qualifying features of the Caithness and Sutherland SPA and Ramsar Site.
North Caithness Cliffs SPA (UK9001181)	Breeding populations of: • Black-legged kittiwake *Rissa tridactyla*; • Common guillemot *Uria aalge*; • Razorbill *Alca torda*; • Atlantic puffin *Fratercula arctica*; • Northern fulmar *Fulmarus glacialis*; and • Peregrine falcon *Falco peregrinus**.	7.4	The assessment remains consistent with the conclusions of the original MEA. **No LSE alone** is determined for the North Caithness Cliffs SPA and its qualifying features.
East Caithness Cliffs SPA (UK9001182)	Breeding populations of: • Black-legged kittiwake; • Great black-backed gull *Larus marinus*; • European herring gull *Larus argentatus*; • Common guillemot; • Razorbill; • Northern fulmar; • Great cormorant *Phalacrocorax carbo*; • European shag *Gulosus aristotelis*; • Peregrine falcon; and • Seabird assemblage.	9.8	The assessment remains consistent with the conclusions of the original MEA. **No LSE alone** is determined for the East Caithness Cliffs SPA and its qualifying features.

Site Name and Code	Qualifying Features* * No Likely Significant Effect (LSE) is concluded for all terrestrial features.	Distance from Study Area (km)	Screening for Likely Significant Effect (LSE)
Hoy SPA (UK9002141)	Breeding populations of: • Black-legged kittiwake; • Great black-backed gull; • Great skua *Stercorarius skua*; • Arctic skua *Stercorarius parasiticus*; • Common guillemot; • Atlantic puffin; • Red-throated diver; • Northern fulmar; • Peregrine falcon*; and • Seabed assemblage.	27.8	The assessment remains consistent with the conclusions of the original MEA. **No LSE alone** is determined for the Hoy SPA and its qualifying features.
Scapa Flow SPA (UK9020321)	Breeding populations of: • Red-throated diver. Non-breeding populations of: • Common eider *Somateria mollissima**; • Long-tailed duck *Clangula hyemalis*; • Red-breasted merganser *Mergus serrator*; • Slavonian grebe *Podiceps cristatus**; • Black-throated diver; • Great northern diver *Gavia immer*; and • European shag.	28.4	The assessment remains consistent with the conclusions of the original MEA. **No LSE alone** is determined for the Scapa Flow SPA and its qualifying features.
Moray Firth SPA (UK9020313)	Breeding populations of: • European shag. Non-breeding populations of: • Greater scaup *Aythya marila**; • Common eider*; • Common scoter; • Velvet scoter; • Long-tailed duck; • Common goldeneye *Bucephala clangula**; • Red-breasted merganser*; • Slavonian grebe*; • Red-throated diver;	40.7	The assessment remains consistent with the conclusions of the original MEA. **No LSE alone** is determined for the Moray Firth SPA and its qualifying features.

Site Name and Code	Qualifying Features* * No Likely Significant Effect (LSE) is concluded for all terrestrial features.	Distance from Study Area (km)	Screening for Likely Significant Effect (LSE)
	• Great northern diver; and • European shag.		
Copinsay SPA (UK9002151)	Breeding populations of: • Black-legged kittiwake; • Great black-backed gull; • Common guillemot; • Northern fulmar; and • Seabird assemblage.	44.8	The assessment remains consistent with the conclusions of the original MEA. **No LSE alone** is determined for the Copinsay SPA and its qualifying features.

3.8.3.2 IN COMBINATION ASSESSMENT

The assessment remains the same as the original MEA. Each of the features of the sites assessed is screened out as having no LSE in combination for any pressure pathways considered. In view of this, and of the small scale of the proposed works and the highly localised extent of effects predicted in the Project alone assessment, an in-combination assessment has not been undertaken.

3.8.3.3 APPROPRIATE ASSESSMENT

Appropriate Assessment (HRA Stage 2) is not required, and no further assessment has been undertaken.

3.8.4 CONCLUSIONS

HRA screening has been undertaken to determine if the Project Design Refinements have potential to impact features of European sites. Screening distances have been applied to the project boundary to identify sites to be considered for LSE. The following screening distances were applied (**Table 3-15**):

- Annex I benthic habitats: 1 km;
- Annex II migratory fish: 10 km;
- Annex II marine mammals: 50 km;
- Annex I seabirds (breeding): 50 km;
- Annex I seabirds (non-breeding): 15 km; and
- Annex I terrestrial birds: 0 km.

No LSE alone was concluded for all sites outside of the screening distances due to the absence of pressure-receptor pathway. A total of 10 sites (8 SPAs and 2 Ramsar Sites) were situated within the stated screening distances and were screened for further consideration within **Table 3-16**.

No LSE alone was concluded for all SPAs considered within Stage 1 HRA screening, and it was determined that an in-combination assessment was not required. In conclusion, no site is required to be taken forward for Stage 2 Appropriate Assessment.

3.9 NATURE CONSERVATION MARINE PROTECTED AREA ASSESSMENT

3.9.1 INTRODUCTION

This section represents an update to the NCMPA assessment to account for changes in the Project Design Refinements from the original application. This section, therefore, provides a summary of the baseline information presented within the original MEA (with appropriate cross-references) and updated impact assessments.

Please refer to the original MEA for the legislation, guidance, and methodology associated with the assessment. The Project Design Refinements do not present additional impact pathways beyond those scoped in within the original MEA. Furthermore, the Project Design Refinements do not amend any design parameters which could introduce new or greater impacts outside of those already consented.

3.9.1.1 AIMS AND OBJECTIVES

This chapter has been produced to provide evidence on whether the potential impacts of the Project will:

- Be capable of affecting (other than insignificantly) a protected feature in an NCMPA or any ecological or geomorphological process on which the conservation of any protected feature in any relevant NCMPA relies; or
- If considered capable of affecting (other than insignificantly) a protected feature, ecological or geomorphological process of an NCMPA, be capable of creating a significant risk of hindering the conservation objectives on any relevant NCMPA.

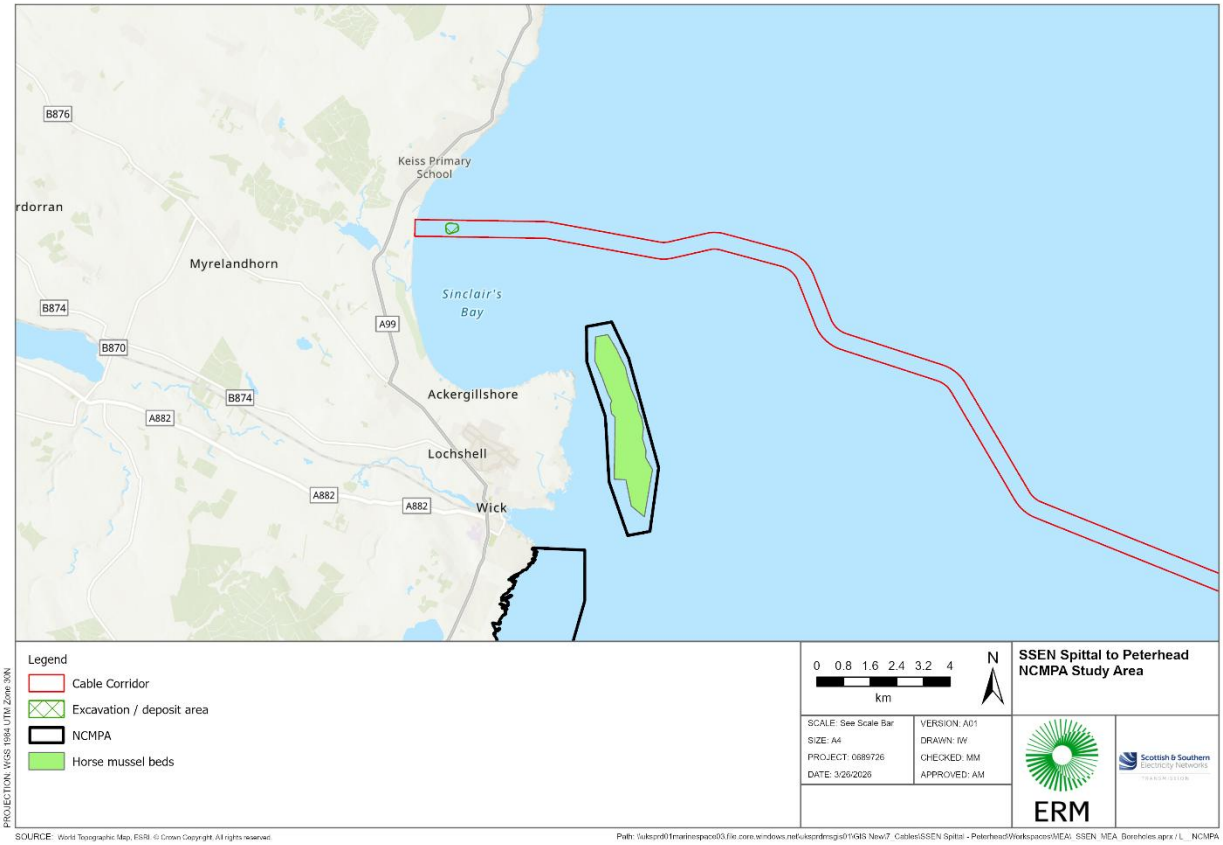
The following sections describe the approach to the initial screening and main assessment stages of the process. Given that Marine Scotland's Nature Conservation Marine Protected Areas: Draft Management Handbook (Marine Scotland, 2013) remains unavailable, the following sections are based on guidance provided on Marine Conservation Zones (MCZs) and marine licensing (MMO, 2013).

3.9.1.2 THE PROJECT SPECIFIC SURVEYS AND ASSESSMENT

To further inform the NCMPA assessment, where available, project-specific data sources and assessments have been consulted. Reviews of the other MEA receptor sections have also been conducted.

Figure 3-8 shows the 2 nearest NCMPAs to the screening Study Area.

FIGURE 3-8 THE SINCLAIR'S BAY STUDY AREA AND NEARBY NATURE CONSERVATION MARINE PROTECTED AREAS



3.9.2 SCREENING – ALONE

<u>Screening Question 1</u>: Is a licensable activity taking place within or near to an area being put forward for, or already designated, as an NCMPA?

There are 2 NCMPAs within 50 km of the Study Area. These are:

- Noss Head NCMPA; and
- East Caithness Cliffs NCMPA.

<u>Screening Question 2</u>: Is a licensable activity capable of affecting (other than insignificantly) the protected features of an NCMPA or any ecological or geomorphological process on which the conservation of any protected feature of an NCMPA is (wholly or in part) dependent?

The following sites are assessed in turn:

- Noss Head NCMPA (**Section 3.9.3**); and
- East Caithness Cliffs NCMPA (**Section 3.9.4**).

Key information used for the screening assessment is sourced from:

- Protected Nature Sites Application;
- Conservation and Management Advice Note Noss Head MPA (NatureScot, 2024);
- East Caithness Cliffs MPA(NC) Site Summary. (NatureScot, 2014);
- Scotland's National Marine Plan Interactive (NMPi) (Scottish Government, 2026);

- Feature Activity Sensitivity Tool (FeAST, 2025);
- Scottish Natural Heritage (SNH) Descriptions of PMFs (Tyler-Walters *et al.*, 2016);
- The Marine Life Information Network (MarLIN) Marine Evidence- based Sensitivity Assessment (MarESA) Guidance (Tyler-Walters *et al.*, 2023); and
- Relevant published reports and peer-reviewed scientific literature.

3.9.3 NOSS HEAD NCMPA

3.9.3.1 SITE FEATURES

The Noss Head NCMPA (8 km^2) has been designated to protect one biodiversity feature:

Biodiversity Feature:

- Horse mussel beds – Inshore sublittoral sediment (Marine).

3.9.3.2 FEATURES TO BE SCREENED

The distance from the NCMPA boundary to the Sinclair's Bay Study Area is 4.8 km.

The sensitivity of horse mussel beds is the same as assessed in the original MEA. FeAST identified horse mussel beds to have a **High** sensitivity to the pressures 'Physical removal (extraction of substratum)', and 'Sub-surface abrasion/penetration'; and a **Medium** sensitivity to the pressure 'Surface abrasion'. However, there is no direct impact footprint associated with the Project Design Refinement, as there is no overlap with the biodiversity feature (see **Figure 3-8)**

Assessment of secondary/indirect impacts associated with the Project Design Refinements are associated with possible smothering due to settlement of sediment, e.g. siltation rate changes (light). This can occur through pre-lay and cable installation works, as well as from HDD drilling fluids, which can contain finer particles capable of wider dispersion than the coarser sediments disturbed during trenching. As seabed sediments are predominantly sand to sandy gravel, most suspended material will fall out of suspension rapidly, with only low concentrations of fine material potentially transported over the feature. The assessments conducted for Physical Environment and Benthic Ecology in the original MEA demonstrated that any smothering pressure would be very small, highly localised, and indistinguishable after 1-2 tidal cycles. The footprint of effects was assessed as being less than a few metres for sands and gravels and a few tens of metres for fines, and therefore low in magnitude. In addition, the Physical Environment Assessment of the Project Design Refinements had determined negligible for the potential effect of increases in (SSC) (refer to **Section 3.1.4.2**). Whilst horse mussel feature shows a **Medium**-**High** sensitivity to smothering, there is no pressure pathway with the nearest part of the feature 4.8 km away.

It is considered that there is no direct or indirect pathway that will interact with the designated horse mussel biodiversity feature. **Noss Head NCMPA is screened out from further assessment under Screening Question 2**.

3.9.4 EAST CAITHNESS CLIFFS NCMPA

3.9.4.1 SITE FEATURES

The East Caithness Cliffs NCMPA (114 km^2) has been designated to protect one biodiversity feature:

- Black guillemot *Cepphus grylle*.

3.9.4.2 FEATURES TO BE SCREENED

Black guillemot are a designated feature of the East Caithness Cliffs NCMPA. The boundary of the NCMPA is 9.7 km from the nearest point of the Sinclair's Bay Study Area. Unlike the other 3 auk species in Scottish waters, black guillemot have a highly restricted foraging range of 9.1 km during the breeding season (Woodward *et al.*, 2019). It is therefore unlikely that any interaction would occur during the breeding season.

The sensitivity of black guillemot is the same as assessed in the original MEA. FeAST identified black guillemot to have a **Medium** sensitivity to the pressures 'Death or injury by collision below water', 'Death or injury by collision above water', 'Underwater noise', and 'Visual disturbance (behaviour)'.

The likelihood of black guillemot colliding with Project guard vessels, above or below water, is considered very low. Up to 20 guard vessels may operate at any one time, representing the realistic worst-case scenario and a small increase (from 17) as assessed in the original MEA. Vessel activity related to the Project Design Refinements will only occur during defined installation windows: up to 2 months for pre-laying activities, 8 months for HDD nearshore works at Sinclairs Bay, 1 month for route clearance, and 4 months for cable laying, with some overlap between phases. These activities will take place outside of the NCMPA. Any collision risk will be highly localised and short term. It will only arise where active vessel operations coincide with areas within the species' foraging range, which represents a relatively small proportion of that range overall; therefore, magnitude is considered low.

Continuous underwater noise and vibrations will be generated by vessel movements, trenching activities, and cable laying operations, including potential noise from seabed equipment. The presence of vessels may also create visual disturbance for black guillemot. Underwater noise, visual disturbance, and associated displacement may cause temporary avoidance behaviour and changes to foraging patterns in black guillemot, potentially increasing energetic costs. However, all vessels will operate outside the NCMPA and away from the cliff faces where breeding colonies reside. Given the limited spatial extent, short duration of works, and the localised nature of vessel activity, the magnitude of these effects is considered low, with only limited interaction expected with the feature.

It is considered that there is no direct or indirect pathway that will interact with the designated black guillemot biodiversity feature. **East Caithness Cliffs NCMPA is screened out from further assessment under Screening Question 2**.

3.9.5 SCREENING SUMMARY

Following screening of the Project Design Refinements alone for Noss Head NCMPA and East Caithness Cliffs NCMPA, all of the site features have been screened out for further assessment.

Considering the highly localised spatial and temporal footprint of the Project Design Refinements, and that all features of sites assessed are screened out as having no direct or indirect pathway of impact on the protected features of the sites, a cumulative assessment has not been undertaken.

3.10 WFD COMPLIANCE ASSESSMENT

3.10.1 INTRODUCTION

This section represents an update to the Water Framework Directive (WFD) compliance assessment to reflect changes in the Project Design Refinements from the original application. This section, therefore, provides a summary of the baseline information presented within the original MEA (with appropriate cross-references) and updated impact assessments.

Please refer to the original MEA for the impact pathways scoped out of the assessment and appropriate justifications. The Project Design Refinements do not present additional impact pathways to those scoped in within the original MEA. Furthermore, the Project Design Refinements do not amend any design parameters that could introduce new or greater impacts outside of those already consented.

For information regarding the legislation, guidance, and methodology associated with WFD assessments, refer to **Sections C.2, C.3, C.4 and C.5** of **Appendix C, Water Framework Directive Compliance Assessment** of the original MEA.

3.10.2 SCREENING

3.10.2.1 WATER BODY IDENTIFICATION

Section C.6 of **Appendix C** of the original MEA identified WFD Coastal or Transitional water bodies up to 3 nm from the shoreline that may be affected by the Project activities, including:

- Water bodies directly impacted by the Project footprint and those located within 2 km of any Project activity;
- Water bodies indirectly impacted by the Project activity and located within the Area of Influence (AoI) of Project activities, determined by the extent of the Total Suspended Solid (TSS) Plume, the realistic worst-case scenario (affected in turn by the tidal excursion zone); and
- Water bodies hydrologically connected to adjacent, directly affected water bodies and water bodies downstream from the water bodies directly affected by the Project activity.

A 2 km boundary was selected because the majority of the substrate in the area comprises coarser sediment such as sand, gravelly sand, and sandy gravel. Therefore, although TSS will be elevated immediately after excavation, concentrations are predicted to fall to background levels within close proximity of the activity (66 m of ploughing activity in hard ground areas and 70 m in sandy areas), with fine deposition occurring out to a maximum of 2 km (Gooding *et al*., 2012).

Based on the criteria above, the initial WFD assessment identified one water body at Sinclair's Bay that was screened in and taken forward to Stage 2 Scoping (Duncansby Head to Noss Head – 200219). No other WFD water bodies were screened in due to them being at least 2 km from the Project; and this determination remains valid. Details of the Duncansby Head to Noss Head (200219) water body is presented in **Table 3-17**.

TABLE 3-17 WFD WATER BODIES SCREENED IN AND TAKEN TO STAGE 2 SCOPING

Parameter	Duncansby Head to Noss Head
Water body ID	200219

Parameter	Duncansby Head to Noss Head
Water body Type	Coastal
Heavily Modified?	No
River Basin District Name	North Highland
Surface Area	173.5 km^2
Ecological Classification 2022 – Cycle 3	Good
Chemical Classification 2022 – Cycle 3	Good
Distance from Project activity	0 km (the northern landfall- Sinclair's Bay)
WFD protected areas within 2 km	Yes

All of the information presented in **Section C.6.2** of **Appendix C** of the original MEA is still correct and of relevance to this MEA Addendum. As such, no changes to Stage 1 Screening are required.

3.10.3 SCOPING

Details on the full scoping rationale and the assessment of other water bodies not of relevance to this addendum are presented in **Section C.7** of **Appendix C** of the original MEA.

The following section considers the potential for the activities listed above in **Section 2.1** to impact WFD receptors, namely: hydromorphology, biology (habitats and fish), water quality, and protected areas. Additional consideration is made of the potential for introduction or spread of INNS. The potential impacts resulting in a "yes" and highlighted in yellow will be taken to Stage 3 assessment.

3.10.3.1 DUNCANSBY HEAD TO NOSS HEAD WATER BODY

Hydromorphology

Table 3-18 considers whether the hydromorphology of the water body is at risk from Project activities and details whether a Stage 3 impact assessment will be required.

TABLE 3-18 HYDROMORPHOLOGY SCOPING QUESTIONS

Consider if the activity:	Yes/No – Hydromorphology Risk Issues
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status.	No. The water body is of High status; however, the Project footprint is small, and the impact is not predicted to cause significant, non-temporary deterioration.
Could significantly impact the hydromorphology of any water body.	No. The impact area is small relative to the size of the receiving environment. The impact is not predicted to cause significant, non-temporary deterioration.
Is in a water body that is heavily modified for the same use as your activity.	No. The water body is not classified as a Heavily Modified Water Body (HMWB).

Biology

Consider if habitats are at risk of Project activities which have a footprint (including a temperature or sediment plume) of >0.5 km^2, >1% of the water bodies area, <500 m of any higher sensitivity habitat, or >1% of any lower sensitivity habitat. WFD habitat sensitivity classification is presented in **Table 3-19**.

Table 3-20 considers whether the benthic habitats of the water body are at risk from the Project activity and details whether a Stage 3 impact assessment will be required.

TABLE 3-19 EXAMPLE HABITAT SENSITIVITIES

High Sensitivity	Low Sensitivity
Chalk reef	Cobbles, gravel, and shingle
Clam, cockle and oyster beds	Intertidal soft sediments like sand and mud
Intertidal seagrass	Rocky shore
Maerl beds	Subtidal boulder fields
Mussel beds, including blue and horse mussel	Subtidal rocky reef
Polychaete reef	Subtidal soft sediments
Saltmarsh	
Subtidal kelp beds	
Subtidal seagrass	

Note: Higher-sensitivity habitats have a low resistance to and recovery rate from human pressures. Lower-sensitivity habitats have a medium to high resistance to and recovery rate from human pressures.
Source: Environment Agency (2017).

TABLE 3-20 WATER BODY BIOLOGY HABITATS SCOPING QUESTIONS

Consider if the footprint of the activity:	Yes/No – Biology – Habitats Risk Issues
Is 0.5 km^2 or larger.	No. The project footprint (i.e. Horizontal Directional Drilling (HDD) excavation footprint) is 0.006775 km^2. As such, is not equal to or greater than 0.5 km^2. The potential for a significant sediment plume generated by the excavation activities has been considered; however, the sediment within the water body comprises sand, sandy gravel, gravelly sand, and exposed bedrock, therefore, no spatially or temporally significant plume is predicted as a result of the Project activities. The impact is not predicted to cause significant deterioration.
Represents 1% or more of the water body's area.	No. As the project footprint (HDD excavation) is 0.006775 km^2, this equates to 0.003% of the water body surface area (173.5 km^2). In consideration of a potential plume, this also remains below the 1% threshold.
Is within 500 m of any higher sensitivity habitat.	No. No higher sensitivity habitats have been identified within 500 m of the Project activities, including

Consider if the footprint of the activity:	Yes/No – Biology – Habitats Risk Issues
	potential plumes generated (Marine Scotland, 2024).
Represents 1% or more of any lower sensitivity habitat.	No. No overlap between the project footprint (HDD excavation) and Annex I reefs has been determined; including a consideration of potential plume extents.

Note: A footprint may also be a temperature or sediment plume.

Section 3.2 of the MEA Addendum: Benthic Ecology provides baseline information on the benthic communities found within the Study Area.

Table 3-21 details whether an impact assessment for the biology quality element of fish is required.

TABLE 3-21 WATER BODY BIOLOGY FISH SCOPING QUESTIONS

Consider if your activity:	Yes/No – Biology – Fish Risk Issues
Is in an estuary and could affect fish in the estuary and outside the estuary but could delay or prevent fish from entering it or could affect fish migrating through the estuary.	No. The Project is not located near an estuary and the impact of Project activities is not predicted to cause significant, non-temporary deterioration.
Could impact on normal fish behaviour like movement, migration, or spawning (for example creating a physical barrier, noise, chemical change, or a change in depth or flow).	No. The proposed HDD excavation activities are of small spatial scale and temporary, therefore, the impact is not predicted to cause significant and/or non-temporary deterioration.
Could cause entrainment or impingement of fish.	No. No entrainment or impingement of fish will occur as a result of Project activities.

Section 3.3 of the MEA Addendum: Fish and Shellfish Ecology, provides baseline information on the fish communities found within the Study Area.

Water Quality

The water quality of a water body, encompassing its biological and chemical elements, is a WFD receptor. Consequently, any activities that might cause deterioration must be assessed for potential risks. In this context, statutory guidance on water quality contamination is obtained from the Environmental Quality Standards Directive (2008/105/EC), whilst non-statutory guidance on sediment contamination is provided by Cefas Action Levels indicators.

Table 3-22, **Table 3-23**, and **Table 3-24** detail whether an impact assessment is required for the water quality elements of the water body. This section provides baseline information on water and sediment quality within the Project Study Area and the water bodies scoped in for assessment.

TABLE 3-22 WATER BODY WATER QUALITY BIOLOGICAL SCOPING QUESTIONS

Consider if your activity:	**Yes/No – Water Quality – Biological (Phytoplankton and Algae) Risk Issues**
Could the activity affect water clarity, temperature, salinity, oxygen levels, nutrients, or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)?	No. Water clarity is to be only temporarily affected (less than a neap tidal cycle) by the HDD excavation activities. Sediment dispersion modelling studies were not deemed necessary to be undertaken as part of this assessment, or as part of the original MEA assessment. The seabed substrate in the Study Area is 'slightly gravelly and slightly silty Sand'. The sand and coarse sediment will likely fall out of suspension immediately adjacent to the areas of seabed disturbance. The finer material may be transported further, but likely only a few hundred metres (m). Therefore, potential effects are highly localised and small-scale (**Section 3.1, Physical Environment**). Temperature, salinity, and dissolved oxygen will not be affected by the Project activities. The impact is therefore not predicted to cause significant, non-temporary deterioration.
Is the activity in a water body with a phytoplankton status of moderate, poor, or bad?	No. The water body has a status of Good (2022).
Is the activity in a water body with a history of harmful algae?	No. There is no evidence of a history of harmful algae events.

TABLE 3-23 WATER BODY WATER QUALITY CHEMISTRY SCOPING QUESTIONS

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	**Yes/No – Water Quality – Chemical Risk Issues**
The chemicals are on the Environmental Quality Standards Directive (EQSD) list.	No. No discharge of EQS chemicals is expected. Non-toxic, biodegradable bentonite clay has been considered for HDD which is not on the EQSD list. The impact is not predicted to cause significant, non-temporary deterioration.
It disturbs sediment with contaminants above Cefas Action Level 1.	No. Site-specific data shows background levels of contaminants in the sediment within the water body (3 nm) and below Cefas Action Level 1.

TABLE 3-24 WATER BODY QUALITY CHEMISTRY (MIXING) SCOPING QUESTIONS

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	**Yes/No – Water Quality – Chemical Risk Issues**
The chemicals released are on the EQSD list.	No. Water based muds will be used during the HDD activities, not present on the EQSD list.

Protected Areas

As part of Stage 2 Scoping, it is necessary to evaluate whether WFD protected areas within 2 km of each water body are at risk, as outlined in the Assessment Methodology (**Section C.4** of **Appendix C** of the original MEA). These protected areas include NCMPAs, SACs, SPAs, bathing waters, nutrient-sensitive areas, and shellfish waters.

The protected areas located within or in the vicinity of the water body of Duncansby Head to Noss Head are summarised below:

- Bathing Waters: No designated bathing waters are located within 2 km;
- Shellfish Waters: No designated shellfish waters are located within 2 km;
- Nutrient Sensitive Areas: The Project location is not within a Nitrate Vulnerable Zone (below MHWS); and
- Protected Areas: The closest designated protected areas are the Noss Head NCMPA and the North Caithness Cliffs SPA, both located within the water body. However, they are approximately 4.82 km and 7.4 km from any Project activities, respectively (outside of the plume area of influence).

Table 3-25 details whether an impact assessment is required for the protected area element of the water body.

TABLE 3-25 WATER BODY PROTECTED AREAS SCOPING QUESTIONS

Consider if your activity is:	Yes/No – Protected Areas Risk Issues
Within 2 km of any WFD protected area*.	No. No MPAs, Bathing Waters, or Shellfish Waters are located within 2 km of the Project activity. The closest MPA, the Noss Head NCMPA, is located 4.82 km from any Project activity.

* A regulator can extend the 2 km boundary if the desired activity has an especially high environmental risk.

Invasive non-Native Species (INNS)

Table 3-26 details whether an impact assessment is required for the INNS element of the water body.

TABLE 3-26 WATER BODY INVASIVE SPECIES SCOPING QUESTIONS

Consider if your activity is:	Yes/No – INNS Risk Issues
Introduce or spread invasive non-native species (INNS).	No. Vessel movements will be limited to the Moray Firth area and there is only a small increase to 20 (from 17) operating at any one time, in consideration of the Project Design Refinements. Vessels will comply with the International Maritime Organization (IMO) ballast water management guidelines and will ensure that the risk of potential introduction and spread of INNS will be minimised. The impact is not predicted to cause significant, non-temporary deterioration.

Summary of the Duncansby Head to Noss Head Water Body Stage 2 Scoping

A summary of the Scoping outcome assessing the effects of the Project on the Duncansby Head to Noss Head water body is shown in **Table 3-27**.

TABLE 3-27 WATER BODY SUMMARY OF SCOPING QUESTIONS

Receptor	Potential Risk to Receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	-
Biology: habitats	No	-
Biology: fish	No	-
Water quality: biology	No	-
Water Quality: chemistry and mixing	No	-
Protected areas	No	-
Invasive non-native species (INNS)	No	-

3.10.4 STAGE 3 ASSESSMENT

3.10.4.1 SUMMARY AND ASSESSMENT

As no potential risks to any of the receptors of the Duncansby Head to Noss Head water body were identified, a Stage 3 Assessment was not required.

3.10.5 CONCLUSIONS

The Project's HDD excavation activities at Sinclair's Bay will not hinder the achievement of WFD and RBMP objectives. Consequently, the Project is determined to align with the requirements of the WFD and, therefore, is considered to be WFD compliant.

3.11 CUMULATIVE IMPACT ASSESSMENT

3.11.1 OVERVIEW

The Cumulative Impact Assessment (CIA) considers the additional effects of the project design refinements alongside the combined impacts of the Project, and those arising from other relevant plans and projects, where shared pathways of effect on appropriate receptors exist. This section evaluates whether the project design refinements alter the cumulative impact conclusions presented in the original MEA.

The cumulative screening for relevant projects and plan and receptors remains unchanged from **Section 7.10** of the original MEA and is therefore not presented.

3.11.2 ASSESSMENT

3.11.2.1 PHYSICAL ENVIRONMENT

Potential pathway changes that may affect marine physical processes (and associated receptors) during the construction and decommissioning phases of the Project are:

- Change in wave regime and tidal currents;
- Increase in suspended sediment concentration;
- Change to sediment transport system;
- Change in geomorphology of protected features; and
- Change in coastal morphology.

Chapter 3.1 Physical Environment assesses the magnitude of these pathways in relation to the construction and decommissioning phases of the Project, and determines that the main project design refinements introduce a small, temporary open-cut trench at Sinclair's Bay, resulting in short-term, highly localised disturbance to the seabed, sediment regime, and nearshore hydrodynamics.

These refinements do not introduce any permanent structures or features capable of altering wave regimes and tidal currents, sediment transport systems, or coastal morphology. The reinstatement of the trench also ensures that the post-construction seabed closely reflects baseline conditions. Sediment mobilisation from excavation will be minimal and rapidly dispersed, and the reduction in the need for cable protection at Sinclair's Bay further limits the potential for long-term physical changes.

When assessed against the original MEA, the Project design refinements do not alter the cumulative impact conclusions for the physical environment. Across all physical process pathways, the Project's cumulative effects remain **Negligible** to **Low,** and are therefore **Not Significant** when considered alongside the impacts of other planned and operational projects. However, determination of the significance of these effects is addressed in the relevant receptor-specific sections of the MEA.

3.11.2.2 BENTHIC ECOLOGY

The Project Design Refinements have been evaluated for their cumulative contribution to Benthic Ecology, in combination with the wider Project and other relevant plans and projects that share pathways of effect on benthic receptors. The following potential impacts that may affect Benthic Ecology, considered for cumulative impact significance, are:

- Temporary localised disturbance of seabed habitats;
- Impacts to habitats or species as a result of pollution or accidental discharge; and
- Increased risk of introduction and spread of marine INNS.

When compared with the original MEA, the Project Design Refinements introduce additional temporary disturbance within the Sinclair's Bay excavation Study Area, increasing the total seabed disturbance footprint by 5.5%, and extending the overall construction duration. These refinements will only overlap with **Offshore Subtidal Sands and Gravels** and potentially **Ocean Quahog** receptors (**Figure 3-3**), with no interaction predicted with higher-sensitivity habitats within the excavation. Although the refinements increase the spatial extent of temporary seabed disturbance, the proportion of the total Benthic and Intertidal Ecology Study Area affected remains extremely small (0.06%), and the sensitive features present across the wider region remain largely unaffected.

The refined parameters do not increase suspended sediment effects beyond those assessed in the original MEA, as sediment transport ranges and deposition patterns remain within previously evaluated thresholds.

Additional vessel activity associated with the refinements marginally increases the hours of operation (1,134 hours compared to 898 hours), yet the risk of pollution, accidental discharge, or introduction of marine INNS remains **Negligible**, due to the short duration of activity, embedded mitigation measures, strong local hydrodynamics, and the already high existing level of regional vessel activity.

For all receptors, the magnitude of cumulative effects remains either **Low** or **Negligible**, resulting in a **Minor Adverse** overall risk for **Offshore Subtidal Sands and Gravels** and **Ocean Quahog**, and **Negligible** overall risk for all other benthic receptors, where only pollution or marine INNS pathways are relevant. All effects are therefore **Not Significant**, which is consistent with the original MEA conclusions.

The Project Design Refinements do not alter the cumulative impact conclusions for Benthic Ecology, and therefore, cumulative effects remain **Not Significant** when refinements are considered alongside other planned and operational projects in the region. No additional mitigation beyond embedded measures is required.

3.11.2.3 FISH AND SHELLFISH ECOLOGY

The Project Design Refinements have been evaluated for their cumulative contribution to Fish and Shellfish Ecology, in combination with the wider Project and other relevant plans and projects that share pathways of effect on the receptors. The following potential impacts that may affect Fish and Shellfish Ecology, considered for cumulative impact significance, are:

- Temporary localised disturbance of seabed habitats; and
- Temporary disturbance via suspended sediment concentration and smothering.

Temporary localised disturbance of seabed habitats

The refined HDD excavation area results in a minor increase in temporary seabed disturbance, affecting 1.85 km^2 in total (**Table 3-4**). Although this represents an increase compared to the original MEA, the disturbed area remains extremely limited relative to the extent of suitable fish and shellfish habitat within the regional Study Area, which is both widespread and environmentally diverse.

Most receptor groups, with the exception of Atlantic herring *(Clupea harengus)* and PMF shellfish species, exhibit **Low** sensitivity to this pathway due to their mobility, broad habitat use, and capacity to avoid or recover from temporary seabed disruption. Atlantic herring is assessed as **Medium** sensitivity due to its reliance on demersal spawning grounds, and PMF shellfish species are assessed as **High** due to their inclusion of sessile or slow-moving life stages, making them vulnerable to direct substrate disturbance.

Given the small footprint and rapid recoverability of most species, the magnitude of cumulative change remains **Low**, resulting in **Negligible** effects for all receptors, except Atlantic herring and PMFs, for which effects are **Minor Advserse**. All effects are therefore considered **Not Significant**.

Temporary disturbance via suspended sediment concentration and smothering

The refinements do not increase the scale or duration of suspended sediment beyond that assessed in the original MEA, and any sediment plumes remain short-lived and highly localised.

Most adult fish species have **Low** sensitivity due to their high mobility, ability to avoid suspended sediment plumes, and natural adaptability to variable turbidity conditions.

Eggs and larvae of pelagic fish, Atlantic herring, shellfish, and PMFs exhibit **Medium** sensitivity, as these life stages are less mobile and may be more susceptible to smothering or reduced gas exchange.

However, given that plume extents are limited and short-term, the cumulative magnitude remains **Low**. This results in **Negligible** effects for mobile adult life stages and **Minor Adverse** effects for eggs, larvae, Atlantic herring, shellfish, and PMFs. All effects, therefore, remain to be considered **Not Significant**.

Routine operational surveys and potential remedial works will result in interactions of similar magnitude but lower than those assessed for the construction phase, because these activities are infrequent, more targeted in scope, and involve less seabed interaction. Sensitivities will remain unchanged; however, with reduced disturbance, the cumulative effects in the operation phase remain **Minor Adverse** and **Not Significant**. Decommissioning impacts mirror construction, but at a lower magnitude, and therefore also remain **Not Significant**.

Overall, the Project Design Refinements do not alter the cumulative impact conclusions of the original MEA for Fish and Shellfish Ecology. The small increase in temporary disturbance and the unchanged suspended sediment pathway result in **Negligible** or **Minor Adverse** cumulative effects across all receptor groups, all of which are **Not Significant** when considered alongside the wider Project and other marine activities in the region. No additional mitigation beyond embedded measures is required.

3.11.2.4 OTHER MARINE USERS

The cumulative impacts of the Project Design Refinements on Other Marine Users have been assessed in combination with the wider Project and other relevant plans and projects that share pathways of effect. The refinements introduce small, localised changes to seabed disturbance, cable protection materials, and the number of Project guard vessels present at any one time, but do not introduce any new interaction pathways beyond those assessed in the original MEA. The CIA, therefore, focuses on whether these refinements modify cumulative effects for:

- Offshore infrastructure;
- Commercial fisheries; and
- Shipping and navigation.

Offshore Infrastructure

Temporary loss of access for Offshore Infrastructure users may occur during construction and decommissioning through the HDD excavation area, temporary seabed deposits, and a modest increase in Project vessel numbers. However, these activities remain highly localised in area and duration, and the increase from 17 to 20 guard vessels is not expected to materially affect access or increase the scale of exclusion zones compared with the original MEA.

Sensitivity remains **Medium** for the Subsea7 pipeline fabrication facility and **Low** for other offshore infrastructure users.

With the unchanged magnitude and embedded mitigation in place, cumulative effects remain **Minor Adverse** for Subsea7 and **Negligible** for all other infrastructure receptors and can therefore be considered **Not Significant**.

Commercial Fisheries

During construction and decommissioning, temporary loss of access to fishing grounds and displacement of activity may arise from the HDD excavation area, increased temporary seabed deposits, and a small increase in vessel presence. A potential snagging risk also exists from temporary deposits and revised cable protection materials. These effects remain highly localised, and an increase of three guard vessels does not represent a meaningful change in spatial footprint or fisheries interaction compared with the original MEA.

Sensitivity to temporary loss of access remains **High** for dredgers, **Medium** for otter trawlers, pots and traps, and demersal trawlers, and **Low** for demersal seine netters. Sensitivity to snagging remains **Medium** for mobile gears and **Negligible** for pots and traps.

As the magnitude of disturbance is unchanged, cumulative effects remain **Minor Adverse** for mobile gears and **Negligible** for pots and traps, meaning they can be considered **Not Significant**.

During operation, the potential for snagging and perceived loss of access remains low due to burial, localised protection, and embedded mitigation. The cumulative effects, therefore, remain **Minor Adverse** or **Negligible**, concluding as **Not Significant**.

Shipping and Navigation

The increase in Project guard vessels during construction and decommissioning (from 17 to 20) may influence vessel routing and collision risk; however, because these additional guard vessels represent only a modest change within an already low to moderate traffic environment, the magnitude of impact remains **Low**, consistent with the original MEA.

Sensitivity remains **Low** for commercial vessels, ferries, and small craft. Therefore, cumulative effects on vessel routing and collision risk remain **Negligible** and are considered as **Not Significant**.

Temporary and permanent seabed deposits associated with revised cable protection could present snagging hazards for anchoring vessels, but these deposits are highly localised, and no designated anchorages fall within the affected areas (except the small, charted anchorage near

Sinclair's Bay). As such, the magnitude and overall cumulative significance of snagging risk remain **Negligible** and are considered **Not Significant** during both construction and operation.

Across offshore infrastructure, commercial fisheries, and shipping and navigation, the project design refinements do not alter the cumulative conclusions of the original MEA. All cumulative effects remain **Minor Adverse** or **Negligible** and are therefore **Not Significant** when the refinements are considered alongside other planned and operational activities in the region. No additional mitigation beyond existing embedded measures is required.

3.11.2.5 MARINE ARCHAEOLOGY

The cumulative impacts of the Project Design Refinements on Marine Archaeology have been assessed in combination with the wider Project and other relevant plans and projects, focusing only on pathways where the refinements could influence the scale, duration, or nature of effects on archaeological receptors. The refinements introduce a localised HDD excavation and backfilling area at Sinclair's Bay, but do not alter the overall corridor alignment, introduce new above-water structures, or expand the footprint into areas of designated archaeological interest. The following potential impacts that may affect Marine Archaeology, considered for cumulative impact significance, are:

- Direct physical impacts from seabed disturbance; and
- Indirect physical impacts from changes in hydrodynamics, sediment transport, and suspended sediment (plumes).

Direct physical impacts from seabed disturbance

Direct cumulative impacts may arise where the refined HDD excavation/deposit area overlaps with known or potential archaeological assets. The MEA Addendum identifies no designated marine archaeological sites within the Study Area, but one non-designated open peat bank (MHG2016) has the potential to extend into the excavation area, and several low-potential geophysical anomalies are located within the wider 1 km buffer.

Although direct disturbance from excavation and seabed contact remains a potential pathway, the refinements do not increase the footprint beyond a small, highly localised area already subject to disturbance in the original MEA. Where unknown archaeology may exist, the precautionary principle is applied.

Sensitivity ranges from **Medium** (peat bank) to **Unknown** (unconfirmed subsurface features). Without mitigation, the magnitude could be **High** due to irreversible loss; however, with continued use of AEZs, AAP, review of geophysical data, and implementation of a WSI and PAD, residual effects remain **Negligible** and therefore are considered **Not Significant**.

Indirect physical impacts from changes in hydrodynamics, sediment transport and plumes

Indirect cumulative impacts may occur through localised changes to hydrodynamics, sediment transport, or deposition resulting from excavation and temporary sediment mobilisation. The MEA Addendum notes that these processes have the potential to destabilise or expose archaeological assets or cause secondary burial, and, in some cases, sedimentation may be beneficial by providing protective cover.

The refinements at Sinclair's Bay do not increase the scale or intensity of these processes beyond what was assessed in the original MEA. Effects remain highly localised, short-term, and small relative to natural coastal dynamics.

Magnitude is therefore **Low**, while sensitivity remains **Medium** to **Unknown**, depending on asset type. With embedded mitigation, residual effects remain **Negligible**, and all cumulative indirect impacts are **Not Significant**.

Operational surveys and maintenance activities have the potential to interact with archaeological assets, but on a much smaller scale than construction. Decommissioning impacts will mirror construction, but with a reduced footprint and lower seabed disturbance where infrastructure is left *in situ*. With mitigation, cumulative impacts across these phases remain **Negligible** and **Not Significant**.

Overall, the Project Design Refinements do not alter the cumulative impact conclusions for Marine Archaeology reached in the original MEA. Direct and indirect impacts remain localised and low in magnitude following mitigation, and **Not Significant** across construction, operation, and decommissioning. This conclusion reflects the absence of designated assets within the affected area, the low archaeological potential within the excavation footprint, and the strong mitigation framework already embedded in the Project.

3.11.3 ASSESSMENT SUMMARY

Across all environmental topics assessed, the Project Design Refinements do not introduce any new cumulative impact pathways, and they do not increase the magnitude or significance of cumulative impacts previously identified in the original MEA.

The refinements result in only minor, highly localised changes. These include the introduction of the refined HDD excavation area at Sinclair's Bay, as well as small adjustments to cable protection and vessel activity. None of these changes significantly alter the scale, intensity, or geographic extent of interactions with other plans and projects.

Minor increases in disturbance occur in a small number of areas, such as the Benthic Ecology and Fish and Shellfish Ecology assessments. However, these changes fall within the ranges previously assessed and affect only a very small proportion of the relevant Study Areas. As a result, cumulative impacts remain **Low** or **Negligible**.

In the original MEA, three pressure receptor combinations were identified as **Major**, prior to mitigation, before being reduced to **Minor Adverse** or **Negligible**, and therefore **Not Significant** following mitigation. The assessments presented in this report confirm that the refinements do not modify the conclusions previously reached for the three receptors.

For all other topics, the refinements constitute no significant change in cumulative pathways. Cumulative impacts, continue to be assessed as **Negligible** or **Minor Adverse**, and therefore, **Not Significant.**

Overall, the project design refinements do not alter any cumulative impact conclusions of the original MEA. All cumulative impacts remain **Not Significant**, and no additional mitigation beyond existing embedded measures is required.

Table 3-28 shows the assessed receptors for the MEA Addendum.

TABLE 3-28 SUMMARY OF CUMULATIVE ASSESSMENT

Topic	Potential Impact	Overall Risk (with embedded mitigation)	Significance	Additional Mitigation	Overall Residual Risk	Overall Significance
Physical Environment	Included in other receptors within the CIA					
Benthic Ecology	Temporary localised disturbance of seabed habitats	Minor Adverse	Not Significant	None required	Minor Adverse	Not Significant
	Pollution / accidental discharge	Negligible	Not Significant	None required	Negligible	Not Significant
	Increased risk of marine Invasive non-native species (INNS) spread	Negligible	Not Significant	None required	Negligible	Not Significant
Fish and Shellfish Ecology	Temporary localised disturbance of seabed habitats	Negligible / Minor Adverse	Not Significant	None required	Negligible / Minor Adverse	Not Significant
	Temporary disturbance via suspended sediment concentration and smothering	Negligible / Minor Adverse	Not Significant	None required	Negligible / Minor Adverse	Not Significant
	Operational surveys and remedial works	Minor Adverse	Not Significant	None required	Minor Adverse	Not Significant
	Decommissioning	Minor Adverse	Not Significant	None required	Minor Adverse	Not Significant
Other Marine Users - Offshore Infrastructure	Temporary loss of access	Minor Adverse / Negligible	Not Significant	None required	Minor Adverse / Negligible	Not Significant
Other Marine Users - Commercial Fisheries	Temporary loss of access and displacement	Minor Adverse / Negligible	Not Significant	None required	Minor Adverse / Negligible	Not Significant
	Snagging risk (construction)	Minor Adverse / Negligible	Not Significant	None required	Minor Adverse / Negligible	Not Significant
	Snagging risk (operation)	Minor/Negligible	Not Significant	None required	Minor Adverse / Negligible	Not Significant

Topic	Potential Impact	Overall Risk (with embedded mitigation)	Significance	Additional Mitigation	Overall Residual Risk	Overall Significance
Other Marine Users - Shipping and Navigation	Vessel routing and collision risk	Negligible	Not Significant	None required	Negligible	Not Significant
	Snagging risk	Negligible	Not Significant	None required	Negligible	Not Significant
Marine Archaeology	Direct physical impacts	Negligible (post-mitigation)	Not Significant	Mitigation incorporated (WSI, PAD, AAP/AEZ)	Negligible	Not Significant
	Indirect physical impacts	Negligible (post-mitigation)	Not Significant	Mitigation incorporated	Negligible	Not Significant

4. CONCLUSION

The Project Design Refinements presented in **Section 1** outline the marine activities and additional deposits proposed for the Spittal to Peterhead Project Design Refinements. An indicative method statement has been used to inform a realistic indication of the likely activities and durations of works associated with the Project Design Refinements. This allows for a realistic worst-case impact assessment to be undertaken, informed by specific footprints and durations, while retaining the flexibility required as the project enters detailed design and execution phases. The impacts associated with the proposed marine activities and additional deposits for the Spittal to Peterhead Project Design Refinements will be reduced to as low as reasonably practicable.

On the basis of known sensitivities, proposed activities and stakeholder feedback, specific impact assessments were undertaken for a number of topics:

- Physical Environment (Section 3.1);
- Benthic and Intertidal Ecology (Section 3.2);
- Fish and Shellfish Ecology (Section 3.3);
- Marine Mammals and Other Megafauna Ecology (Section 3.4);
- Ornithology (Section 3.5);
- Other Marine Users (Section 3.6);
- Marine Archaeology and Cultural Heritage (Section 3.7);
- Habitats Regulations Assessment (Section 3.8);
- Nature Conservation Marine Protected Areas Assessment (Section 3.9);
- Water Framework Directive Compliance (Section 3.10); and
- Cumulative Impacts Assessment (Section 3.11).

Where relevant, these impact assessments have considered interactions with protected sites, indirect impacts on other receptors, and the potential for cumulative impact. As outlined in **Sections 3.1-3.11**, it is predicted that there will be **No Significant Effects** on the receptors identified as a result of the activities for the Project Design Refinements. This is primarily due to the limited nature of the proposed activities, both temporally and spatially. A range of control and mitigation measures will also be implemented to ensure that any impacts are kept within acceptable limits. SSENT recognises that the effective implementation of these control and mitigation measures, detailed in **Table 6-5** of the original MEA, will be required to ensure that the Project Design Refinements do not result in a significant impact.

A summary of impacts from this MEA can be found in **Table 4-1** below.

TABLE 4-1 SUMMARY OF IMPACTS

Topic	Assessment Conclusion
Physical Processes	No Significant Impact
Benthic Ecology	No Significant Impact
Marine Megafauna	No Significant Impact
Ornithology	No Significant Impact
Marine Archaeology	No Significant Impact
Other Marine Users	No Significant Impact
HRA	No Significant Impact
NCMPA Assessment	No Significant Impact
WFD Compliance Assessment	No Significant Impact (WFD Compliant)
Cumulative Impact Assessment	No Significant Impact

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ERM's London Office
2nd Floor, Exchequer Court
33 St Mary Axe
London, EC3A 8AA
T +44 (0)20 3206 5200

www.erm.com

APPENDIX A: NRA ADDENDUM (UPDATED HDD POP OUT SAFETY JUSTIFICATION)

NASH MARITIME

HDD POP-OUT SAFETY JUSTIFICATION

Spittal to Peterhead HVDC Cable Scheme

ERM

Document No: P20076 | R02-00

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NASH MARITIME LTD, 2 CANUTE ROAD, SOUTHAMPTON, HAMPSHIRE, SO14 3FH, UNITED KINGDOM.

info@nashmaritime.com
+44 (0) 2380 381 681

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ABBREVIATIONS

Abbreviation	Detail
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
HDD	Horizontal Directional Drilling
HVDC	High Voltage Direct Current
KP	Kilometre Point
kV	Kilovolt
m	Metre
MCA	Maritime and Coast Guard Agency
MGN	Marine Guidance Note
NRA	Navigation Risk Assessment
SSEN	Scottish & Southern Electricity Networks
UKC	Under Keel Clearance
UKHO	United Kingdom Hydrographic Office

1 INTRODUCTION

NASH Maritime Ltd (NASH) have been contracted by The ERM International Group Limited (ERM) to undertake a Safety Justification for the proposed Pop-Out location for the Horizontal Directional Drilling (HDD) as part of the Spittal to Peterhead High Voltage Direct Current (HVDC) Cable Scheme (hereafter referred to as the 'Project'). To transfer the increasing amounts of renewable power generated in the north of Scotland to demand centres in the south, a 525-kilovolt (kV) HVDC link via subsea cable from Spittal in Caithness and Peterhead in Aberdeenshire is required. The Project is proposed by Scottish & Southern Electricity Networks (SSEN) Transmission (this is the trading name of Scottish Hydro Electric Transmission PLC), responsible for the electricity transmission network in the north of Scotland. The Project is part of the broader 'Pathway to 2030 Holistic Network Design', which aims to accommodate the growth in renewable electricity across Great Britain and meet the UK and Scottish Government's 2030 energy target.

A Navigation Risk Assessment (NRA) for the cable has been undertaken within which it was concluded that the cable would have no significant adverse effects on navigational safety. However, following design refinements to the Project, it was concluded that HDD was required near landfall at Rattray Head. This would necessitate subsurface drilling from the shore with the cable then pulled through ducts which are installed into the HDD bores which "Pop-Out" from the seabed before being laid on the surface of the sea floor. As there would be three cables, there would be three Pop-Out locations, which are situated approximately 0.6 nm from the coast. In the vicinity of the Pop-Out locations, the cable will be elevated from the seabed and additional protection would be required. Therefore, the navigable depth of water at this location will be reduced and this NRA Addendum assesses the impacts of this on navigational safety as a result.

1.1. SUMMARY OF MGN654 REQUIREMENTS

Marine Guidance Note (MGN) 654 Annex 3 Section 6.7 (Maritime and Coastguard Agency (MCA), 2021) provides guidance to developers on navigational safety for cable burial and protection. The guidance states that if it is not possible to bury cables, which would be a preference, they should be suitably protected to mitigate any risks posed to vessels. This will inevitably decrease the water depth and as such any cable protection works must ensure existing and future safe navigation is not compromised. The guidance states that the MCA would be willing to accept up to 5% reduction in surrounding charted depths referenced to Chart Datum, unless developers are able to demonstrate that any identified risks to any vessel type are satisfactory mitigated. Developers must discuss the tolerability of any changes to depth with the MCA.

2 SUMMARY OF HDD POP-OUT LOCATIONS AND PROTECTION REQUIREMENTS

The Pop-Out location is shown in **Table 2** and **Figure 9**.

TABLE 2: POP-OUT COORDINATES

[Redacted]

The planned cable protection berms considered within this NRA are outlined in **Table 3**:

TABLE 3: CABLE PROTECTION BERM SPECIFICATIONS

KP Start	KP End	Water Depth	Max. Height	Max. Width	Side Slope
162.03	163.315	27.14-38.16	1.653 m	14.22 m	01:04
163.315	165.784	8.45-27.14	2.453 m	21.33 m	01:04

As the NRA for the cable route identified no intolerable risks to navigation, this safety justification focuses on the Pop-Out location and the areas where cable protection will reduce water depths by over 5%. These areas are summarised below:

- Kilometre Point (KP) 162.03-KP163.315: maximum protection height of 1.653 m with a maximum width of 14.22 m. This equivalates to a worst-case water depth reduction of 6.1% at the shallowest point along the specified length of cable.
- KP163.315-KP165.784 (Pop-Out): maximum protection height of 2.453 m with a maximum width of 21.33 m. This equivalates to a worst-case water depth reduction of 29.0% at the shallowest point along the specified length of cable.

For protection of up to 1.653 m, a less than 5% reduction in depth would be where this occurs in waters of less than 33.06 m chart datum. Therefore, this assessment has been limited up to the 33 m contour.

3 IMPACT ON UNDER KEEL CLEARANCE

3.1. REVIEW OF BATHYMETRY IN AFFECTED AREA

The bathymetry at the Pop-Out locations and cable route is shown in **Figure 9**. There is a significant difference in some of the depths shown by the Admiralty Chart and the high-resolution bathymetry data held by the Project. The bathymetry data was gathered via 20 cm multibeam echosounder survey. The chart uses a survey of Rattray Head that was completed in 1987 and the rest of the depth data was acquired by lead line in 1834. Given the age of the data used within the Admiralty Charts, the higher resolution data from the bathymetric survey has been used in this assessment.

3.2. TIDE AND CURRENT

The tides on the North and East coasts of Scotland are predominantly semi-diurnal. It is noted that given the length of the cable, tides and rates will vary along the route with the local bathymetry. Localised currents may be present in some areas which are not represented within the tidal diamond data, in particular close to the coast in proximity to the landfalls. At Peterhead Port, the mean spring range is about 3.3 m and the mean neap range is about 1.5 m. At Fraserburgh Harbour, the mean spring range and the mean neap range are 3.0 m and 1.5 m respectively.

The tide increases the navigable water depth and therefore reduces the risk of grounding over the area of protection. As a result, any analysis will be done considering chart datum which will be the minimum water depth over the berm and therefore is precautionary and presents the highest risk.

[Redacted]

Figure 9: Chart Showing Pop-Out Locations, Cable Route And Bathymetry.

3.3. VESSEL TRAFFIC ANALYSIS IN AFFECTED AREA

Vessel traffic analysis was undertaken using Automatic Identification System (AIS) data from 01/02/2022 to 31/01/2023. Over the year, a total number of 966 vessels crossed the cable (**Figure 10**) up until the 33 m contour. The maximum draught depth was 8.9 m with 78 vessels (8.1%) having a draught greater than 5 m. All of these crossed in a water depths greater than 18.9 m.

Within 500 m of the Pop-Out location, 24 vessels crossed the cable, none of which had a draught greater than 2.5 m (**Figure 10**).

The majority of vessels crossing the cable route where water depth will be reduced by more than 5% are fishing and recreational vessels with a small number of tug and service vessels crossing at the outer end of the area (**Figure 11**). These are typically small vessel with shallow draughts. Larger vessels such as cargo vessels transit further offshore in deeper waters.

There are no harbours or anchorages within the bay. The inner bay is shallow with areas that dry at low tide and rocky areas. As a result, vessels typically navigate from headland to headland without entering the bay. There are two main traffic lanes off the coast (**Figure 12**). The location of these are dictated by Peterhead and Rattray Head. Large vessels with deep draughts rarely come closer than 2 nm to the coast. Smaller vessels rarely come closer than 0.75 nm to the coast, the exception is when they turn around Rattray Head where traffic comes as close as 0.5 nm. Therefore, the principal flows of traffic naturally keep both deep and shallow draught vessels further off the coast than the HDD Pop-Out locations.

[Redacted]

Figure 10: Pop-Out Location with Tracks by Type with 500m Buffer.

[Redacted]

Figure 11: Pop-Out Location with Tracks by Draught.

[Redacted]

Figure 12: Pop-Out Location in relation to key coastal features.

3.4. CALCULATION OF UKC REQUIREMENTS

MGN 654 Annex 3 (MCA, 2021) states several key factors in determining UKC:

1. The height of the underwater structure.
2. The draught of the vessel transiting.
3. The effects of dynamic draught in swell.
4. Any safety margin.
5. Calculating the minimum under keel clearance (UKC) is one of the factors required to provide safe passage for vessels. The key heights and measurements required for this calculation are illustrated in **Figure 13**.

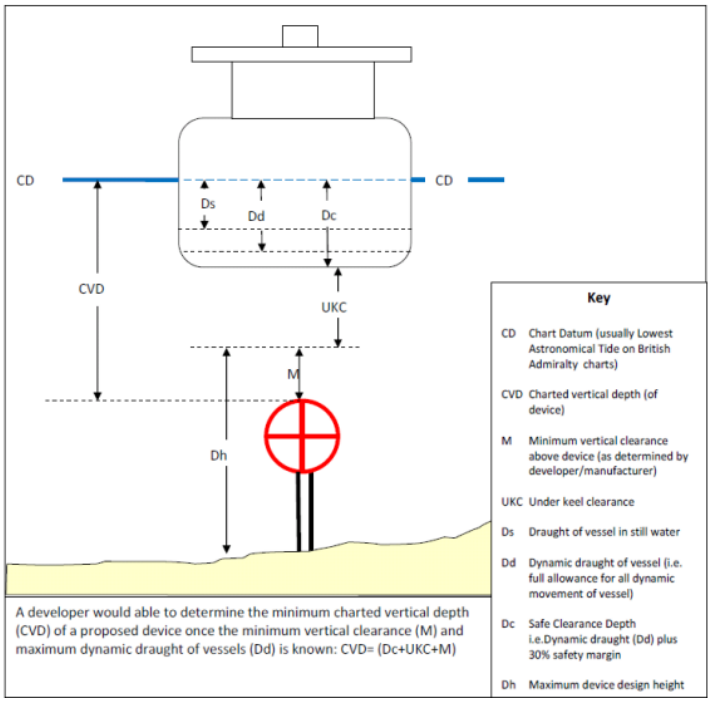

Figure 13: Illustrative view of a vessel passing over an underwater wave, tidal or similar device such as a protective rock berm with the key heights and measurements (MCA, 2021).

Vessel traffic data can be used to establish the deepest draught of observed traffic (Ds) and from this modelling can be used to establish the dynamic draught (Dd). This assessment has used a 50% dynamic draught buffer; this is assumed to be a worst-case scenario and the actual dynamic depth of any vessel is likely to be much smaller than this. A 30% safety factor is the applied to the dynamic draught to give the overall safe clearance depth (Dc).

$$Dc = 1.3Dd$$

Charted Depth is then reduced by the Dc gives a maximum height above seabed available from which cable height (Dh) including any design clearance requirements (M) can be

established. This simple formula will then give a minimum depth over the berm against a calculated worst-case scenario.

$$M = CD - Dc - Dh$$

The bathymetry overlaid with the height of the protective berm and the 5% water depth reduction compared to the maximum vessel draught, a 50% dynamic draught buffer and a 30% safety margin is shown in **Figure 14**. As can be seen the berm reduces the water depth by greater than 5% along the cable length up to the 33 m contour. However, it can also be seen that even at the worst-case scenario of draught depth vs bathymetry there is still an acceptable UKC, with the minimum UKC seen being 8.41 m. Furthermore, the additional height of tide would add additional water depth for safe passage (see **Section 3.2**).

Therefore, across the cable route there is more than twice the available water than the deepest draught vessels recorded.

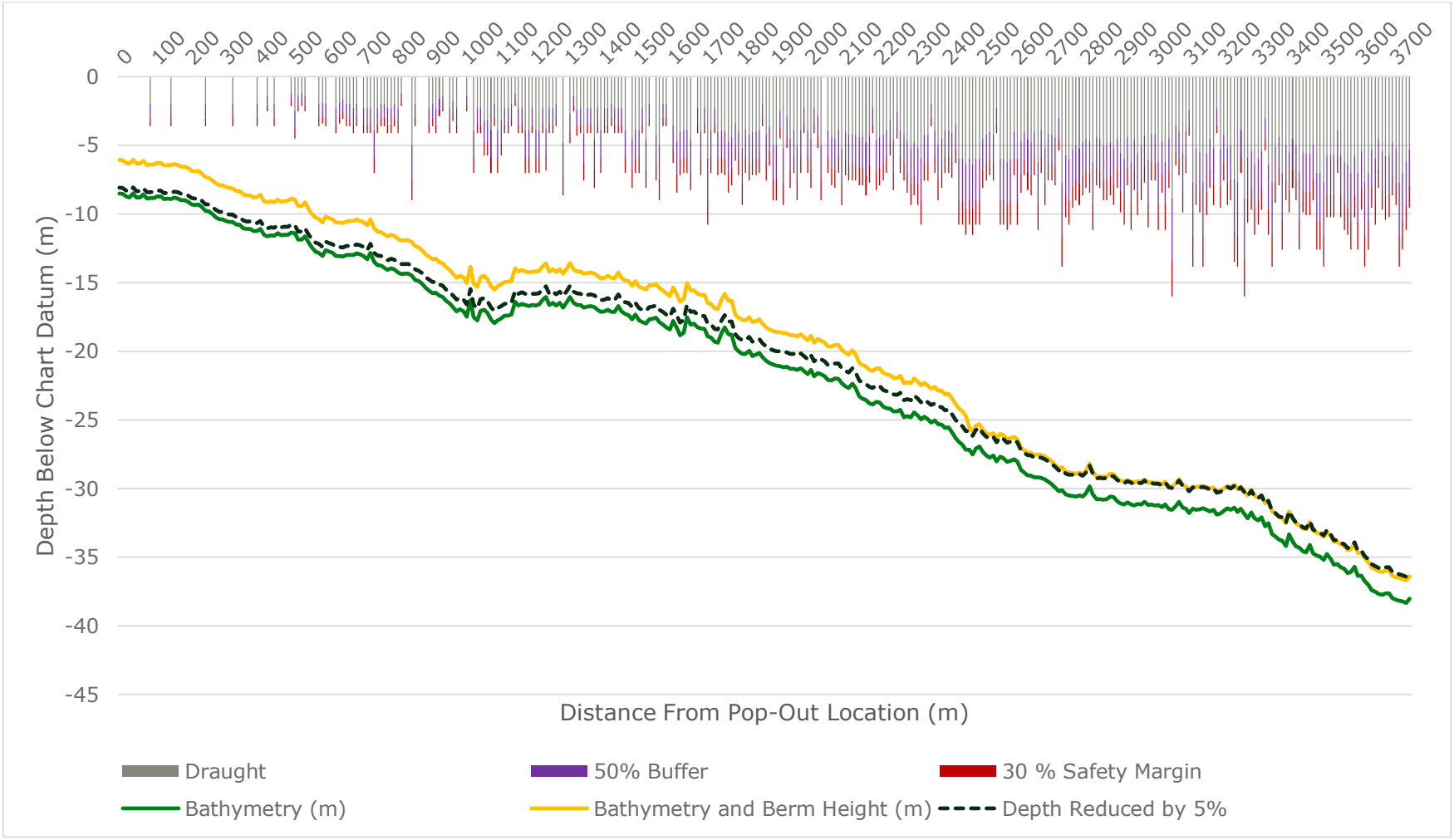

Figure 14: Graph showing bathymetry, 5% water depth reduction and berm height compared to maximum vessel draught, 50% buffer and 30% safety margin for draught. The origin point represents the HDD Pop-Out location.

3.5. REVIEW OF APPLICABLE NRA RISK CONTROLS

The following risk control measures in **Table 4** of the NRA would manage the risks associated with the HDD Pop-Out locations.

TABLE 4: EMBEDDED MITIGATIONS DURING INSTALLATION AND DECOMMISSIONING

Mitigation	Description
Information to mariners	Notice to Mariners will be circulated to inform ports and maritime users of installation/decommissioning works.
Fisheries Liaison Officer (FLO)	A Fisheries Liaison Officer will be assigned for the Project to ensure early and effective communications and coexistence.
Liaison with ports/harbours	Ongoing liaison with local ports and harbours to ensure port operations and vessels visiting Fraserburgh, Peterhead and Wick are not disrupted.
Marking on charts	The fully installed cable will be clearly marked on nautical charts in line with United Kingdom Hydrographic Office (UKHO) standards, with associated note/warning.
Kingfisher Bulletin	Locations of cables and associated infrastructure e.g., cable protection will be included in fishermen's awareness charts issued by Kingfisher.
Cable design	Compass deviation effects will be minimised through cable design and separation distance.

3.6. REVIEW OF RISK ASSESSMENT FINDINGS

3.6.1. Snagging

There are no anchorage areas around the Pop-Out locations and no trawling is undertaken in the area. As a result, the berm is unlikely to increase the snagging risk as assessed in the NRA. Therefore, all snagging risks are Tolerable and As Low As Reasonably Practicable (ALARP).

3.6.2. Grounding

The proposed HDD Pop-Out locations and the cable protection berms would have the biggest impact on the risk of grounding compared to other hazards.

As demonstrated in **Section 3.3**, there is a very low level of traffic in proximity to the Pop-Out locations, with 24 vessels recorded within 500 m of the Pop-Out locations in an entire year. In addition, these vessels have a shallow draught, a maximum of 2.5 m. Furthermore, the natural geography of the coastline offsets both shallow and deep draught vessels away from the Pop-Out locations.

The shallowest waters along the cable route section with protection of 2.453 m is at the HDD Pop-Out locations, which are located in a water depth of 8.45 m. This would allow a clearance of approximately 6 m. In addition, the Pop-Out location is in close proximity to the coast therefore if a deep draught vessel were to be navigating across this feature it would be at imminent risk of running aground irrespective of the presence of the berms.

The HDD Pop-Out lies south of a charted shallow water area of 2 m depth that extends approximately 650 m east of the Pop-Out Location. Therefore, it is anticipated that vessels already navigate in such a way to avoid the Pop-Out location area. Any vessel navigating around the 2 m sounding would take a path seaward of the blue dotted line depicted in **Figure 12**, meaning they would cross the cable around the 10 m contour (see inset in figure for more detail). With a berm height of 2.453 m, this would allow approximately 7.5 m of clearance. The deepest draught vessel crossing the cable route landward of the blue dotted line had a draught of 2.5 m.

For the cable berms, the presented analysis in **Section 3** and the graph displayed in **Figure 14** have demonstrated that UKC would still be adequate for safe navigation. Although there are more vessels in the vicinity of the berms than the HDD Pop-Out location itself, it was observed within the vessel traffic analysis that all vessels with a draught over 5 m were recorded in water depths of 18.9 nm or deeper.

With the above considered, the berms are unlikely to increase grounding risk to that assessed as part of the NRA. Therefore, all grounding risks are considered to be Tolerable and ALARP.

3.6.3. Collision

The installation of the berms will not involve extra vessels compared to the cable installation assumed within the NRA. Therefore, collision risk would not be increased over what was assessed within the NRA. Collision risks can be considered to be Tolerable and ALARP.

3.7. ADDITIONAL RISK CONTROLS

To further manage the risks associated with the HDD Pop-Out locations and the berms, two further recommendations are made:

1. HDD Pop-Out locations to be marked on navigational charts with an appropriate note agreed with UKHO.
2. Engineering design team to ensure as far as reasonably practicable minimum berm height above seabed, noting the above assessment considers the unlikely worst-case assumptions.
3. A post-installation bathymetric survey should be undertaken to confirm the as-built berm profile and verify that achieved heights remain within design tolerances assumed in this safety justification.
4. Port-installation bathymetric survey data should be made available to UKHO to support chart updates and ensure mariners have access to accurate seabed information in areas where berm height has increased.

4 CONCLUSIONS AND RISK STATEMENT

This study has assessed the potential impacts on navigational safety associated with the HDD Pop-Out locations near Rattray Head of the Spittal to Peterhead HVDC Cable.

This assessment has followed the guidance of MGN654 Annex 3 (MCA, 2021) and has been based off precautionary parameters including maximum berm/protection heights, deepest draught vessels observed, conservative clearance distances and assessed at chart datum (without any height of tide). It is highly likely that the reduction in navigable depth will be less than that assessed within this study.

This assessment reaches the following conclusions:

1. Low traffic in the affected area. A total of 24 vessels transits were recorded within 500 m of the Pop-Out location. The maximum draught of these vessels was 2.5 m.
2. The coastal geography naturally keeps both shallow and deep draught vessels further off the coast and well clear of the Pop-Out location, which lies south of a charted shallow water area of 2 m depth that extends approximately 650 m east of the Pop-Out.
3. Given the sizes and types of vessels, there is sufficient depth of water to maintain an acceptable UKC.
4. There is considered to be no material change in the risk of snagging, grounding or collision assessed as part of the NRA as a result of the HDD Pop-Out locations and therefore the risks are considered Tolerable and As Low As Reasonably Practicable with embedded risk controls.
5. The risk controls proposed in the NRA are adequate for managing the risk; however, the following further suggestions are made:
    - HDD Pop-Out locations to be marked on navigational charts with an appropriate note agreed with UKHO.
    - Engineering design team to ensure as far as reasonably practicable minimum berm height above seabed, noting the above assessment considers the unlikely worst-case assumptions.
    - A post-installation bathymetric survey should be undertaken to confirm the as-built berm profile and verify that achieved heights remain within design tolerances assumed in this safety justification.
    - Port-installation bathymetric survey data should be made available to UKHO to support chart updates and ensure mariners have access to accurate seabed information in areas where berm height has increased.

Overall, it is considered that the risks associated with the HDD Pop-Out locations are Tolerable and that safe navigation is not compromised.

References

MCA (2021). MGN 654. Available at: https://www.gov.uk/guidance/offshore-renewable-energy-installations-impact-on-shipping

NASH MARITIME

+44 (0) 2380 381 681

info@nashmaritime.com

www.nashmaritime.com