



Aurora: United Kingdom

Environmental Assessment Report –
Rock Placement

PREPARED FOR

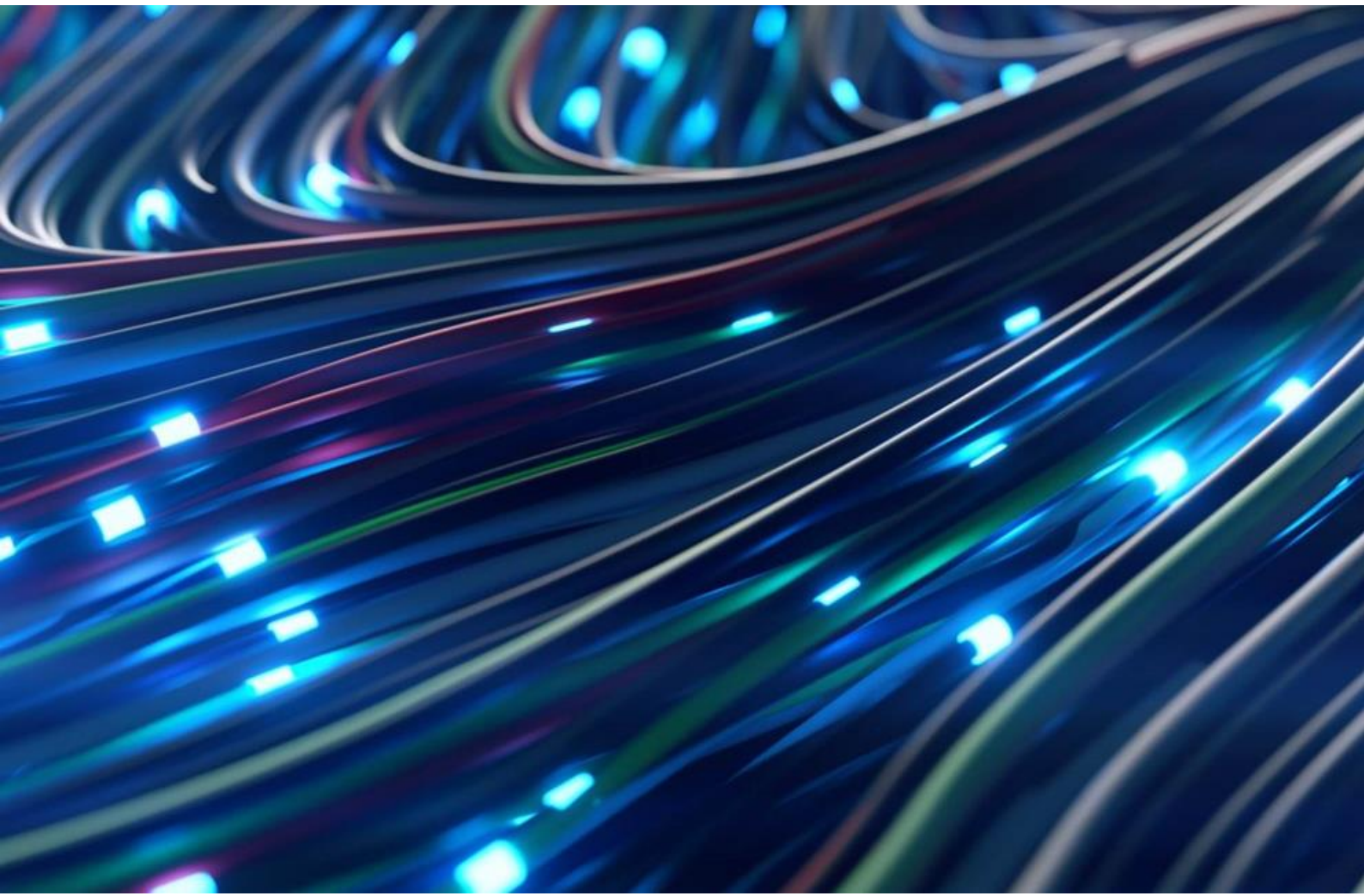


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[Redacted]

Jonathan Lewis

Partner

Environmental Resources Management
Limited
6th Floor
102 West Port
Edinburgh
Scotland
EH3 9DN

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
°C	Degrees Celsius
μPa	Micropascal
AA	Appropriate Assessment
AIS	Automatic Identification System
AL	Action Level
ALARP	As low as reasonably practicable
AoI	Area of Interest
AoO	Advice on Operations
ASN	Alcatel Submarine Networks
AtoN	Aid to Navigation
BCAs	Block Crossing Agreements
BWM	Ballast Water Management
CCS	Carbon Capture Sequestration
CES	Crown Estate Scotland
CIA	Cumulative Impact Assessment
cm	Centimetres
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea
CPT	Cone Penetration Test
CRS	Cable Route Survey
CS	Celtic Sea
CSEMP	Clean Seas Environment Monitoring Programme
D&R	Demonstration and Research
DAS	Discretionary Advice Service
dB	Decibel
DGPS	Differential Global Positioning Systems
DIN	Dissolved Inorganic Nitrogen
DIP	Dissolved Inorganic Phosphorous
DPS	Dynamic Positioning System
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMODnet	European Marine Observation and Data Network
EPS	European Protected Species

Acronyms	Description
ERCoP	Emergency Response Cooperation Plan
ERM	Environmental Resources Management
EUNIS	European Nature Information System
FeAST	Feature Activity Sensitivity Tool
FFPV	Flexible Fall Pipe Vessel
FLAGS	Brent A to St. Fergus
GEP	Good Ecological Potential
GES	Good Ecological Status
HES	Historic Environment Scotland
HF	High frequency
HMCG	His Majesty's Coastguard
HRA	Habitats Regulations Appraisal
IBTS	International Bottom Trawl Survey
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
km	Kilometres
LF	Low frequency
LSE	Likely Significant Effect
m	Metres
MA	Management Unit
MaCAA	Marine and Coastal Access Act
MarESA	Marine Evidence based Sensitivity Assessment
MarLIN	Marine Life Information Network
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships
MBES	Multibeam bathymetry
MCA	Maritime Coastguard Agency
MCZ	Marine Conservation Zone
MD-LOT	Marine Directorate Licensing Operations
MHWS	Mean High Water Springs
MLA	Marine Licence Application
MLWS	Mean Low Water Springs
MOD	Ministry of Defence

Acronyms	Description
MPA	Marine Protected Area
MPS	Marine Policy Statement
MSS	Marine Scotland Science
MU	Management Unit
NCMPA	Nature Conservation Marine Protected Area
NEFTA	North East Fishermen's Training Association
NGO	Non-Governmental Organisation
NLB	Northern Lighthouse Board
nm	nautical miles
NMP	National Marine Plan
NMPi	National Marine Plan Interactive
NRA	Navigation Risk Assessment
NSTA	North Sea Transition Authority
NtM	Notice to Mariners
O&G	oil and gas
OPRED-ODU	Offshore Petroleum Regulator for Environment and Decommissioning Offshore Decommissioning Unit
PAD	Protocol for Archaeological Discoveries
PAH	Polyaromatic hydrocarbon
PLB	Post-lay burial
PLIB	Post lay inspection and burial
PMF	Priority Marine Feature
PSU	Practical Salinity Units
PTS	Permanent Threshold Shift
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAGE	Scottish Area Gas Evacuation
SCANS	Small Cetaceans in European Atlantic waters and the North Sea
SCFF	Scottish Creel Fishermen's Federation
SCOS	Special Committee on Seals
SEPA	Scottish Environment Protection Agency
SFA	Shetlands Fishermen's Association
SFF	Scottish Fishermen's Federation
SFO	Scottish Fishermen's Organisation

Acronyms	Description
SIRGE	Shetland Island Gas Export System
SLVA	Seascape, Landscape and Visual Amenity
SMU	Seal Management Unit
SNCB	Statutory Nature Conservation Body
SNH	Scottish Natural Heritage
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SPA	Special Protection Area
SPFA	Scottish Pelagic Fishermen's Association
SPL _{RMS}	Sound Pressure Level Root Mean Square
SSC	Suspended Sediment Concentration
SSMO	Shetland Shellfish Management Organisation
SSS	Sidescan sonar data
SST	Sea Surface Temperatures
SWFPA	Scottish White Fish Producers Association
TBT	Tributyltin
TS	Territorial Seas
TTS	Temporary Threshold Shift
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UNESCO	United Nations Educational, Scientific and Cultural Organisation
US	United States
USBL	Ultra-Short Baseline
UXO	Unexploded Ordnance
VHF	Very High Frequency
VMS	Vessel Monitoring System
VTs	Vessel traffic service
WFD	Water Framework Directive
WMP	Waste Management Plan
WSI	Written Scheme of Investigation
WWII	World War II

1. INTRODUCTION

1.1 PROJECT OVERVIEW

This Environmental Assessment (EA) Report relates to proposed rock placement activities for the Aurora Project only.

The Aurora Project is a planned subsea fibre optic telecommunication cable system (hereafter referred to as 'the Aurora Project', or the subsea cable), with a total estimated length of 7,230 kilometres (km) (**Figure 1-1**). The Aurora Project will connect landings at Manasquan, New Jersey in the United States (US) and Blaabyerg in Denmark, traversing through both United Kingdom (UK) and Norwegian waters, and is expected to go live in 2027/2028.

Alcatel Submarine Networks (ASN) has been contracted to design, build and install the Aurora Project, and Environmental Resources Management (ERM) have been appointed by ASN to obtain the necessary permits for the installation of the Aurora Project in UK waters.

The Aurora Project has received a Marine Licence (reference number: MS-00011067) on 10 July 2025 from the Marine Directorate Licensing Operations Team (MD-LOT), for the installation and operation of the Aurora Project in the UK Territorial Seas (TS) (hereafter referred to as the 'Scottish TS'). The location and extent of the Aurora Project within UK waters is shown below in **Figure 1-2**.

Based on ongoing discussion with asset owners, the Aurora Project is now also looking to submit a separate Marine Licence Application (MLA) under Part 4 of the Marine and Coastal Access Act (MaCAA) 2009 and Part 4 the Marine (Scotland) Act 2010 for rock placement activities, which will provide additional protection at existing pipeline and cable crossing locations within the Scottish TS and UK Exclusive Economic Zone (EEZ).

To avoid duplication of information, for further information specifically on the Aurora Project, please refer to the Marine Licence reference number: MS-00011067 on MD-LOT's website, available at: [Marine Licence - Cables - Between Fair Isle and Mainland, Shetland - 00011067 | marine.gov.scot](https://marine.gov.scot/marine-licence-cables-between-fair-isle-and-mainland-shetland-00011067).

1.2 PURPOSE OF THIS REPORT

This EA Report has been prepared in support of the separate MLA process to the MD-LOT. This EA Report aims to identify potential impacts associated with rock placement activities from the Aurora Project in the UK EEZ and Scottish TS, determine the significance of effect for each potential impact and recommend mitigation measures as appropriate to minimise potential effects.

As the legislative requirements and consenting processes vary between countries, the appropriate permitting and consenting processes will be conducted for each countries' waters, in which the Aurora Project is located: the US, UK, Norway and Denmark. As this report has been prepared in support of the MD-LOT MLA for rock placement activities within the UK segment of the subsea cable route, only potential impacts of the Aurora Project rock placement activities on receptors in UK waters have been considered. The Norwegian and Danish segments of the Aurora Project will be assessed as appropriate within separate applications to the respective national authorities.

FIGURE 1-1 PROPOSED ROUTE OF THE AURORA PROJECT

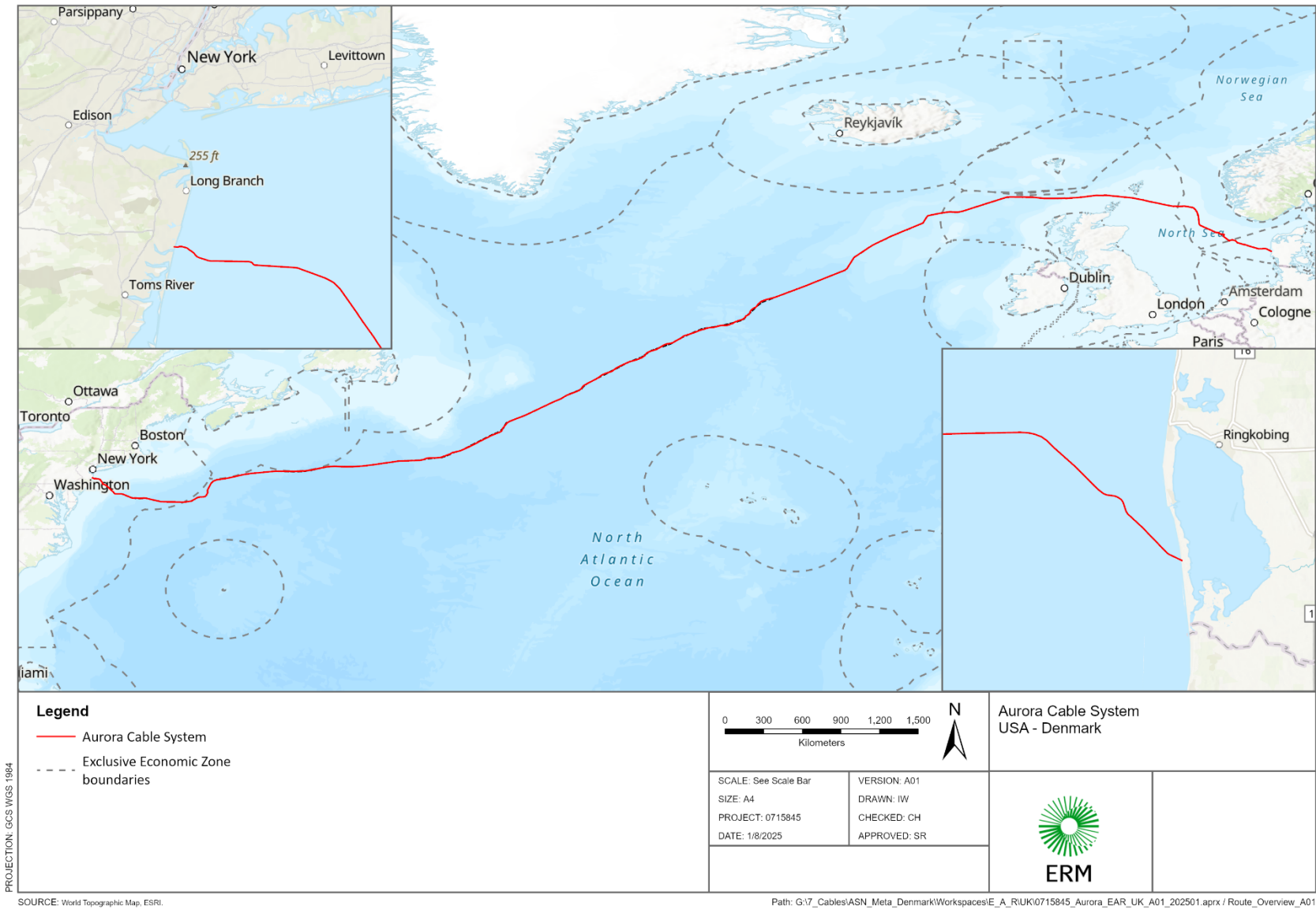
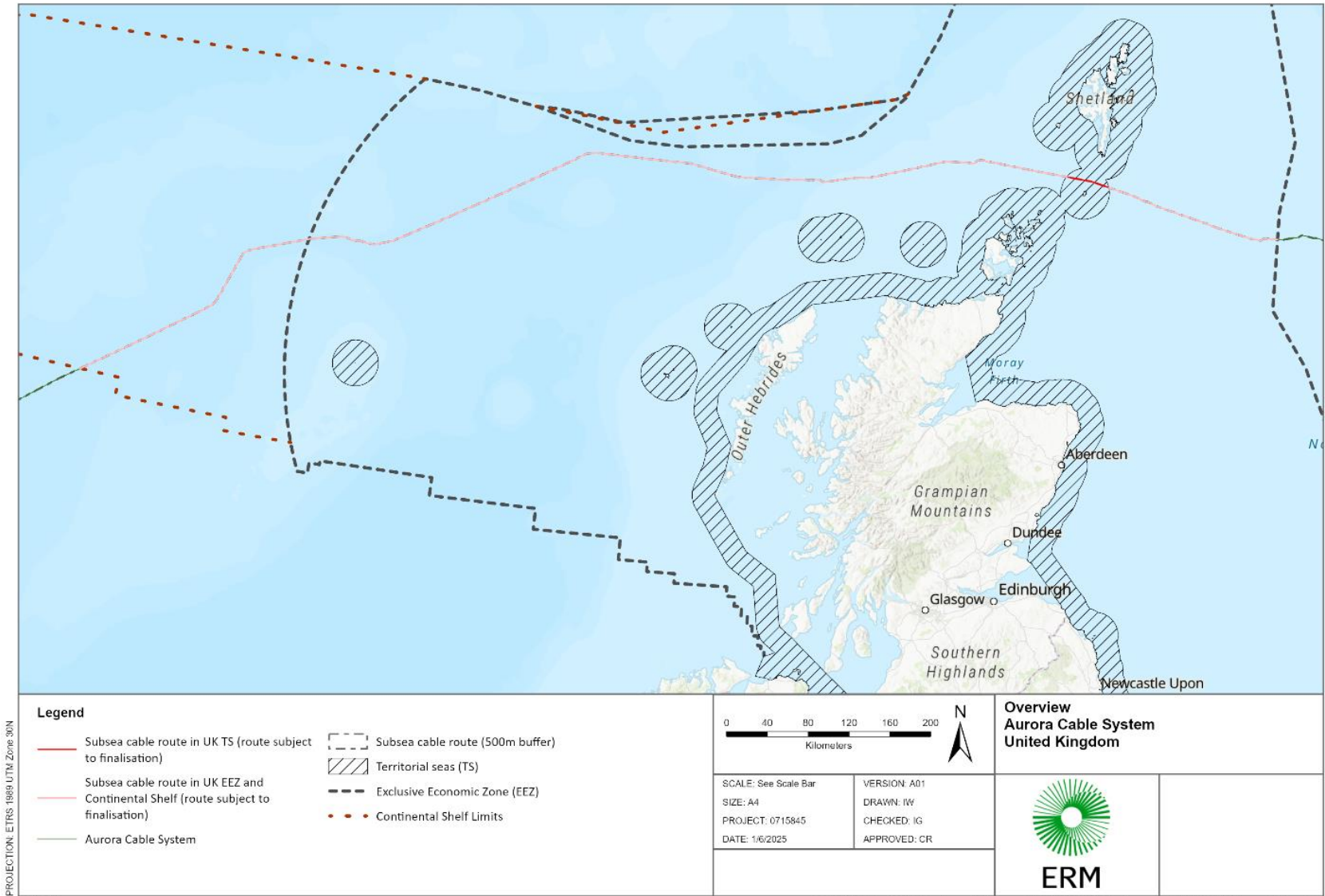


FIGURE 1-2 PROPOSED UNITED KINGDOM AURORA SUBSEA CABLE ROUTE



SOURCE: World Topographic Map; Eri UK; Eri; TomTom; Garmin; FAO; NOAA; USGS
World Hillshade; Esri; USGS contains public sector information licensed under the Open Government License v3.0.

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1.3 DOCUMENT STRUCTURE

The remainder of this report is structured as follows:

- **Section 2:** Legislative Context and Regulatory Requirements
- **Section 3:** Stakeholder Engagement
- **Section 4:** Project Description
- **Section 5:** Assessment Methodology
- **Section 6:** Environmental Assessment
- **Section 7:** Conclusion

The following appendices are also included as part of this EA Report:

- **Appendix A:** Technical Note
- **Appendix B:** Habitats Regulations Appraisal (HRA)
- **Appendix C:** Nature Conservation Marine Protected Area (NCMPA) Assessment
- **Appendix D:** Embedded Mitigation Measures for Rock Placement Activities associated with the Aurora Project in UK Waters
- **Appendix E:** Site Specific Geophysical Data at Rock Placement Activities Locations
- **Appendix F:** Navigation Risk Assessment (NRA)

2. LEGISLATIVE CONTEXT AND REGULATORY REQUIREMENTS

2.1 MARINE LICENCE

2.1.1 THE MARINE AND COASTAL ACCESS ACT 2009

Part 4 of the MaCAA 2009 details licensable marine activities and sets out the requirements for marine licences in the area between the 12 nautical miles (nm) limit and the UK's EEZ (200 nm).

Part 4, Section 66 defines the licensable marine activities which require a marine licence to be authorised by the relevant authority. Licensable activities are defined under Part 4, Chapter 1, Section 66, Paragraph 1: To deposit any substance or object within the UK marine licensing area, either in the sea or on or under the sea bed, from (a) any vehicle, vessel, aircraft or marine structure'. For the Scottish EEZ, marine licence applications are submitted to MD-LOT and are also considered by Scottish Ministers.

2.1.2 MARINE (SCOTLAND) ACT 2010

Under Part 4 of the Marine (Scotland) Act 2010, an MLA is required for the permanent deposit of substances below Mean High Water Springs (MHWS) in the Scottish TS (i.e. within 12 nm).

Section 21 describes the licensable marine activities, which require a Marine Licence submission to MD-LOT and consideration by Scottish Ministers. In line with Section 21, a Marine Licence is required for the Project as an activity *"to construct, alter or improve any works within the Scottish marine area either in or over the sea, or on or under the seabed"*.

2.2 SCOTTISH NATIONAL MARINE PLAN

The Scottish National Marine Plan (NMP) (Marine Scotland, 2015) establishes policies and objectives to enable the sustainable development and management of Scotland's marine resources, in both Scottish inshore (out to 12 nm) and offshore waters (12 to 200 nm). The NMP details 21 general policies that are applicable to all future developments and uses within Scottish waters. These general policies are supplemented by sector-specific policies, enabling policies, and objectives to be targeted at particular industries. The Submarine Cables chapter of the NMP details four marine planning policies that should be considered when considering cable developments. Two of these four policies, as detailed below, are relevant to the rock placement activities associated with the Aurora Project.

- Protect submarine cables whilst achieving successful seabed user co-existence; and
- Safeguard and promote the global communications network

Currently, the Scottish NMP 2 is in consultation and, consequently, has not been considered further in this report.

2.3 EUROPEAN PROTECTED SPECIES LICENCE

In the UK EEZ beyond 12 nm, the Habitats Directive is transposed into law by the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended). The protection of wild animals listed in Annex IV(a) is addressed under Regulation 45, which details the activities that constitute an offence against the regulations.

In Scottish waters, the European Habitats Directive (European Union Council Directive 92/43/EEC) is implemented by the Habitats Regulations 1994 (The Conservation (Natural Habitats &c.) Regulations 1994). These are strengthened by the Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007, which contain a revision of the disturbance offence for European Protected Species (EPS) specifically through Regulation 39, which details the activities that constitute an offence under the regulations.

Any activity that has the potential to disturb these species must therefore obtain an EPS licence prior to the commencement of the activity. Licensing may be granted exempting the proposed activity, provided the activity meets certain strict criteria:

- There is a licensable purpose;
- There are no satisfactory alternatives; and
- The actions authorised will not be detrimental to the maintenance of the population of the species concerned at favourable conservation status in their natural range.

If these criteria are fulfilled, then an EPS licence may be granted such that the proposed activity may proceed.

The potential disturbance to marine mammals through noise, vibration and collision risk, and disturbance to ornithology receptors is anticipated to be negligible, and therefore it is anticipated that no EPS Licence will be required for the Scottish TS and UK EEZ.

3. STAKEHOLDER ENGAGEMENT

3.1 ENGAGEMENT STRATEGY OVERVIEW

Well-planned and executed stakeholder consultation is key to the successful consenting / permitting of any marine development project. Specific consultation on the proposed rock placement activities associated with the Aurora Project has been conducted with the relevant stakeholders via distribution of a Technical Note which summarises the rock placement activities (**Appendix A**). The engagement has been recorded via a live stakeholder communication log throughout the application process. A summary of the stakeholder engagement log is provided in **Table 3-1**. The key objectives of initial discussions are to introduce the rock placement activities for the Aurora Project and to gather details regarding the required permits. The responses received from the stakeholders will / have been responded to as appropriate and / or required, and requests for information to be incorporated into the EA Report have been taken into consideration.

TABLE 3-1 SUMMARY OF STAKEHOLDER ENGAGEMENT

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
<i>Statutory</i>			
Northern Lighthouse Board (NLB)	Responsible for the management of all lighthouses, buoys and beacons within Scottish waters	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	11 June 2025 Confirmed receipt of Technical Note and noted that the NLB will formally respond once consulted. The NLB noted that they will likely advise the following: • Notice to Mariners (NtMs), Kingfisher Bulletins and Radio Navigation Warnings are issued in advance of activities. • NtMs be issued via email to the NLB. • The Aurora Project submits final survey data to the UK Hydrographic Office advising the as-laid information for the subsea cable and rock placements.
Maritime and Coastguard Agency (MCA)	Authority for enforcing merchant shipping legislation	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	27 June 2025 Confirmed receipt of Technical Note and noted that the MCA expect the safety of navigation to be maintained during rock placement activities, and the subsea cable to be buried in accordance with the cable burial assessment. The MCA welcomed that post lay inspection and burials (PLIBs) will be undertaken after installation and noted that consultation with fisheries and other local marine operators is expected. The MCA noted they would expect a NRA, following recognised methodology, to be undertaken, and risk reduced and considered to be 'as low as reasonably practicable' (ALARP). The MCA made recommendations regarding the maximum accepted reduction in chart datum and noted that it is expected that all maritime safety legislation is complied with, and up-to-date publications/charts are used. Advice on risk mitigation measures through marine licence conditions will be provided by the MCA at the formal marine licence application stage with MD-LOT.
Scottish Environment Protection Agency (SEPA)	Non-departmental body of the Scottish Government responsible for regulating and	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities.	03 June 2025 Confirmed receipt of Technical Note and noted that the application appears to fall below the thresholds for which SEPA provide site specific advice.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
	protecting Scotland's environment		
NatureScot	Lead advisory body on nature, wildlife management, and landscape management across Scotland. Responsible for MPAs	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 01 July 2025 Response to comments on Technical Note, confirming that feedback has been considered, and that unexploded ordnances (UXOs) are outside the scope of this MLA.	27 June 2025 Confirmed receipt of Technical Note and provided comments on the following topic areas: • Marine Physical Processes – recommendation to include seabed scour into the assessment of 'changes to the morphology of the seabed'. • Benthic Ecology – advised that impacts of Invasive Non-Native Species (INNS) and consideration of impacts to Annex I habitats and Priority Marine Features (PMFs) should be included. • Fish and Shellfish Ecology – clarity sought on whether diadromous fish and basking shark have been included. • Marine Mammals – agreed that potential impact of underwater noise should be assessed and recommended that potential impact of UXO) clearance should be included. • Cumulative Impact Assessment (CIA) – advised that agreement with MD-LOT should be sought on the projects / activities to be included.
<i>Non-Statutory</i>			
Orkney Islands Council	Local council	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Shetland Islands Council	Local council, provides works licence for any installation works that fall with 12 nm of Shetland	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 01 July 2025 Follow up engagement regarding pre-application enquiry.	26 June 2025 Confirmed receipt of Technical Note and noted an officer will respond in due course. 27 June 2025 Response to Technical Note, noting no substantive comments. The Shetland Islands Council recommended pre-application consultation is undertaken with the stakeholders listed in Table 3-1 of the Technical Note, in addition to the Shetland Regional Archaeologist. Shetland Islands Council noted that the issuing of the Technical Note has been registered as pre-application enquiry, to further discuss whether a separate Shetland Islands Council Marine Works Licence Application is required for rock placement activities. 11 July 2025 Shetland Islands Council confirmed requirement for a Marine Works Licence Variation for rock placement activities within 12nm of Shetland.
Crown Estate Scotland (CES)	Manages the seabed out to 12 nm and provides licences for property rights of cables and licences	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
MD-LOT / Marine Directorate Science	Regulator who grants the Marine Licences and scientific division of MD-LOT	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	24 June 2025 Confirmed that as the regulator, MD-LOT do not respond to consultations.
Joint Nature Conservation Committee (JNCC)	Statutory nature advisor to all four countries of the UK	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities.	05 June 2025 Confirmed receipt of Technical Note, and noted that JNCC will be consulted directly by MD-LOT. JNCC advised that they offer a Discretionary Advice Service (DAS) for projects at the pre-application stage.
Chamber of Shipping	Shipping industry representative	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Ministry of Defence (MOD)	Responsible for military activities	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
National Trust for Scotland	Own the Fair Isle, Shetland	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
Historic Environment Scotland (HES)	Responsible for Scotland's heritage sites	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	09 June 2025 Confirmed receipt of Technical Note and confirmed that they do not have any comments to make on the proposals.
HM Coastguard (Orkney and Shetland)	Coordinate all maritime search and rescue operations	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities.	No response received from HM Coastguard. See response received from MCA.
Scottish Fishermen's Federation (SFF)	Fishing industry representative	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 SFF provided with a deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 01 July 2025 Response to SFF comments, providing clarification on rock placement volume and influencing factors behind rock berm design. Confirmation given that cross-section figures are indicative and that actual rock berms will form a sloped profile, as preferred.	02 June 2025 Confirmed receipt of Technical Note and asked for clarification on deadline for responses. 03 June 2025 Introduced development of the Horizon Watch platform, to allow the fishing industry to have early insight into proposed cable routes and therefore, the opportunity to engage with the developer. 25 June 2025 Response to Technical Note made on behalf of the SFF's constituent associations (i.e. Anglo Scottish Fishermen's Association, Fife Fishermen's Association, Fishing Vessel Agents and Owners Association, Mallaig & North West Fishermen's Association, Orkney Fisheries Association, Scottish Pelagic Fishermen's Association, the Scottish White Fish Producer's Association and Shetland Fishermen's Association). The SFF recommended that the concerns and preferences raised at the Aurora Project fisheries stakeholder meeting held in October 2024 are taken into consideration. The SFF proposed that the Orkney Fisheries Association, although represented by the SFF, are added as a consultee within this table. Clarification sought on the rationale behind the volume of rock berms and the influencing factors (e.g. engineering, environmental and risk mitigation considerations) behind the rock placement. The SFF noted

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
			their preference for sloped rock berm cross-section, rather than an apex as indicated in Figures 4-1 to 4-3 of the Technical Note. Recommendation made to use guard vessels to reduce snagging risks, and utilise the Horizon Watch platform to provide fishermen with early access to subsea cable route information. The SFF welcomed the use of rock placement for cable protection, as opposed to concrete mattresses, grout bags, rock / sand bags.
Fisheries Management Scotland	Fishing industry representative	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
North East Fishermen's Training Association (NEFTA)	Fishing industry representative	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued,	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Seafood Scotland	Fishing industry representative	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Scottish White Fish Producers Association (SWFPA)	Fishing industry representative	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Shetland Fishermen's	Fishing industry representative	02 June 2025	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
Association (SFA)		Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Scottish Fishermen's Organisation (SFO)	Fishing industry representative	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Scottish Creel Fishermen's	Fishing industry representative	02 June 2025	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
Federation (SCFF)		Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Scottish Pelagic Fishermen's Association (SPFA)	Fishing industry representative	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
North Atlantic Fishing Company	Fishing industry representative	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued,	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Western Isles Fishermen's Association	Fishing industry representative	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Mallaig and Northwest Fishermen's Association	Fishing industry representative	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued,	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Royal Society for the Protection of Birds (RSPB)	Non-Governmental Organisation (NGO) often consulted by MD-LOT	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Whale and Dolphin Conservation	NGO often consulted by MD-LOT	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Orkney Islands Council Port	Responsible for the management	02 June 2025	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
Harbour Authority	of Orkneys ports and harbours	Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Shetland Islands Council Harbour Authority	Responsible for the management of Shetlands piers and harbours	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
NorthLink Ferries	Commercial vessel operator	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued,	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Streamline Shipping Group	Commercial vessel operator	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Orkney Ferries	Commercial vessel operator	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued,	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Royal Yachting Association (RYA)	National governing body for recreational boating	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Shetland Inter-Club Yachting Association	Local recreational group	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Orkney Sailing Club	Local recreational group	02 June 2025	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Sullom Voe Terminal	Oil terminal located in Sullom Voe in Shetland, that receives oil by pipeline from the oilfields in the East Shetland Basin and the deep waters West of Shetland	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
The North Sea Transition Authority (NSTA)	Oil and gas (O&G) authority	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued,	10 June 2025 Confirmed receipt of Technical Note, and noted that where O&G pipelines have been identified, this should include decommissioned assets. The developer should ensure owners are contacted to negotiate crossing agreement, following which it is the responsibility of the Pipeline Operator to inform the NSTA and the Offshore Petroleum Regulator for Environment and Decommissioning Offshore Decommissioning Unit

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	(OPRED-ODU) to see if there are any other requirements. Owners of petroleum or carbon storage blocks and licences that the Aurora Project traverses should also be contacted to negotiate Block Crossing Agreements (BCAs).
Cruising Association	Recreational boating association	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Shetland Shellfish Management Organisation (SSMO)	Manage and regulate commercial fisheries within inshore 6 nm	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
Shetland Amenity Trust– Local Council	Shetland Regional Archaeologist	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	02 June 2025 Confirmed receipt of the Technical Note and advised that the Regional Archaeology Services have now been relocated to Shetland Islands Council.
Dunrossness Community Council	Local Community Council	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Shetland Islands Council Ferry Operations Team	Inter-Island Ferry Operator	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	
Fair Isle Marine Environment and Tourism Initiative	Community-led initiative to protect marine resources around Fair Isle	02 June 2025 Technical Note issued to inform stakeholders of proposed rock placement activities. 09 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025. 23 June 2025 Follow up correspondence issued, reiterating opportunity to comment on Technical Note by deadline of 27 June 2025.	No response received.
Orkney Fisheries Association	Fishing industry representative	26 June 2025 Issued with Technical Note following SFF recommendation to include Orkney Fisheries Association.	No response received.

4. PROJECT DESCRIPTION

The proposed rock placement activities is divided into two (2) different campaigns. One, pre-installation campaign to protect the existing infrastructure from the subsea cable, and a second, post-installation campaign to protect the Aurora subsea cable from external damage due to activities such as fishing.

4.1 PROJECT LOCATION

The Aurora Project crosses a total of 10 existing cables and pipelines within the Scottish TS and UK EEZ, of which there are two (2) fibre optic cables and one (1) power cable crossing in the Scottish TS, and (7) pipeline crossings within the UK EEZ. It should be noted that rock placement will not be required for the fibre optic cable crossings in the Scottish TS.

Therefore, the descriptions in this EA Report will only be referring to the one (1) existing power cable in the Scottish TS and seven (7) existing pipelines in the EEZ, including one (1) decommissioned pipeline.

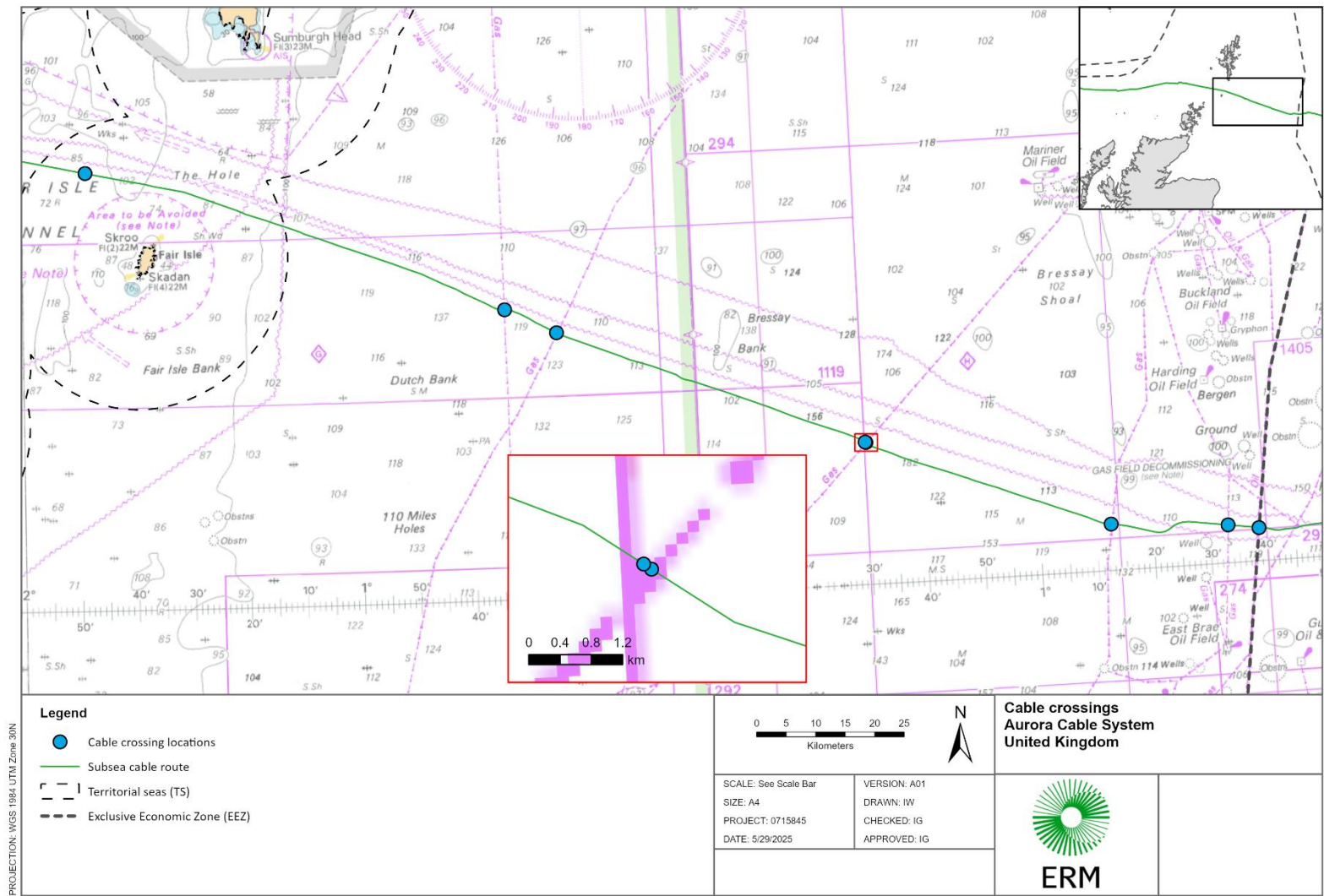
To support crossing agreements with asset owners for existing infrastructure, the Aurora Project is proposing pre- and / or post-installation rock placement for protection of existing assets at the eight (8) crossing locations as shown in **Table 4-1** and **Figure 4-1** below.

TABLE 4-1 UNITED KINGDOM SUBSEA CABLE CROSSING LOCATIONS

System Name	Latitude	Longitude	Timing for Rock Placement
Shetland HV DC Link	059° 40.039' N	001° 48.398' W	Post-Installation
Shetland Island Gas Export System (SIRGE)	059° 26.553' N	000° 33.569' W	Pre-Installation and Post-Installation
Frigg to St. Fergus 1	059° 12.968' N	000° 29.868' E	Pre-Installation and Post-Installation
Scottish Area Gas Evacuation (SAGE)	059° 04.225' N	001° 12.566' E	Pre-Installation and Post-Installation
Bruce to Forties	059° 03.041' N	001° 38.674' E	Post-Installation
Brent A to St. Fergus (FLAGS)	059° 24.276' N	000° 24.408' W	Pre-Installation and Post-Installation
Vesterled Pipeline	059° 13.006' N	000° 29.764' E	Pre-Installation and Post-Installation
Devenick – East Brae	059° 03.464' N	001° 33.268' E	Pre-Installation and Post-Installation

Note: WGS84 Datum in degrees decimal minutes.

FIGURE 4-1 LOCATION OF CABLE AND PIPELINE CROSSINGS AND ROCK PLACEMENT IN UNITED KINGDOM WATERS



SOURCE: © Crown Copyright and/or database rights. Reproduced by permission of The Keeper of Public Records and the UK Hydrographic Office (www.GOV.UK/UKHO).

Path: G:\7_Cables\0715845_Aurora_Rock_Placement\workspace\working\0715845_Aurora_RP.aprx / UK cable crossing

4.2 COMPONENTS FOR ROCK PLACEMENT ACTIVITIES

Per standard industry practice in the North Sea, freshly crushed Norwegian granite will be utilised for the Aurora Project rock placements, to minimise contamination risks for environmentally sensitive areas of the seabed. For pre-installation rock placement, it is expected that 1"-5" or 1"-3" rock mix will be used. Rock material produced for offshore installation generally follows the EN-13383-1 'Armourstone – Part 1: Specification' regarding material quality requirements. This standard specifies that the material "*shall not contain any foreign matter in a quantity that will cause damage to the structure or the environment in which it is used*". The proposed rock type is 1-5" size filter rock layer, used in areas where 100-year storm conditions would be applied to wave break forces.

The subsea cable will be protected by a recognised high-density synthetic material approximately 25 mm thick, to provide further separation at the crossing locations between the Aurora Project and top of the existing assets. The additional separation will prevent direct metallic contact between subsea cable armour and steel pipelines.

The proposed parameters of the rock placement activities for the Aurora Project is shown below in **Table 4-2**, as well as the area footprint and quantities. **Figure 4-2** to **Figure 4-5** provides an indicative cross-section profile and plan view of the pre-installation rock placement and post-installation rock placement on a flat seabed.

TABLE 4-2 COMPONENTS FOR ROCK PLACEMENT ACTIVITIES

Parameter	Units	Value	
		Territorial Sea	Exclusive Economic Zone
Rock Placements and Protection			
Number of Pre-Installation Rock Placement	No.	0	6
Number of Post-Installation Rock Placement	No.	1	7
Rock Berm Profile at Pre-Installation Rock Placement*	m	-	Length: 85 to 100 Height: 0.2 to 2 Width: 8 to 10
Rock Berm Profile at Post-Installation Rock Placement*	m	Length: 44 to 52 Height: 0.6 to 0.8 Width: 3.6 to 5.2	Length: 44 to 52 Height: 0.6 to 0.8 Width: 4.8 to 6.8
Height*	m	Pre-installation: Not required Post-installation: 0.6 to 0.8 Total: 0.6 to 0.8	Pre-installation: 0.2 to 2 Post-installation: 0.6 to 0.8 Total: 0.8 to 2.8
Slope	-	1:3	1:3
Type of Deposit Material	-	Norwegian granite	Norwegian granite
Size of Deposit Material	mm	Pre-installation: Not required Post-installation: 50 to 200	Pre-installation: 25 to 125 Post-installation: 50 to 200

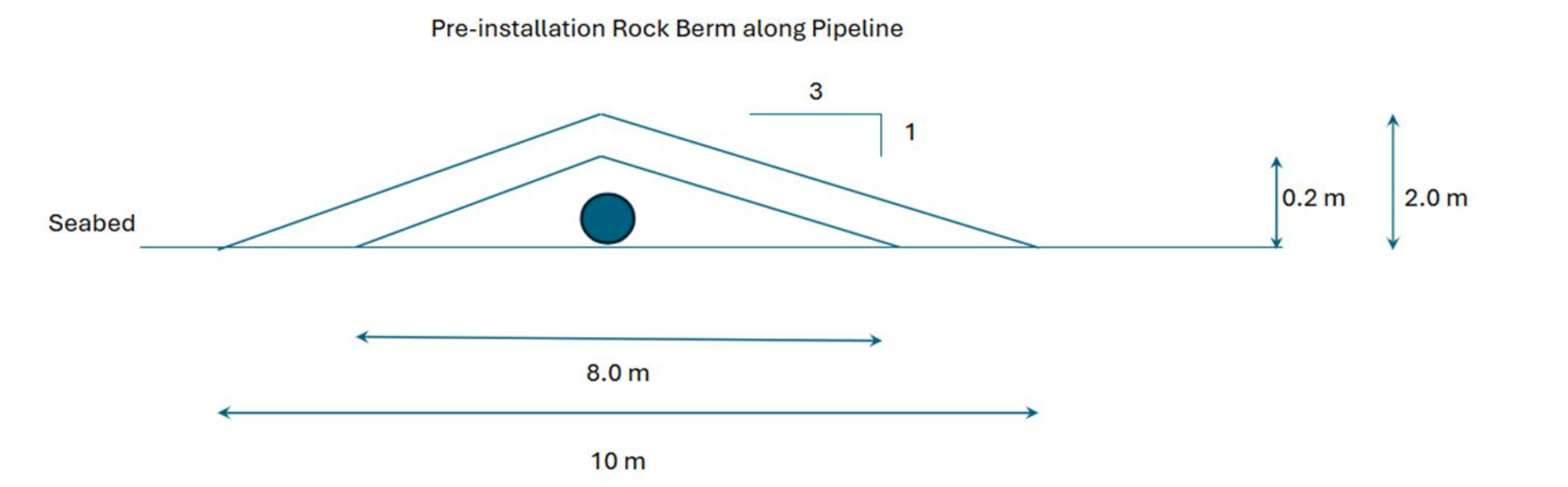
Parameter	Units	Value	
		Territorial Sea	Exclusive Economic Zone
Volume of Rock (per crossing location)*	m ³	Pre-installation: Not required Post-installation: 95 to 216.3	Pre-installation: 136 to 2,000 Post-installation: 126.7 to 282.9
Volume of Rock (total)*	m ³	Pre-installation: Not required Post-installation: 95 to 216.3	Pre-installation: 816 to 12,000 Post-installation: 887 to 1,980.2
Length of Separation Product (Uraduct)	m	100	100
Seabed			
Number of Vessels	No.	1	1
Affected Seabed Footprint Area (per crossing location)*	m ²	Pre-installation: Not required Post-installation: 158.4 to 270.4	Pre-installation: 680 to 1000 Post-installation: 211.2 to 353.6
Affected Seabed Footprint Area (total)*	m ²	Pre-installation: Not required Post-installation: 158.4 to 270.4	Pre-installation: 4,080 to 6,000 Post-installation: 1,478.4 to 2,475.2
Timings and Duration			
Proposed Pre-Installation Rock Placement Start Date	-	-	Q1 2027
Proposed Post-Installation Rock Placement Start Date	-	Q3 2027	Q3 2027
Pre-Installation Rock Placement Duration	Days	-	6
Post-Installation Rock Placement Duration	Days	1	7

Notes:

* The dimensions of the post-installation and pre-installation rock berm profiles have not been finalised and are subject to the crossing agreements which were under negotiation with asset owners at the time of writing this document. Post-installation rock berm profile dimensions will be determined following PLIBs that are performed after the subsea cable is installed.

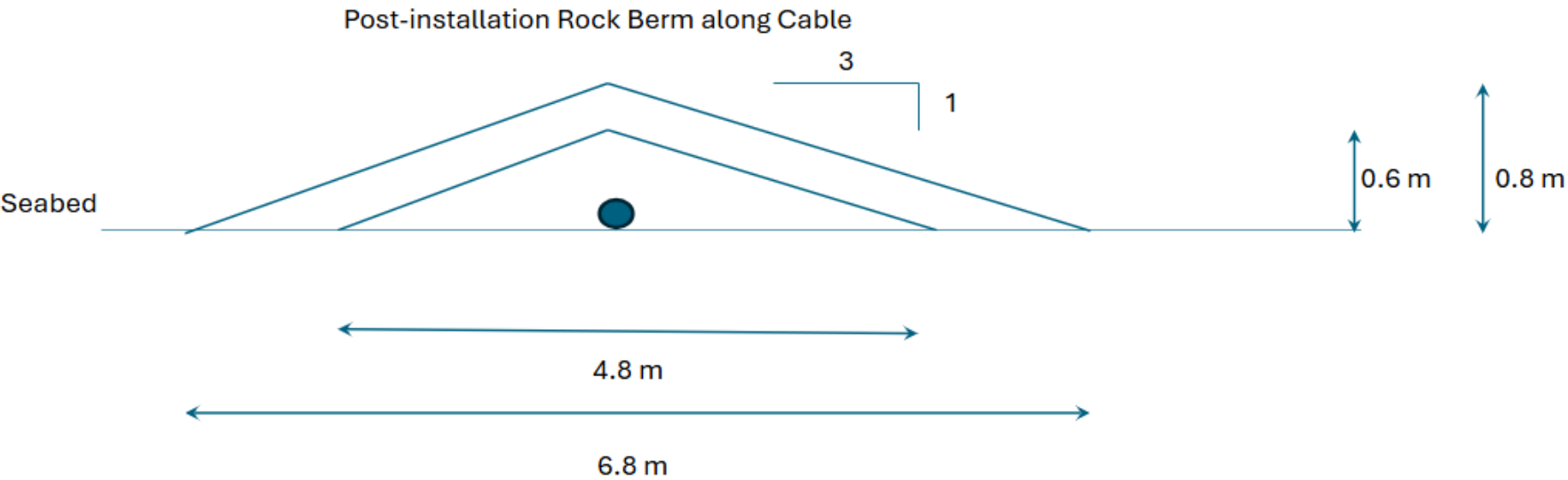
Source: ASN, 2025

FIGURE 4-2 CROSS-SECTION PROFILE OF PRE-INSTALLATION ROCK BERM ALONG PIPELINE IN THE UNITED KINGDOM EXCLUSIVE ECONOMIC ZONE



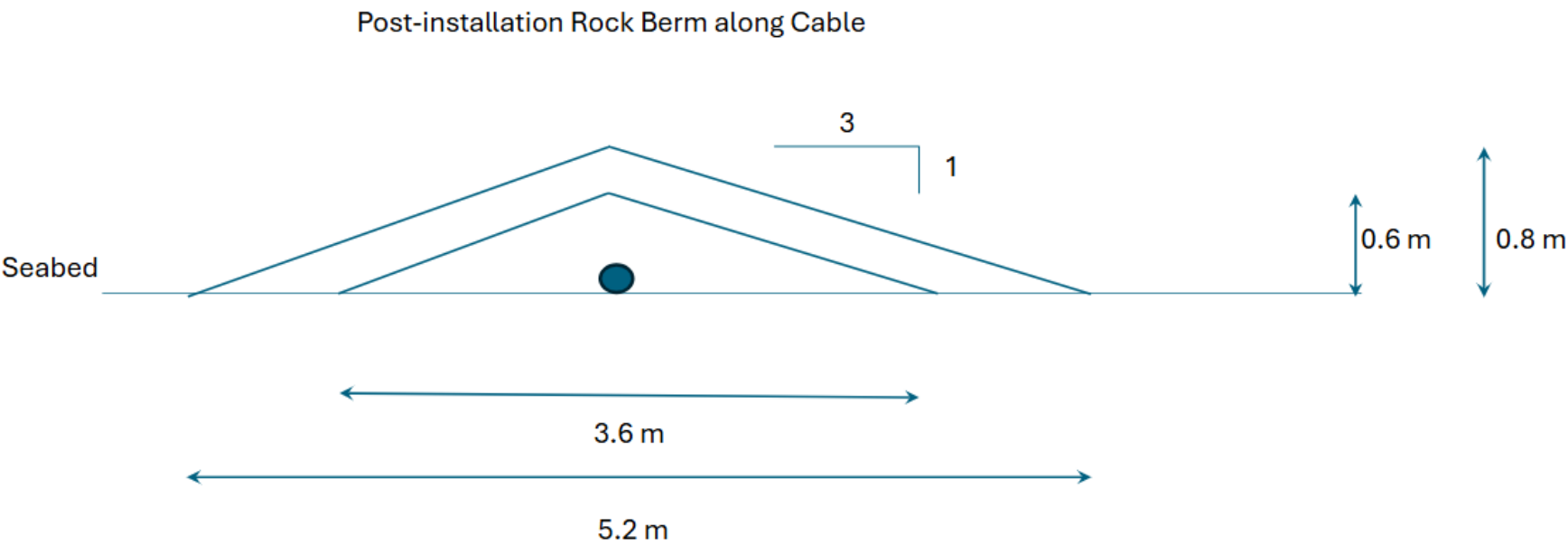
Source: ASN, 2025

FIGURE 4-3 CROSS-SECTION PROFILE OF POST-INSTALLATION ROCK BERM IN THE UNITED KINGDOM EXCLUSIVE ECONOMIC ZONE



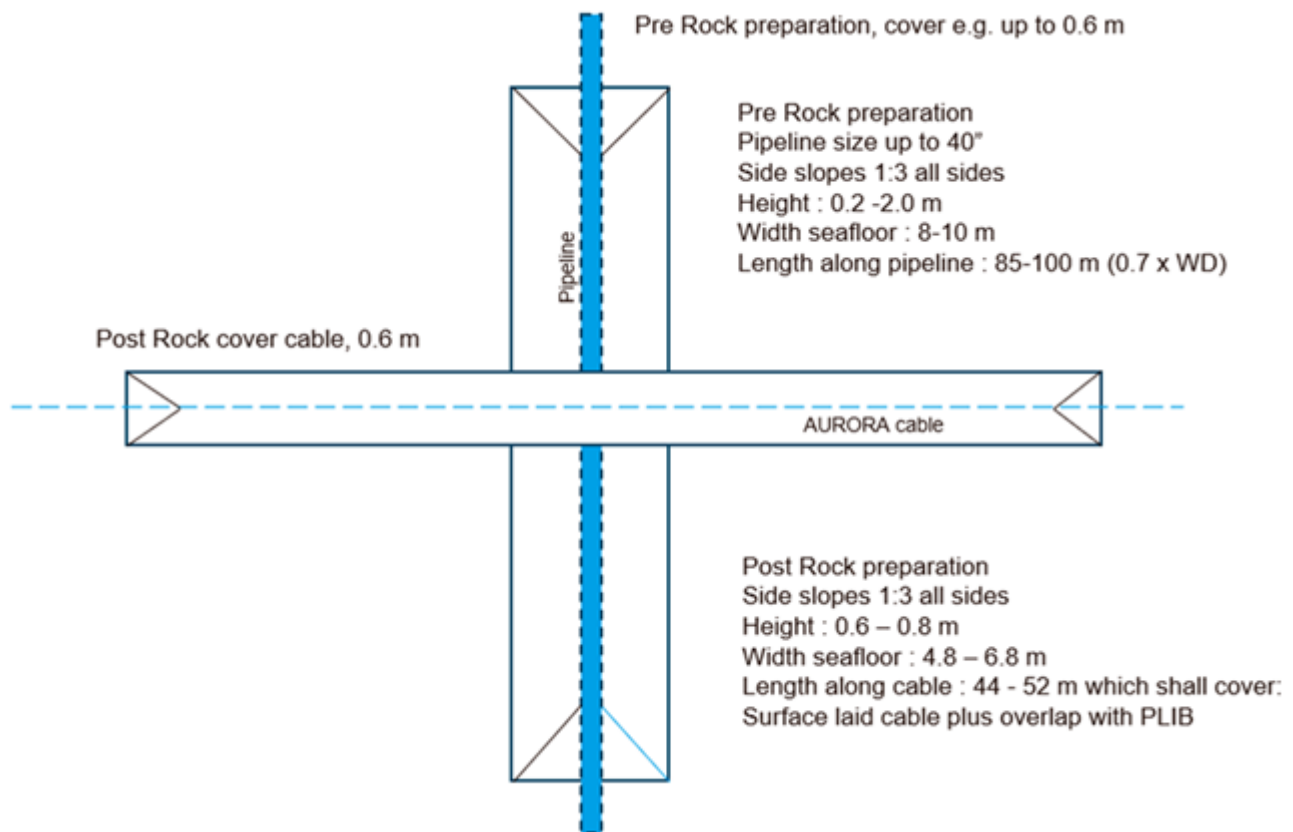
Source: ASN, 2025

FIGURE 4-4 CROSS-SECTION PROFILE OF POST-INSTALLATION ROCK BERM IN SCOTTISH TERRITORIAL SEAS



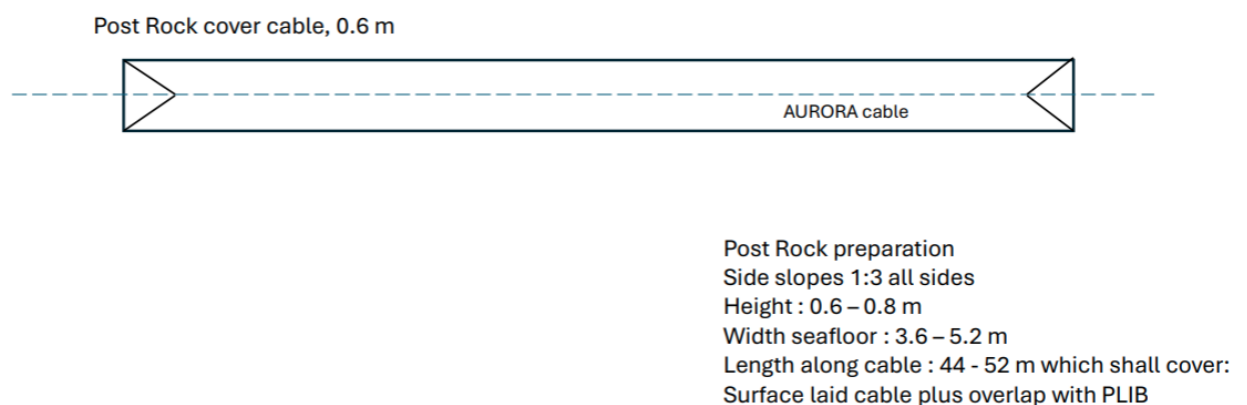
Source: ASN, 2025

FIGURE 4-5 PLAN VIEW OF PRE-INSTALLATION ROCK AND POST-INSTALLATION ROCK BERMS IN EXCLUSIVE ECONOMIC ZONE



Source: ASN, 2025

FIGURE 4-6 PLAN VIEW OF POST-INSTALLATION ROCK BERMS IN SCOTTISH TERRITORIAL SEAS



Source: ASN, 2025

4.3 ROCK PLACEMENT ACTIVITIES

The Aurora Project rock placement activities will involve the following:

- Pre-installation rock placement; and
- Post-installation rock placement.

As mentioned in **Section 1.1**, a separate Marine Licence has been obtained from MD-LOT on 10 July 2025 for the installation and operation of the Aurora Project within the Scottish TS (reference number: MS-00011067). Therefore, the installation and operation activities will not be discussed in this document.

4.3.1 PRE-INSTALLATION ROCK PLACEMENT

Prior to rock placement for the Aurora Project, a video inspection will be undertaken to document the condition of the existing pipelines which the Aurora Project will cross. This inspection will also record the horizontal and vertical positioning of the asset.

The pre-installation rock placement activities at the pipeline crossings will be undertaken to a minimum 0.6 m separation between top of pipelines in the UK EEZ and the Aurora Project. These will be undertaken in advance of the installation of the subsea cable at the designated pipeline crossings, by a Flexible Fall Pipe Vessel (FFPV) (**Figure 4-7**) equipped with FPROV.

The FFPV is dynamically positioned by Differential Global Positioning Systems (DGPS). The vessel will deliver graded, crushed, rock material in a controlled manner from deck to the seabed, via a flexible fall-pipe.

Subject to availability, a rock placement vessel with up to 25,000 tonnes capacity may be utilised. At time of writing this document, the crossing agreements are under negotiation with the asset owners and as such the quantity of rocks that will be utilised for the Aurora Project has yet to be defined.

The extent of the pre-installation rock placement will be approximately 85-100 m along each of the pipeline crossings, to allow a wide target for the FFPV to lay the subsea cable on this pre-installation rock placement at the crossing locations.

The general side slope for all rock berms at each crossing location will be a minimum of 1:3.

FIGURE 4-7 A TYPICAL FLEXIBLE FALL PIPE VESSEL



Source: ASN, 2025

The FPROV located at the end of the flexible fall pipe is fitted with survey and positioning equipment that manoeuvres the pipe to deliver rock accurately and precisely on the seabed. **Figure 4-8** shows a typical FPROV.

Following completion of the pre-installation rock placement, the FPROV will perform a video inspection to document the installation and to confirm the parameters of the rock, i.e. length/width/height.

FIGURE 4-8 A REMOTELY OPERATED VEHICLE AT END OF FALL PIPE



Source: ASN, 2025

4.3.2 POST-INSTALLATION ROCK PLACEMENT

To protect the Aurora subsea cable after installation from external damage due to activities such as fishing, PLIB will be performed on either side of the crossing locations where the subsea cable will be jetted into the seabed (activity assessed under Marine Licence, reference number: MS-00011067). This burial will be performed as close as practically possible to the assets from either side.

If any of the assets are visible on the seabed surface, the post-lay burial (PLB) will stop at a short distance before the asset.

The installation method for post-installation rock placement will basically be the same as that described for the pre-installation rock placement in **Section 4.3.1**.

As post-installation rock placement are designed to protect the subsea cable passing over a feature, such as a pipeline, it will generally be thinner and longer than the pre-installation rock placement berms. All post-installation rock placement activities on the Aurora Project at each of the crossing locations will have a minimum 5 m overlap with the end of PLIB. PLIB may stop a few meters from foot of pre-installation rock placement berm.

4.4 INDICATIVE SCHEDULE

The pre-installation rock placements within UK EEZ are expected to commence in Q1 2027 before the subsea cable is installed. Estimated total duration is six (6) days.

The post-installation rock placements within the Scottish TS and UK EEZ are expected to commence in Q3 2027 after the PLIBs. Estimated total duration is eight (8) days.

5. ASSESSMENT METHODOLOGY

This EA Report assesses whether the rock placement activities associated with the Aurora Project are likely to have any potential significant effects on the environment. This is done using a standardised methodology, The ERM Impact Assessment Standard v1.1 (The ERM IA Standard), across all those topics scoped in to the assessment. The ERM IA Standard presents a global standard for completion of Impact Assessments by ERM impact assessment practitioners, drawing from best practices to identify key guiding principles and establish common terminology. **Section 5.1** details how scoping has been carried out in the context of rock placement activities associated with the Aurora Project, and which topics have been scoped in and scoped out of the assessment. The methodology used for the impact assessment is provided in **Section 5.2.2**.

5.1 SCOPING

5.1.1 TOPICS SCOPED IN TO THE ASSESSMENT

Table 5-1 outlines which topics have been scoped in to this EA Report. Justification for each scoping decision has been included in each corresponding section.

TABLE 5-1 TOPICS SCOPED IN TO THE ENVIRONMENTAL ASSESSMENT

Topic	Scoping Decision	Further Details
Marine Physical Processes	Scoped In	See Section 6.1
Benthic Ecology	Scoped In	See Section 6.2
Fish and Shellfish Ecology	Scoped In	See Section 6.3
Marine Megafauna	Scoped In	See Section 6.4
Ornithology	Scoped In	See Section 6.5
Other Users (including Commercial Fisheries, and Shipping and Navigation)	Scoped In	See Section 6.6
Marine Archaeology	Scoped In	See Section 6.7
Water Framework Directive (WFD) and Environmental Quality	Scoped In	See Section 6.8
HRA	Scoped In	See Appendix B
NCMPA Assessment	Scoped In	See Appendix C

5.1.2 TOPICS SCOPED OUT OF THE ASSESSMENT

Table 5-2 outlines each topic that has been scoped out of the assessment and provides a justification for each decision.

TABLE 5-2 TOPICS SCOPED OUT OF THE ENVIRONMENTAL ASSESSMENT

Topic	Scoping Decision	Justification for Scoping Decision
Aviation and Radar	Scoped Out	Potential impacts on aviation and radar receptors are primarily associated with developments that have permanently installed

Topic	Scoping Decision	Justification for Scoping Decision
		marine infrastructure above the sea surface level. As the Aurora Project rock placement activities will not install any infrastructure above sea level, there are no pathways for potential impacts; therefore, Aviation and Radar has been scoped out of the assessment.
Noise and Vibration	Scoped Out	Underwater noise and vibration impacts that have the potential to effect ecological receptors, such as marine mammals and fish and shellfish, have been considered and assessed separately within the respective topic sections of this EA Report. Noise and Vibration as a topic has been scoped out of the assessment, as the airborne noise and vibration produced by the Aurora Project rock placement activities will be similar in level to other vessel use in the area, therefore, no increase in noise and vibration beyond the existing baseline levels.
Seascape, Landscape and Visual Amenity (SLVA)	Scoped Out	Potential impacts on SLVA receptors may include alterations to the physical characteristics and changes to the visual amenity of the seascape, due to the installation of infrastructure. As the Aurora Project rock placement activities will not install any infrastructure above sea level, and will only involve one vessel operating at a distance from land, there are no pathways for potential impacts; therefore, SLVA has been scoped out of the assessment.
WFD Assessment	Scoped Out	Due to the location of the Aurora Project rock placement activities, there will be no activities undertaken within the marine environment out to 1 nm. Additionally, as the closest water body is located approximately 10.2 km from the Aurora Project, there is no potential for the area of influence from any fine sediment plumes to overlap with water bodies. Therefore, a WFD assessment is not required and has been scoped out of the assessment.

5.2 IMPACT ASSESSMENT

The assessment methodology for each scoped in topic discussed in **Section 6** of this EA Report involves the following key stages:

- Stage 1: identification of a suitable Study Area for each scoped in topic. According to The ERM IA Standard, the Study Area for each topic is defined by considering the type of project, geographic extent of the project, the nature of the impacts it may have, and the characteristics of the environmental and social receptors that may be affected. For rock placement activities on a subsea cable, the Study Area will be defined with consideration to several key factors, including the footprint of the project, characteristics of the rock placement activities, techniques employed during installation and characteristics of the particular receptor.
- Stage 2: description of the existing environment within the Study Area, including the identification of key receptors that will be the focus of the assessment. The receptors considered within this EA Report vary for each topic but may include physical, biological and human receptors. The relevant baseline information is provided at the start of each topic chapter.

- Stage 3: identification of any project activities (**Section 4.3**) that are likely to result in changes to the environment at any stage in the lifetime of the rock placement activities associated with the Aurora Project.
- Stage 4: assessment of these activities and their potential impacts against the sensitivity of each identified receptor, to produce an overall potential effect significance. Embedded mitigation measures associated with rock placement activities for the Aurora Project are considered when assessing the overall potential significance within each topic's assessment. Whilst a formal Environmental Impact Assessment (EIA) is not required as part of this MLA, this EA Report has been conducted using similar EIA terms and definitions for transparency and ease of understanding.

5.2.1 IDENTIFICATION OF IMPACTS

Impacts and effects are often used interchangeably, but for the purpose of this EA Report, they are assigned different meanings.

- Impact: any alteration of existing conditions, adverse or beneficial, caused directly or indirectly by the rock placement activities associated with the Aurora Project.
- Effect: the specific consequence (to a resource / receptor) arising from an alteration of existing conditions (impact) caused by the rock placement activities associated with the Aurora Project.

Therefore, an impact does not necessarily result in an effect if the environment is not sensitive to it. Effects can be positive or negative.

This EA Report identifies any rock placement activities that are likely to result in changes to the natural and human environment throughout the lifespan of the Aurora Project in UK waters. For each of the topics scoped in to the EA Report, key receptors have been identified. Impacts of the rock placement activities associated with the Aurora Project relevant to each topic and receptor have been described, and an effects assessment of each impact on each receptor has been carried out.

5.2.2 IMPACT ASSESSMENT METHODOLOGY

A standard methodology based on The ERM IA Standard has been employed to assess the level of potential effects from the Aurora Project on environmental receptors. This methodology considers the sensitivity of the receptor, and the magnitude of the impacts, producing an overall effect (risk) on each receptor. Impacts can be categorised as direct or indirect, where direct impacts are those that occur through the direct interaction of an activity with a receptor, and indirect impacts arise as a result of the direct impacts but are generally detectable at a distance from the activity / source. Impacts can be favourable (positive) or adverse (negative).

The significance of the potential effects of the rock placement activities associated with the Aurora Project is assessed in terms of:

- The sensitivity of the receiving receptors; and
- The magnitude of the impacts, based on the size, extent and duration.

5.2.2.1 SENSITIVITY

The sensitivity of a receptor is defined by how susceptible it may be to an impact with consideration to its resilience (tolerance, adaptability and recoverability) and, where applicable, its value (conservation significance, ecological importance and / or quality).

Sensitivity of a receptor is based on the following factors:

- Tolerance to change;
- Recoverability;
- Adaptability; and
- Value.

The scale of sensitivity is as follows: Negligible, Low, Medium and High, defined in **Table 5-3**. It is important to note that the quality, value, rarity or importance of the receptor can vary and where applicable, this is discussed in the respective receptor assessment chapters.

TABLE 5-3 DEFINITIONS OF SENSITIVITY

Sensitivity	Definition
Negligible	The receptor is generally tolerant and can accommodate a particular effect without the need to recover or adapt.
Low	The receptor has some tolerance to accommodate a particular effect or will be able to recover or adapt.
Medium	The receptor has a low tolerance to accommodate a particular effect with a low ability to recover or adapt.
High	The receptor has a very low / no tolerance to accommodate a particular effect with a low/no ability to recover or adapt.

5.2.2.2 MAGNITUDE

The magnitude of an impact is a measure of size or degree of the change in the baseline conditions and can be characterised by considering the following factors:

- The nature of the change (what is affected and how);
- Its size, scale or intensity;
- Its geographical extent and distribution;
- Its duration, frequency and reversibility; and
- Where relevant, the probability of the impact occurring as a result of accidental or unplanned events.

The evaluation of magnitude has adopted a qualitative ranking of Negligible, Low, Medium and High. A general definition of each level of magnitude is provided in **Table 5-4**. The magnitude is defined differently according to the type of impact.

TABLE 5-4 DEFINITIONS OF MAGNITUDE

Magnitude	Environmental Impact
Negligible	Slight environmental damage contained within the premises.

Magnitude	Environmental Impact
Low	Impacts unlikely to be discernible or measurable.
	No contribution to transboundary or cumulative impacts.
	Minor environmental damage, but no lasting impacts.
Medium	Change in habitats or species which can be seen and measured but is at same scale as natural variability
	Unlikely to contribute to transboundary or cumulative impacts.
	Environmental damage that will persist or require cleaning up.
High	Widespread change in habitats or species beyond natural variability with recovery likely within 1-2 years following cessation of activities, or localised medium-term degradation with recovery in 2-5 years.
	Possible minor transboundary and cumulative impacts.
	Severe environmental damage that will require extensive measures to restore beneficial uses of the environment. Widespread degradation to the quality or availability of habitats and/or wildlife requiring significant long-term restoration effort.
	Recovery not expected for an extended period (>5 years following cessation of activity) or that cannot be readily rectified.
	Transboundary impacts or contribution to cumulative impacts anticipated.

5.2.2.3 RISK ASSESSMENT MATRIX

Once determined, the magnitude of the impact and sensitivity of the receptor are then combined to determine the significance of the effect as shown in the risk assessment matrix in **Table 5-5**.

TABLE 5-5 EVALUATION OF EFFECT SIGNIFICANCE

		SENSITIVITY			
		Negligible	Low	Medium	High
MAGNITUDE	Negligible	Negligible	Negligible	Negligible	Minor
	Low	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	High	Minor	Minor	Moderate	Major

The outcome of the overall risk assessment equates to a significance rating. An overall risk determined to be **Negligible** or **Minor** is '**Not Significant**', and an overall risk determined to be **Moderate** or **Major** is '**Significant**' and will require further mitigations to be implemented to minimise or remove the residual risk.

5.2.2.4 MITIGATION AND RESIDUAL RISK

The EA Report identifies mitigation measures to prevent, reduce or offset the identified adverse potential environmental effects, or create or enhance environmental benefits. Mitigation measures which are agreed with the Aurora Project for the rock placement activities and embedded as part of the Project Description (**Section 4**) are accounted for in the evaluation of potential effect significance and summarised in **Appendix D**. Where the evaluation results in a potential significant effect (i.e. Moderate or Major) additional project-specific mitigation measures are put forward to reduce the effect significance to a level considered to be as low as reasonably practicable.

Design Requirements

Design requirements include measures that have been embedded into the design of rock placement activities associated with the Aurora Project and are inherent to the rock placement activities for which consent is sought. The EA process, which includes consultation, has informed the optioneering and design process in order to optimise the rock placement activities and reduce potential effects where possible.

The assessment within the technical sections of this EA Report accounts for design requirements already being implemented (i.e. embedded / inbuilt mitigation measures in **Appendix D**). As such, the mitigations for the impact assessment within some technical sections may indicate as “none”, given the embedded mitigation measures are predicted to result in an acceptable level of impact without the need for additional mitigation to be applied.

Project-Specific Mitigation

If required, project-specific mitigation measures are applied in addition to embedded design requirements, to prevent, avoid, and reduce any remaining potential environmental effects.

Where required, project-specific mitigation measures have been identified and outlined within each topic specific section and all design measures and project-specific mitigation is summarised in **Appendix D**.

5.2.2.5 CUMULATIVE IMPACT ASSESSMENT

The CIA considers combined impacts of the rock placement activities associated with the Aurora Project with the potential impacts from other planned projects, on the same single receptor / resource. The CIA will also consider the combined impacts of the rock placement activities with the subsea cable installation activities of the Aurora Project.

A two-staged approach to identifying cumulative impacts has been applied as summarised below:

- Stage 1 – Identification of activities, receptors and pressures; and
- Stage 2 – Defining and assessing interactions

Stage 1 Identification of activities, receptors and pressures

Projects included in the CIA are identified based on their likelihood to interact with common receptors and pressures with the Aurora Project’s rock placement activities. Cumulative impacts arise from other planned activities. The ongoing potential effects from existing projects and activities are considered as part of the baseline environment for the assessment.

For cumulative impacts to arise, common receptors and pressures between the Aurora Project's rock placement activities and other projects, must share a common pressure-receptor pathway, which overlaps spatially and temporally. Projects to be included in the cumulative impact assessment are therefore located within the Study Area for each topic and will be considered where their planned activities coincide with planned activities from the rock placement activities for the Aurora Project.

Stage 2 Defining and assessing interactions

For each of the topics scoped in to the EA Report, identified common pressure-receptor pathways with other planned projects are then assessed in accordance with the impact assessment methodology presented in **Section 5.2.2** above.

6. ENVIRONMENTAL ASSESSMENT

6.1 MARINE PHYSICAL PROCESSES

6.1.1 INTRODUCTION

This subsection describes and assesses the potential significant effects that the pre- and / or post-installation rock placement activities associated with the Aurora Project may have on the marine physical environment within the designated marine physical processes Study Area. This section will therefore include information pertaining to the bathymetry, seabed geology, waves and tidal processes, and sediment transport processes.

Potential effects of the rock placement activities on marine physical processes to be assessed may include:

- An increase in suspended sediment concentration (SSC);
- Changes to a sediment transport system;
- Changes to coastal and seabed morphology; and
- Changes to wave regime or tidal currents.

It should be noted that marine physical processes are pathways, and any changes to marine physical processes may result in potential effects for other sensitive receptors, such as: benthic ecology (**Section 6.2**), fish and shellfish ecology (**Section 6.3**), marine archaeology (**Section 6.7**) and WFD and environmental quality (**Section 6.8**). These potential effects are discussed in their respective subsections.

6.1.2 MARINE PHYSICAL PROCESSES STUDY AREA

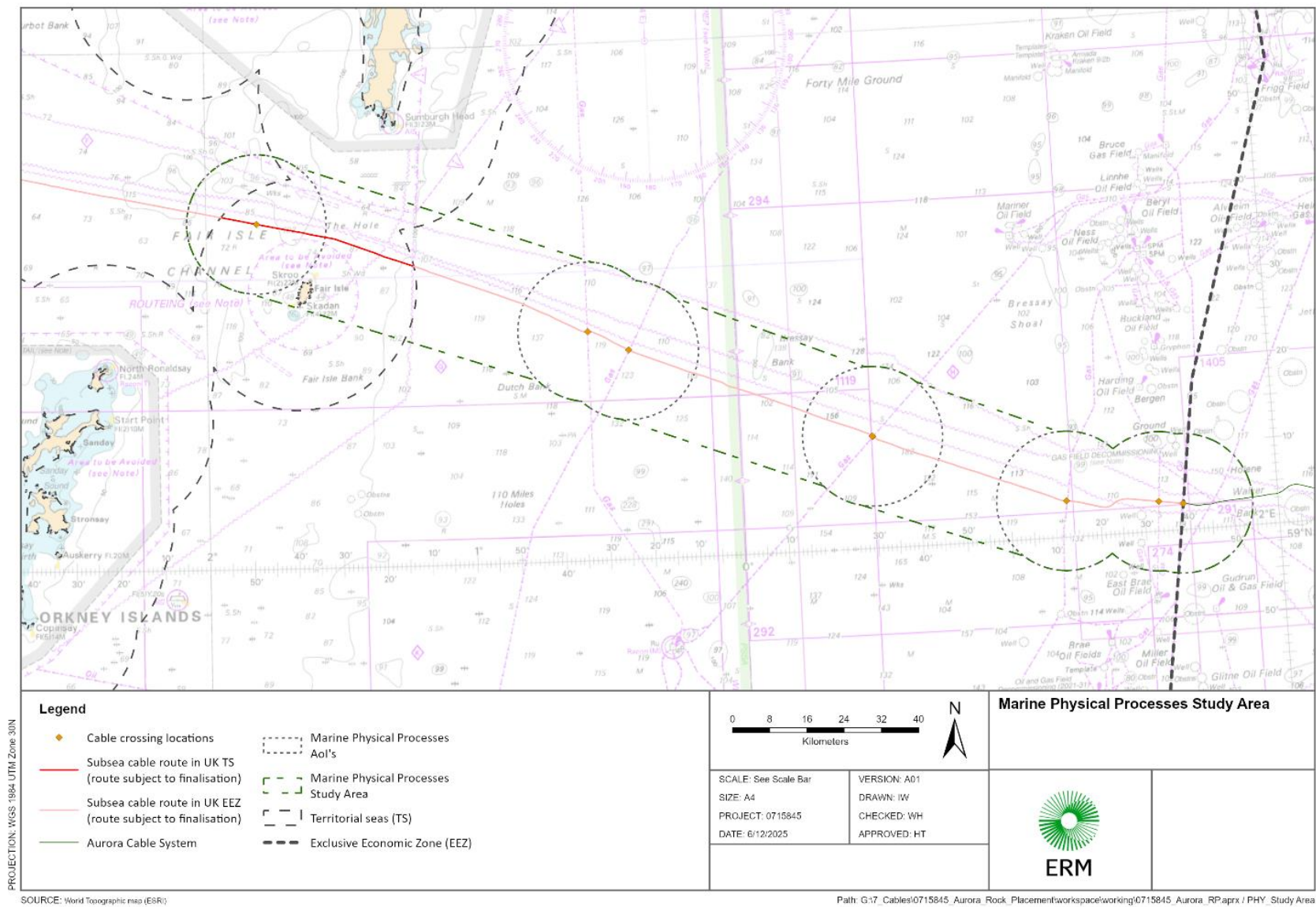
For this assessment, marine physical processes within the Scottish TS, extending 12 nm from the baseline at Mean Low Water Springs (MLWS), and within the UK EEZ have been considered (**Figure 6-1**).

The marine physical processes Study Area, shown in **Figure 6-1**, consists of an approximately 30 km wide corridor, linking seven (7) proposed rock placement activities locations at the subsea cable crossings in the UK EEZ, and one (1) in the Scottish TS in the Fair Isle channel; and will be referenced when discussing regional processes in the following sections. Where the Scottish TS, or UK EEZ are referred to, this only includes the area within the marine physical processes Study Area corridor described above. A circular buffer extending 15 km in all directions at each rock placement activities location has also been created and provides a designated area of interest (AoI) which will be referenced in the following sections when discussing localised processes.

Stretches of coastline, e.g. the coast of Fair Isle and its fringing islands, have also been considered when assessing the potential effects that the Aurora Project may have on the marine physical processes. It is important, however, to note that Fair Isle sits just outside the 15 km buffer at the closest rock placement activity location and is, therefore, outside the nearest AoI. Its consideration, therefore, is solely precautionary.

The coastline along Fair Isle can be described as predominantly rocky, with steep coastal cliffs, and a general absence of sandy coastline, apart from sporadic beaches found in several coves throughout the island.

FIGURE 6-1 MARINE PHYSICAL PROCESSES STUDY AREA



6.1.3 BASELINE ENVIRONMENT

The pre- and / or post-installation rock placement activities associated with the Aurora Project have the potential to affect seabed and coastal morphology, change the sediment transport and deposition regimes, and alter the oceanic currents throughout the marine physical processes Study Area.

In order to understand the baseline geological and oceanographic conditions found within the region, the subsequent sections describe and outline the following aspects:

- Bathymetry;
- Seabed Geology - including bedrock and overlying sediment;
- Waves and tidal processes; and
- Sediment transport in the marine physical processes Study Area.

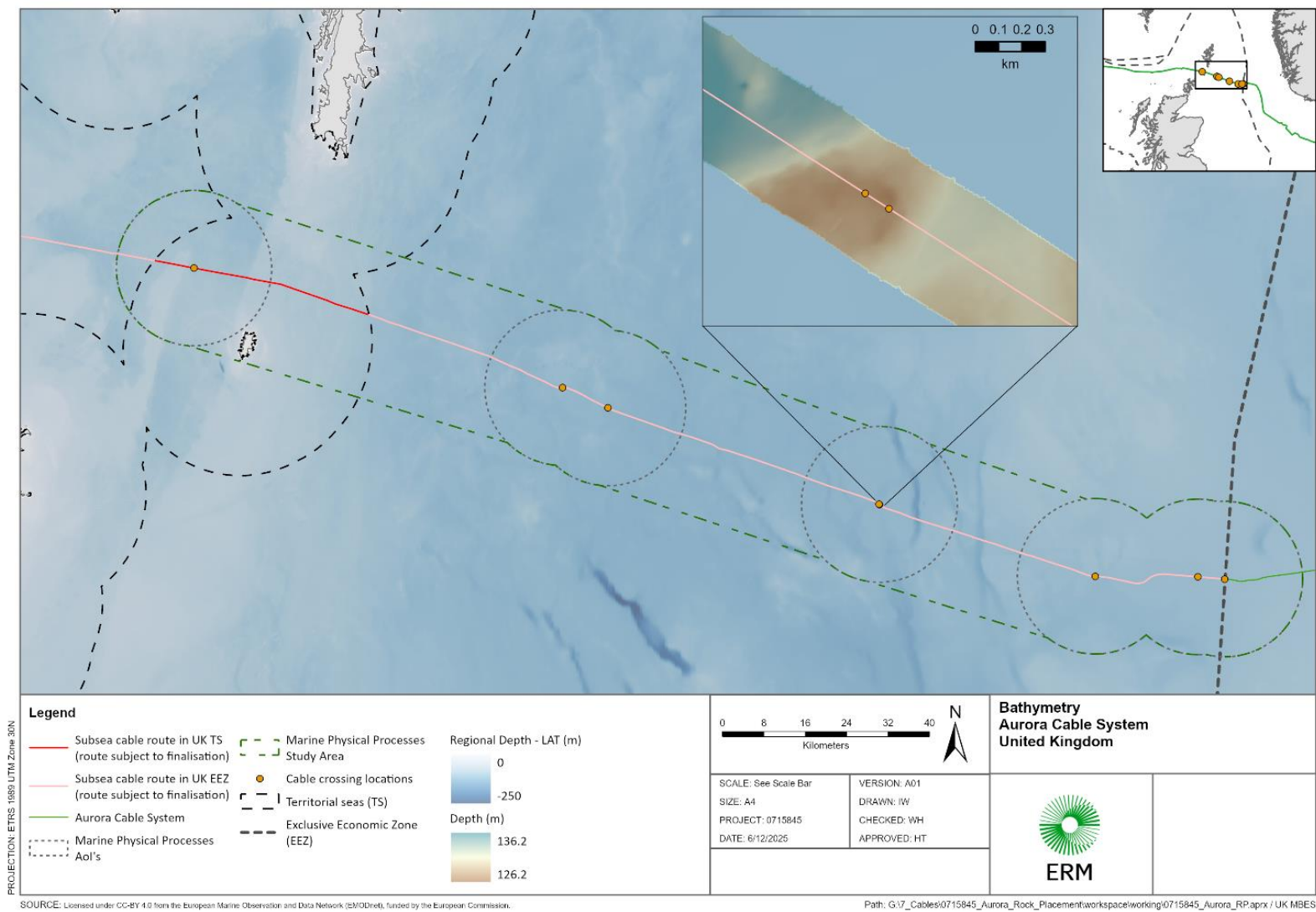
6.1.3.1 BATHYMETRY

Site-specific data were used to enhance and validate the interpretation made from publicly available bathymetry data (EMODnet, 2022) and scientific literature (Bradwell *et al.*, 2019; Holmes *et al.*, 2004), about the bathymetric conditions in the region, and enable a better understanding of the water depths at each rock placement activities location at a localised scale. Bathymetry data were collected during the Cable Route Survey (CRS) (EGS, 2024) (completed in September 2024) over rectangular grids of approximately 2 km x 0.5 km, with data gridded at 5 m, at each of the rock placement activities locations in the UK EEZ and are reproduced in **Appendix E**.

In the regional bathymetric data, the Fair Isle channel represents a bathymetric high, running north / south between Shetland and Fair Isle, with depths of approximately 85 m. To the west of this is the West Shetland Shelf, where depths increase to over 100 m; while to the east the depth of the seabed gradually increases to more than 120 m at several locations across the North Sea Shelf. Depths of over 110 m are common across the UK EEZ, as far east as the Norwegian trough, where depths increase significantly, to over 1,000 m (EMODnet, 2022; Bradwell *et al.*, 2019).

Site specific bathymetry data (EGS, 2024) collected as part of the Aurora Project CRS, and focusing on the UK EEZ, show that the deepest recorded water depths in the marine physical processes Study Area are found close to the Frigg to St Fergus rock placement location, toward the east of the North Sea Shelf, with measured depths of 136 m (**Figure 6-2**). The shallowest depths are proximal to the Scottish Area Gas Evacuation rock placement location, where depths were measured at 113.84 m.

FIGURE 6-2 BATHYMETRY AT THE FRIGG TO ST FERGUS ROCK PLACEMENT ACTIVITIES LOCATION



Source: EGS, 2024, EMODnet, 2022

6.1.3.2 SEABED GEOLOGY

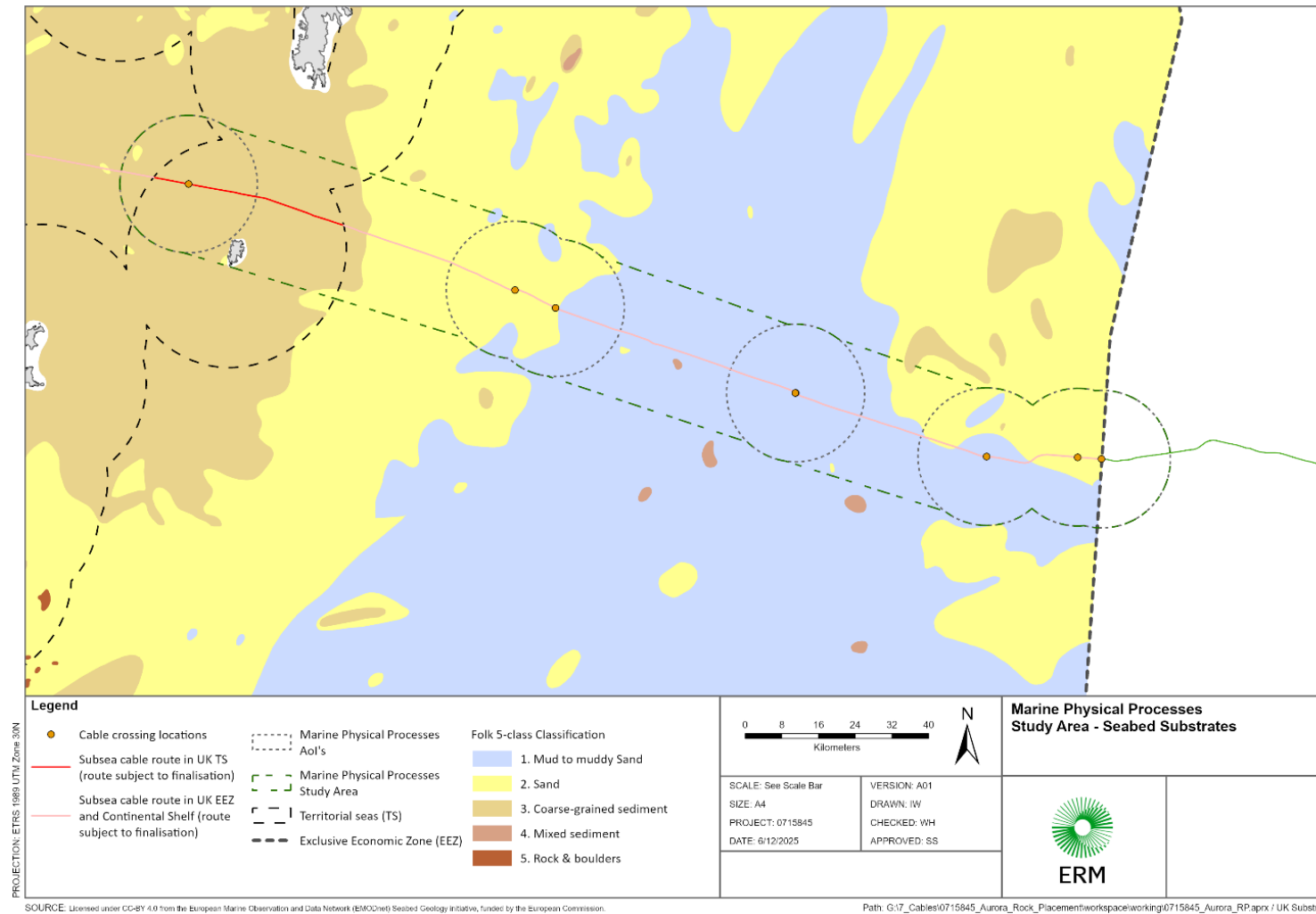
The bedrock in the marine physical processes Study Area consists of Mesozoic interbedded sandstone and Palaeozoic sedimentary deposits (EMODnet, 2022). Apart from the Fair Isle coastline, which sits just outside the 15 km AoI at the Shetland HVDC Link rock placement activities location in the Scottish TS, the marine physical processes Study Area lacks significant areas of outcropping, with sub-cropping bedrock below seabed sediments being more common. Therefore, this study will focus primarily on the seabed (Holocene) sediments, and bedforms.

Seabed sediments vary in thickness from 5-20 m throughout much of the Scottish TS within the marine physical processes Study Area, with areas of less than 5 m thickness along the north to south orientated bathymetric high between Shetland and Fair Isle (see **Section 6.1.3.1**), while within the UK EEZ Holocene sediment thicknesses can exceed 50 m. The seabed substrate throughout the marine physical processes Study Area is predominantly composed of undifferentiated Holocene sediments, with coarse grained material forming much of the seabed throughout the Scottish TS. Throughout the UK EEZ, sands are found in the west and east of the region, with a shift to finer-grained material across much the North Sea shelf, where muddy sands, sandy clays, and silts make up the composition of the seabed (**Figure 6-3**, EMODnet, 2022; EGS, 2024).

To ground truth the interpretation made from publicly available data, geotechnical samples were collected at the rock placement activities locations in the UK EEZ (EGS, 2024). The results of this geotechnical survey (**Table 6-1**) confirm that the seabed substrate becomes finer grained throughout the centre of the marine physical processes Study Area, where a notable shift from loose to medium dense sand in the west of the UK EEZ to mud and muddy sands is observed (**Figure 6-3**).

Geotechnical data collected as part of the CRS for the Aurora Project (completed in September 2024) were analysed to investigate the seabed substrate within the Scottish TS. These data showed that the seabed within the AoI in the Fair Isle channel consisted of loose to medium dense gravelly sands, which is consistent with the characterisation made from publicly available data (EMODnet, 2022; **Figure 6-3**).

FIGURE 6-3 SEABED GEOLOGY SHOWING THE REPRESENTATIVE SUBSTRATE IN THE SCOTTISH TERRITORIAL SEAS AND UNITED KINGDOM EXCLUSIVE ECONOMIC ZONE



Source: EMODnet, 2022

TABLE 6-1 SEABED SUBSTRATE DESCRIPTIONS BASED ON CONE PENETRATION TEST SAMPLES COLLECTED AT THE ROCK PLACEMENT ACTIVITIES LOCATIONS IN THE UNITED KINGDOM EXCLUSIVE ECONOMIC ZONE

Sample	Easting	Northing	Substrate
AUR-S1-GR-CP159	5330607.38	14377384.5	Loose to medium dense SAND/very low to medium strength SILT/CLAY
AUR-S1-GR-CP161	5339510.70	14373538.3	Loose to medium dense SAND/very low to medium strength SILT/CLAY
AUR-S1-GR-CP162	5342436.13	14371989.5	Loose to medium dense SAND/very low to medium strength SILT/CLAY
AUR-S1-GR-CP175	5392629.44	14351991.0	Extremely low to low occasionally medium strength SILT/CLAY
AUR-S1-GR-CP175a	5392635.49	14351992.7	Extremely low to medium strength SILT/CLAY
AUR-S1-GR-CP176	5396164.81	14349897.7	Extremely low to low strength SILT/CLAY
AUR-S1-GR-CP186	5434462.83	14334869.6	Extremely low to low strength SILT/CLAY
AUR-S1-GR-CP187	5438526.89	14333866.0	Extremely low to low strength SILT/CLAY
AUR-S1-GR-CP192	5458193.68	14332416.5	Extremely low to low strength SILT/CLAY
AUR-S1-EV-CP055	5463210.32	14331657.3	Very loose to loose SAND, with Gravel

Source: EGS, 2024

The seabed throughout the marine physical processes Study Area, and across the North Sea shelf in general, shows a considerable number of relict, immobile, glacial bedforms, the majority of which are identified as moraines. These features, which were identified using publicly available data (EMODnet, 2022), are oriented approximately north-northeast to south-southwest, and were formed by the movement of ice sheets during the last glacial maximum. There are moraines close to the rock placement activities locations at several AoIs, both in the Scottish TS and UK EEZ; however all are at least several hundred metres from each rock placement activities location (EMODnet, 2022; Bradwell *et al.*, 2019).

In the centre of the UK EEZ, and within the marine physical processes Study Area, glacial tunnel valleys are also seen, and follow an approximately north-south orientation. However, as with the moraines described above, these features are all at least several hundred metres from any rock placement activities location.

In the Scottish TS, seabed escarpments, oriented approximately north-northeast to south-southwest are also visible (EMODnet, 2022). The closest of these passes approximately 1.3 km to the west of the Shetland HVDC Link rock placement activities location.

6.1.3.3 WAVES AND TIDAL PROCESSES

Long term hindcast records of wave and tidal data from the ABPmer SEASTATES model were analysed. Within the Scottish TS (close to the Shetland HVDC Link rock placement activities location), mean significant annual wave heights were measured at approximately 2.70 m, increasing marginally to approximately 3.36 m during the winter months. With its location straddling the North Atlantic and North Sea, that part of the marine physical processes Study

Area within Scottish TS is also subject to strong tidal activity, which coupled with the non-tidal ocean currents that pass between Shetland and Fair Isle, make the region hydrodynamically quite active (Holmes *et al.*, 2003).

Non-tidal ocean currents are formed from the mixing of oceanic waters and shelf sea waters through a number of complex interrelated processes. These are less predictable than tidal currents with circulation changing due to factors within the wider environment, such as Atlantic Ocean, including atmospheric conditions (pressure, winds), seasonal changes (heat, density) and freshwater runoff. Within the Scottish TS, there is the Scottish Slope Current moving northerly along the western UK continental shelf, entering the northern North Sea either between Orkney and Shetland (in to North Scotland Shelf and Fladen & Moray Firth Offshore marine region), or around the east of Shetland (East of Shetland Shelf) and the western edge of the Norwegian Trench. Between Orkney and Shetland the current is modelled by De Dominicis *et al.* (2018) to flow at c.0.05-0.25 m/s, entering the North Sea and circulating anti-clockwise flowing out the eastern edge of the Norwegian Trench. This aligns with the CRS for the Aurora Project (EGS, 2024) which showed an average current speed of 0.04-0.23 m/s at depth (approximately 100 m, location dependent).

At the centre of that part of the marine physical processes Study Area in Scottish TS, mean peak spring flow tidal streams are recorded as being between 0.51 m/s and 0.75 m/s (ABPmer, 2018). These flow speeds remain constant through much of the region, apart from a stretch of water proximal to the north coast of Fair Isle, where localised mean spring peak flows more than 1.50 m/s are recorded (ABPmer, 2018). This location is approximately 16 km southeast of the Shetland HVDC Link rock placement activities location and, therefore, sits outside the 15 km buffer that makes up the AoI and is, thus, unlikely to affect the works carried out as part of the pre- and / or post-installation rock placement activities associated with the Aurora Project.

At locations within that part of the marine physical processes Study Area within the UK EEZ, the mean significant annual wave heights were between approximately 2.49-2.51 m, with the latter being measured in the northern region of the marine physical processes Study Area. As with the Scottish TS, wave heights increase marginally during the winter months from between approximately 2.49-2.51 m, to heights of approximately 3.27 m (ABPmer, 2018). Mean peak spring flow tidal streams are between 0.21-0.41 m/s (ABPmer, 2018), with flow speeds remaining constant through much of the region but increasing gradually toward the west of the marine physical processes Study Area, where the highest velocities were seen at the boundary with the Scottish TS.

Throughout the marine physical processes Study Area, in both the Scottish TS and UK EEZ, the predominant wave direction is westerly (>60% of the time) which, coupled with maximum recorded wind speeds of over 16 m/s at 100 m above sea level, results in maximum wave heights of >6 m being recorded (ABPmer, 2018). Maximum wave heights are, therefore, significantly larger than the average wave heights found through throughout both Scottish TS and UK EEZ, but these heights are uncommon and likely occur during extreme weather events.

6.1.3.4 SEDIMENT TRANSPORT

The seabed sediment in the marine physical processes Study Area includes coarse grained material, e.g. medium dense sands through the Scottish TS, with a transition to muds and muddy sands, low strength silts and clays and sands with gravels in the UK EEZ (for further

details see **Section 6.1.3.2**). Modern sediment input to the marine physical processes Study Area is low, with the modern seabed predominantly representing the reworking of sediments that were deposited during the last glaciation (Holmes *et al.*, 2003).

Both tidal and wave-generated currents can initiate the mass movement of sediment and aid in maintaining sediment suspension, and the mode by which sediment is transported in the region is largely determined by a combination of tidal currents and non-tidal currents (Johnson *et al.*, 1982; see **Section 6.1.3.3**). This combination determines the overall direction of sediment transport through the marine physical processes Study Area, which, broadly speaking, is toward the east and southeast; generally, towards the North Sea Shelf (Holmes *et al.*, 2003).

6.1.3.5 REVIEW OF SITE-SPECIFIC DATA

To fully understand the seabed conditions at each rock placement activities location, and to better inform this EA Report (**Section 6.1.4**), site-specific geophysical data (EGS, 2024) collected within the AoIs in the UK EEZ, were analysed. These data included multibeam bathymetry (MBES) at 5 m resolution, both high frequency (HF) and low frequency (LF) sidescan sonar data (SSS), and magnetometer data; all of which were ground-truthed by geotechnical data (Cone Penetration Test [CPT], gravity log, grab samples), as described in **Section 6.1.3.2** and **Table 6-1**.

In the Scottish TS AoI, geophysical data collected by EGS as part of the CRS for the Aurora Project (EGS, 2024) were analysed, and included MBES and SSS, which were also ground-truthed by geotechnical data, and cross-referenced with alignment charts which gave detailed descriptions of the seabed at each rock placement activities location. It is important to note that the quality of the data collected in the UK EEZ was variable and, therefore, the interpretations made were based on best judgement, and experience working with similar data on other projects.

Mobile bedforms are indicators of sediment mobility; areas with high sediment mobility are more prone to significant scour. Although the CRS for the Aurora Project (EGS, 2024) identified potentially mobile bedforms, which were described as megaripples within the Scottish TS (indicating the potential presence of bottom currents within the region), analysis of newly acquired bathymetry and SSS data (EGS, 2024) showed that at each AoI, there was a notable absence of large bedforms (>5 m), with small-scale ripples being identified at some locations. Potential minor localised scouring was identified at some locations where previous infrastructure had been surface laid, e.g. at the Frigg to St Fergus cable crossing rock placement activities location. This potential scouring presented as abrupt, but minor, increases in bathymetry (approximately 0.30 m deep), running parallel to this infrastructure for lengths of approximately 60 m.

SSS data also showed that although several boulders were identified within each AoI at all locations. There was an absence of outcropping bedrock, with seabed substrate being composed of Holocene sediments of varying types. Detailed information based on the interpretation of geophysical and geotechnical data at each rock placement activities location is shown in **Table 6-2**.

**TABLE 6-2 INTERPRETATION OF SEABED FEATURES AT EACH ROCK PLACEMENT ACTIVITES
LOCATION BASED OFF GEOPHYSICAL DATA**

Location	Boulders Within 250 m (Y/N)	Bedrock Identified Within 250 m (Y/N)	Bedforms Within 250 m (Y/N)	Seabed Ripples Identified (Y/N)	Evidence of Minor Scouring	Seabed Substrate
Shetland HVDC Link	Y	N	N	Y	N	Very loose to medium dense gravelly SAND with mega-ripples
Shetland Island Gas Export System (SIRGE)	N	N	N	Y	N	Slightly gravelly silty SAND
Brent A to St. Fergus (FLAGS)	N	N	N	N	Y	Loose to medium dense SAND/ very low to medium strength SILT/CLAY
Vesterled Pipeline	N	N	N	N	Y	Extremely low to low strength SILT/CLAY
Frigg to St. Fergus 1	Y	N	N	N	N	Extremely low to low strength SILT/CLAY
Scottish Area Gas Evacuation (SAGE)	Y	N	N	Y	N	Extremely low to low strength SILT/CLAY
Devenick to East Brae	N	N	N	N***	Y**	Extremely low to low strength SILT/CLAY
Bruce to Forties	Y	N	N	Y	N	Very loose to loose SAND with Gravel

NOTE:

** Possible previous rock placements also interpreted on SSS data.

*** Area of gas seepage Identified on Alignment Charts.

Source: EGS, 2024

6.1.4 IMPACT ASSESSMENT

Geophysical and geological data, alongside publicly available data and scientific literature, were investigated to establish an understanding of the baseline environment in the marine physical processes Study Area (**Section 6.1.2**). These data are used to assess the potential resultant effects that may occur on marine physical processes within the Study Area as a direct result of the pre- and / or post-installation rock placement activities associated with the Aurora Project.

This assessment follows the Aurora Project EA methodology, which, along with definitions for both 'impacts' and 'effects' as they relate to the Aurora Project, can be found and described in detail in **Section 5** of this report.

6.1.4.1 POTENTIAL IMPACTS

The assessment of potential impacts will focus on potential changes to the marine physical processes that may arise during the pre- and / or post-installation rock placement activities associated with the Aurora Project, as outlined in **Section 4.3**.

During the rock placement activities, potential impacts on marine physical processes within the Study Area may include:

- Changes to seabed or coastal morphology due to the rock placement activities;
- Increased SSC;
- Changes to the sediment transport system due to rock placement activities; and
- Changes to the wave regime or oceanic currents due to the rock placement activities.

It is important to note, that although no sensitive marine physical processes receptors exist within the marine physical processes Study Area, it is possible that any changes to such processes may act as pathways to further potential effect receptors in other topics within **Section 6**. Any instances of this occurring will be considered and assessed in their respective sections of this report.

Pre- and / or post-installation rock placement activities associated with the Aurora Project will be conducted by one (1) vessel at eight (8) locations over 14 days across six (6) months. Once installed this will consist of a combined total footprint of between 5,716.8 m² to 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²). Once the rock placement activities are completed, it is also important to note that there will be no further disturbance to the seabed.

6.1.4.2 IMPACT ASSESSMENT

The assessment of the impacts outlined in **Section 6.1.4.1** is presented in **Table 6-3**.

TABLE 6-3 IMPACT ASSESSMENT FOR PHYSICAL PROCESSES

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
Changes to seabed morphology	Rock placement activities have the potential to affect the morphology of the seabed. Changes to seabed morphology can include, but are not limited to, the migration of sediment through scour which may in turn affect the bathymetry of the seabed; the alteration of bedforms and naturally occurring features, e.g. the rock placement activities through or across subaqueous dunes, glacial moraines etc.; or the creation of features that would not otherwise naturally occur. Analysis and interpretation of the CRS geophysical data (EGS, 2024) showed that at each AoI in both the Scottish TS and UK EEZ, there was a notable absence of bedforms, or other features that could be considered sensitive to works that may be carried out during the rock placement activities associated the Aurora Project. Additionally, the absence of notable bedforms may indicate limited sediment mobility, which in turn may mean low sensitivity to scour. Prior to the rock placement activities, no interference to the seabed e.g., grapnel runs, boulder clearance etc., will be conducted, with works being limited to a video survey as outlined in Section	As described in Section 4 of this report, the pre- and / or post- installation rock placement activities will occur at eight (8) locations covering a combined total footprint of between 5,716.8 m² and 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²). This represents a small fraction of the AoI as designated by the 15 km buffer zone that was placed around each rock placement activities location. Furthermore, once installed, the rock berm itself will cover a small footprint at each location and will be laid perpendicularly (Table 4-2, Figure 4-5). Although minor scour is evident at locations within the marine physical processes Study Area, this has minor potential effect on the overall morphology of the seabed; therefore, due to this small footprint, and lack of notable bedforms or geomorphic features, the magnitude of changes to the seabed can be considered Low.	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	4.3.1 of this report. Similarly, during the rock placement activities, the use of a FFPV allows the rocks to be placed at the seabed in a controlled manner. These factors, coupled with the absence of sensitive seabed features as receptors allows the sensitivity to be Negligible .					
Changes to coastal morphology	Rock placement activities have the potential to affect the morphology of the coastline. However, there is no coastline within the 15 km AoI at any rock placement activities location in either the Scottish TS or UK EEZ, and the use of a FFPV will allow the rocks to be placed at the seabed in a controlled manner. Given the distance of the coastline from the rock placement activities, and the methodologies proposed, the sensitivity of the coastal morphology is Negligible .	As described in Section 4 of this report, the pre- and / or post-installation rock placement activities will occur at eight (8) locations that represent a small fraction of the combined AoI as designated by the 15 km buffer zones that were placed around each rock placement activities location. Due to the absence of coastline in any of the rock placement activities AoI, and the small footprint of the rock placement activities itself, the magnitude of changes to the morphology of the coastline can be considered Negligible .	Negligible	Not Significant	None Required	Not Significant
Increased SSC	Pre- and / or post-installation rock placement activities associated with the Aurora Project may act as the sources for potential increases in the SSC within the AoI. During the pre- and /or post-installation rock placement activities, a minor increase in SSC	As described in Section 4 , the pre- and / or post-installation rock placement activities will occur at eight (8) locations covering a combined total footprint of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	beyond background levels is probable, due to fine sediment being deposited at the seabed. Although freshly crushed Norwegian granite, composed of 1" - 3" or 1" - 5" rock mix, is being utilised during rock placement activities, it is likely that small amounts of fine-grained sediment, generated during the crushing process, will also be deposited into the water column, close to the seabed, along with the larger clasts. Increases in SSC may also arise from the mobilisation of <i>in situ</i> finer sediments from the seabed during the rock placement activities, e.g. muds / clays found at some locations, however, due to the composition of the substrate across much of the AoIs (Table 6-1), it is expected that SSC increases would be limited, spatially restricted, and should be re-dispersed and deposited after a short period of time by ocean currents. Changes in SSC are not associated with a sensitive physical environment receptor. Therefore, the sensitivity is Negligible. Changes in water quality associated with changes in SSC are assessed separately in Section 6.8 (WFD and Environmental Quality).	0.006 km² to 0.009 km²). This represents a small fraction of the AoI as designated by the 15 km buffer zone that was placed around each rock placement activities location. Furthermore, once installed, the rock berm itself will cover a small footprint and will be laid perpendicularly (Figure 4-5). These dimensions outlined in Table 4-2 conclude that the rock placement activities will have a small footprint on the seabed; therefore, it is predicted that the spatial area that may be affected SSC will also be minimal. Sediment plumes that may be generated during rock placement activities are also expected to be temporary, localised (due to the small scale of seabed disturbed), and are likely not to travel further than 9.9 km in the realistic worst-case scenario (See Section 6.8), settling within 1 – 2 tidal cycles. Coarse grained sediments are also likely to settle and be re-deposited on the seabed proximal to the rock placement activities locations and will therefore not travel significant distances in the				

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
		water column; thus, leaving only finer grained sediments in suspension (clays, muds etc.), which are expected to fall out of suspension after a short time. Taking into account the composition of the seabed substrate, the spatially and temporally restrictive nature of the sediment plume, and footprint of the rock placement activities, the magnitude of increased SSC are considered to be Low .				
Potentially localised scour effects from rock placement activities on the seabed	The sediment transport system is controlled by factors including the availability of mobile sediments (e.g. sand, silt/clay), and favourable hydrodynamic conditions (e.g. tidal or oceanic currents sufficient to mobilise such sediments). Often, works carried out during large scale offshore infrastructure projects, can result in unfavourable changes to one or more of the above factors, such as increased sediment suspension, higher rates of sediment loss (scour), or new areas of sediment deposition. Once installed, the rock berms will form an elevated surface around which currents can flow. In such conditions, the altered hydrodynamics can have the potential effect of removing	The potential effects of scouring at the rock placement locations during both the pre- and / or post-installation rock placement activities associated of the Aurora Project is likely to be localised and spatially restricted. Scour typically occurs at specific locations, e.g. the edges or margins of rock berm, and is therefore likely to impact an area within the AoI not greater than a few metres. Although the presence of existing potential scour was identified in several AoIs, the impact to the bathymetry was minimal, therefore suggesting that the removal of sediment was minor.	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	sediment from the edges, corners or margins of rock berm, thus resulting in scouring. Analysis and interpretation of geophysical data (EGS, 2024) suggested that at several rock placement activities locations, evidence of minor scouring exists along the edges of previously installed pipelines, which manifested as subtle changes in bathymetry (approximately 0.30 m) to the sides of such structures (Table 6-2). The presence of ripples at several locations also suggest that these locations are hydrodynamically active, although modelled and measured velocities are not considered to be high (noting limited local time series). Based on these interpretations, and the presence of very localised minor potential existing scour at several locations, the sensitivity of the seabed to localised scouring is considered to be Low .	Furthermore, due to the low profile of the rock berms themselves having a total height between 0.6 - 0.8 m in the Scottish TS, or 0.8 m - 2.8 m in the UK EEZ, and a slope of 1:3, they are not likely to significantly alter the hydrodynamics of the area, therefore it is expected that scouring will remain minimal and local. Based on the above factors, the magnitude of the potential effects of scour on the seabed are considered Low .				
Changes to Sediment Transport Pathways	The rock placement activities can result in minor or localised re-routing of oceanic currents, which in turn can see an increase in sediment scour, the unplanned accumulation of sediment, or a change in the overall concentration of sediment being transported. There is limited evidence of seabed mobility within the AoIs	The rock placement activities in the Scottish TS and UK EEZ are not likely to affect the magnitude of sediment being transported through the AoI, as the volume of available mobile sediment, coupled with the makeup of the seabed substrate (Table 6-1) suggest that even should erosive scour occur at	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	and limited available mobile sediments. The pathways in themselves are not considered to be sensitive receptors, therefore the sensitivity of sediment transport pathways can be considered Negligible .	the newly installed rock berm contribute sediment to the transport system, it would not be of a high enough volume to affect the concentration of sediment in a meaningful way, therefore the magnitude can be considered Negligible .				
Changes to the Wave Regime	Offshore infrastructure works in shallow water have the potential to temporarily affect the wave regime, however, in this case, the water depths across the marine physical processes Study Area are such that any localised changes that may occur to the seabed, for example, the relief added by the rock placement activities, will not be sufficient to alter the wave regime. Analysis of MBES data (EGS, 2024), showed that the water depths at the rock placement locations are between 113.84 m and 136.18 m (Section 6.1.3.1, Appendix E). These depths, coupled with the planned height of the rock berm (0.6 - 0.8 m in the Scottish TS, and 0.8 m - 2.8 m in the UK EEZ), mean that the rock placement activities would not pose a significant enough of an obstruction in deep water to instigate a change to the wave regime. There are no receptors that are sensitive to changes in	The height of the rock berms (0.6 - 0.8 m in the Scottish TS, and 0.8 m - 2.8 m in the UK EEZ) and overall footprint of the rock placement activities in the Scottish TS and UK EEZ, and the depth of the water at these locations, mean that the rock berm is unlikely to be at a large enough scale to affect the wave regime at each rock placement activities location. As there are no nearshore, or shallow locations where protections are being installed, the magnitude of changes to the wave regime can be considered Negligible .	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	the wave regime, therefore the sensitivity can be considered Negligible.					

6.1.5 ASSESSMENT SUMMARY

The potential effects on marine physical processes were assessed for the pre- and /or post-installation rock placement activities associated to the Aurora Project. The impacts considered include: the morphology of the seabed or coastline, an increase in SSC, changes to the sediment transport system itself, and changes to the wave regime or oceanic currents. Given the depth of the water at the rock placement activities locations, the coarse nature of the substrate and absence of significant mobile sediment, any changes to marine physical processes are likely to be temporary, extremely localised and temporally short.

In conclusion, the **Negligible** to **Low** sensitivity for all receptors, combined with the **Negligible** to **Low** magnitude, results in an overall **Negligible** risk, therefore the overall potential effects on marine physical processes are considered to be **Not Significant**, and no additional mitigation is proposed.

6.2 BENTHIC ECOLOGY

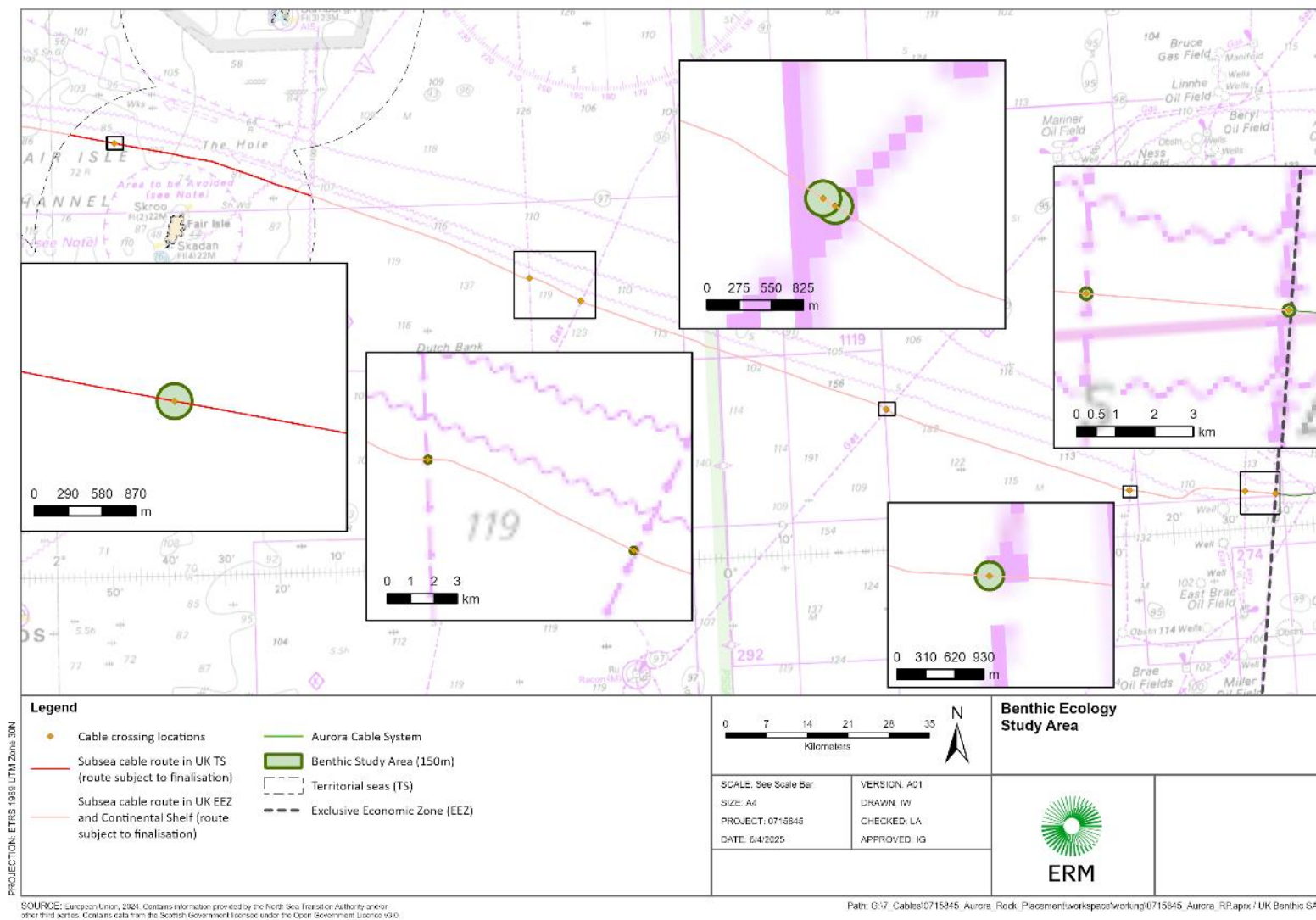
6.2.1 INTRODUCTION

This section will assess the potential effects of the pre- and / or post-installation rock placement activities on benthic ecology. The subsea cable traverses between Orkney and the Shetland Islands, passing through the UK EEZ and the Scottish TS, as presented in **Figure 6-4**.

6.2.2 BENTHIC ECOLOGY STUDY AREA

The benthic ecology Study Area has been primarily defined as comprising the footprints of the eight (8) pre- and post-rock placement locations along the subsea cable route. In order to consider potential secondary effects, such as localised increases in SSC, scour effects, and sediment disturbance, a 150 m buffer has also been applied around each location. **Figure 6-4** shows the regional benthic ecology Study Area that encompasses all eight (8) rock placement locations across the UK EEZ and the Scottish TS, and their associated individual 150 m buffers.

FIGURE 6-4 BENTHIC ECOLOGY REGIONAL STUDY AREA AND CABLE / PIPELINE CROSSING LOCATIONS FOR THE PRE- AND POST- INSTALLATION ROCK PLACEMENT



6.2.3 BASELINE ENVIRONMENT

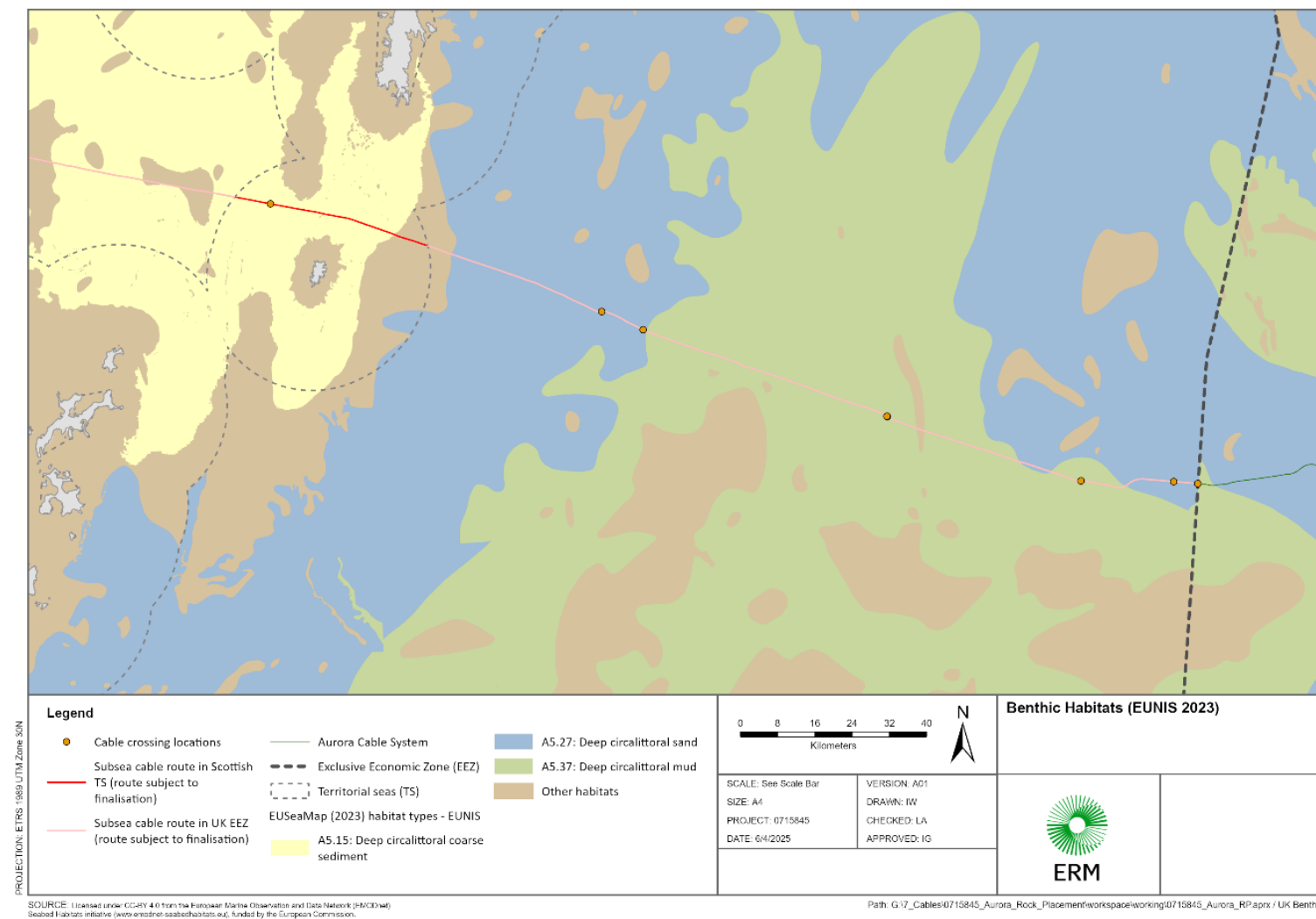
In the UK EEZ, the subsea cable route and associated pipeline crossings are predicted to predominantly overlap deep circalittoral mud habitat (A5.37), as well as areas of deep circalittoral sand (A5.27). The single power cable crossing location within the Scottish TS of the Study Area is predicted to overlap deep circalittoral coarse sediment (A5.15) (**Figure 6-5**).

Within the benthic ecology Study Area overlapping the UK EEZ, the deep circalittoral mud habitats of the subsea cable crossing locations may be expected to be typically dominated by polychaete worms, and also characterised by high densities of infaunal bivalves (e.g. *Thyasira* spp.), as well as echinoderms and foraminifera (EUNIS, 2019a). By comparison, deep circalittoral sand has very little known about these habitats, although they are reported to be more stable than shallower areas, and often characterised by a diverse range of polychaetes, amphipods, bivalves, and echinoderms (EUNIS, 2019b).

Within the Scottish TS of the Study Area, two (2) surveys were conducted in the region of the subsea cable route. In 2011, Marine Scotland Science (MSS) conducted the International Bottom Trawl Survey (IBTS) in Q3, and in 2010, the MSS / JNCC Scottish Marine Protected Area (MPA) Drop Down Video Survey was also conducted, in proximity to the subsea cable route (Goudge and Morris, 2014; JNCC, 2022). The most characteristic fauna recorded were polychaete worms, the bryozoan *Flustra foliacea*, and the horse mussel *Modiolus modiolus*. Scavenging species recorded included the decapods *Cancer pagurus* and *Munida rugosa*, and the heart urchin *Spatangus purpureus*, and predatory species including *Asterias rubens*, *Neptunea antiqua*, and *Crossaster papposus*.

From these surveys, species listed as Scottish PMFs were also identified (these are summarised below in **Section 6.2.3.1**).

FIGURE 6-5 BENTHIC ECOLOGY REGIONAL STUDY AREA AND THE SPATIAL DISTRIBUTION OF BIOTOPES OVERLAPPING THE SUBSEA CABLE CROSSING LOCATIONS



Source: Eunis, 2023

6.2.3.1 NATURE CONSERVATION

Designated Sites

There are no MPAs designated for benthic features located along, or in close proximity to the subsea cable route within the UK EEZ or Scottish TS at the subsea cable crossing locations (**Appendix B** and **Appendix C**).

Scottish Priority Marine Feature

A number of species listed as Priority Marine Features (PMFs) were identified from the 2010 and 2011 surveys in the Scottish TS (Goudge and Morris, 2014; JNCC, 2022):

- Fan Mussel *Atrina fragilis*;
- Northern feather star *Leptometra celtica*;
- Ocean quahog *Arctica islandica*; and
- European spiny lobster *Palinurus elephas*.

Of the PMF species listed above, ocean quahog *A. islandica* is predicted to occur across both the Scottish TS and UK EEZ, within the region of the subsea cable route. All others listed are distant, clustered around the coastal regions of the Shetland and Orkney Islands (Scottish Government, 2025).

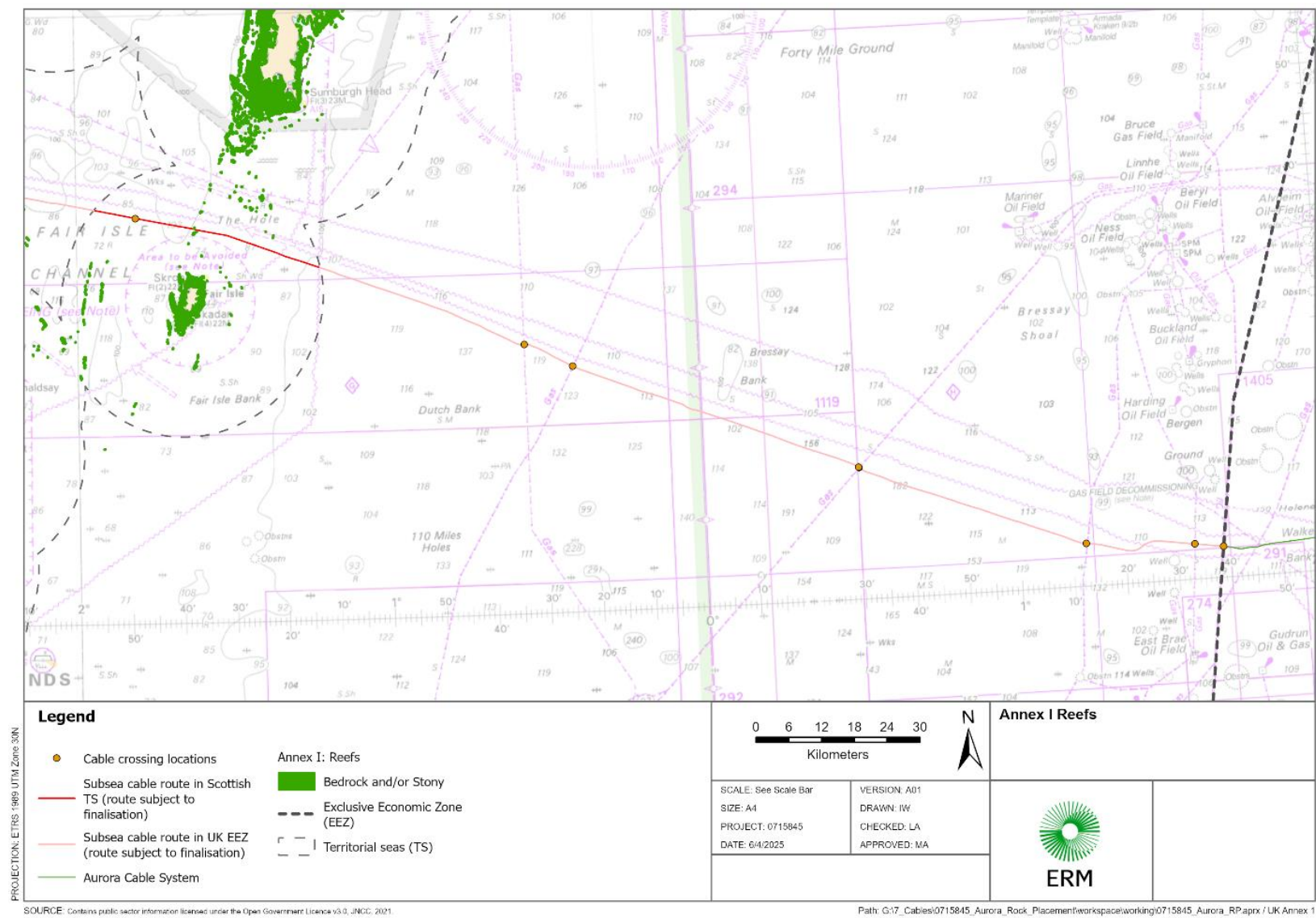
The biotope characterising the UK EEZ of the benthic ecology Study Area were A5.37 'deep circalittoral mud'. The biotope A5.37 'deep circalittoral mud' is considered a representative of the PMF 'Offshore Deep Sea Muds'. These offshore mud habitats can be characterised by the burrowing urchin *Brissopsis lyrifera*, brittlestar *Amphiura chiajei* and the Norwegian lobster *Nephrops norvegicus*. This habitat occurs below 20-30 m, and is extensive across many areas of Scottish waters, although predominantly in the northern and western offshore regions, and is one of the widest common deep-water habitats in the UK. (Tyler-Walters *et al*, 2016).

A5.27 'deep circalittoral sand' of the UK EEZ, and A5.15 'deep circalittoral coarse sediment' of the Scottish TS regions of the Study Area, are both considered representative habitats of the PMF 'Offshore Subtidal Sands and Gravels' (Tyler-Walters *et al*, 2016). This PMF is characterised by sand and gravel sediments. The offshore coarser sediments will support communities of polychaetes and small bivalves, while offshore fine to muddy sands will support tube building polychaetes, burrowing brittlestars, bivalves and hooded shrimp. The habitat also supports mobile predators of flatfish, starfish, crabs and hermit crabs. This PMF is widespread across all of Scottish offshore waters (Tyler-Walters *et al*, 2016).

Annex I Reef

Potential Annex I Reef (H1170), present as bedrock and stony reef is distributed spatially across the Scottish TS, near to the subsea cable route (**Figure 6-6**). Such features would potentially be sensitive to direct and indirect disturbance from rock placement activities. However, due to the distance between reef habitat, and the single crossing in the Scottish TS, this feature is not expected to be affected by the proposed pre- and / or post-installation rock placement activities.

FIGURE 6-6 SPATIAL DISTRIBUTION OF ANNEX I REEF (BEDROCK OR STONY)



6.2.3.2 RECEPTORS FOR ASSESSMENT

Overall, three (3) benthic ecology receptor groups are to be assessed. These are derived from the three (3) key biotopes and representative PMF habitats that are predicted to characterise the seabed overlapping the proposed pre- and / or post-installation rock placement locations of the subsea cable crossings.

- **Receptor Group 1:** Offshore Circalittoral Mud (PMF: Offshore Deep Sea Muds);
- **Receptor Group 2:** Offshore Circalittoral Coarse Sediment (PMF: Offshore Subtidal Sands and Gravels); and
- **Receptor Group 3:** Offshore Circalittoral Sand (PMF: Offshore Subtidal Sands and Gravels).

6.2.4 IMPACT ASSESSMENT

6.2.4.1 POTENTIAL IMPACTS

The proposed pre- and post-installation rock placement activities for the Aurora Project will potentially result in the following impacts to benthic ecology within the Study Area.

- Permanent habitat change/loss;
- Temporary increases in SSC and siltation;
- Potentially localised scour effects from rock placement on the seabed; and
- Introduction and spread of INNS.

The potential impacts have been assessed based on the worst-case parameters, as outlined within the Project Description (See **Section 4**), and in relation to benthic ecology.

Pre- and / or post-installation rock placement activities will be undertaken by a single vessel across the eight (8) locations of the UK EEZ and Scottish TS. The combined footprint of rock placement associated with the Aurora Project will range between 5,716.8 m² to 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²). The period of seabed disturbance will be localised to small individual areas at any one time. Following completion of the pre- and / or post-installation rock placement works for the Aurora Project, there will be no further disturbance to the seabed.

6.2.4.2 IMPACT ASSESSMENT

The assessment of the potential impacts outlined in **Section 6.2.4.1** is presented in **Table 6-4** for each receptor group.

The assessment of sensitivity for benthic ecology has been undertaken in accordance with the relevant Marine Evidence based Sensitivity Assessment (MarESA) reviews (Tyler-Walters *et al.*, 2023), and the Feature Activity Sensitivity Tool (FeAST) (NatureScot, 2025).

TABLE 6-4 IMPACT ASSESMENT FOR BENTHIC ECOLOGY

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
Permanent habitat change/loss	Receptor Group 1: Offshore Circalittoral Mud (PMF: Offshore Deep Sea Muds). Physical disturbance from the pre- / post-installation rock placement will lead to permanent habitat change / loss of benthic habitats. Sensitivity has been assessed using the review for the proxy level 5 biotope - A5.376 '<i>Paramphionome jeffreysii</i>, <i>Thyasira</i> spp. and <i>Amphiura filiformis</i> in offshore circalittoral sandy mud'. Sensitivity to permanent habitat change/loss is likely 'High' as it would lead to a change to physical character of the substratum, with recoverability considered to be low, and adaptability and tolerance considered to be none (De Bastos, 2016). Receptor Group 1 has a High sensitivity to permanent habitat change / loss.	Magnitude is determined as the maximum extent of seabed impact associated with pre- / post-installation rock placement activities that will directly impact the seabed. The total combined footprint of change/loss will range between 5,716.8 m² to 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²). In total, these combined areas cover an extremely low proportion of the total habitat present. Receptor Group 1 is very extensive regionally (Figure 6-5). Furthermore, the FFPV are dynamically positioned by Dynamic Positioning System (DPS), where the vessel will deliver rock material in a controlled manner to the seabed, via a flexible fall-pipe, thereby maintaining control over the resulting footprint extent of rock placement. Magnitude of potential effect has been considered Low for Receptor Group 1.	Minor	Not Significant	None Required	Not Significant
Permanent Habitat Change/Loss	Receptor Group 2: Offshore Circalittoral Coarse Sediment (PMF: Offshore Subtidal Sands and Gravels). Physical disturbance from the pre-/ post-installation rock placement activities at the one (1) location in	Magnitude of permanent habitat change / loss is determined as the maximum extent of seabed impact associated with the pre-/ post-installation rock placement activities that will directly impact the seabed. The total combined footprint extent of permanent habitat change/loss is	Minor	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	the Scottish TS (Figure 6-5), will lead to localised permanent habitat change / loss of the habitat. Sensitivity of the receptor has been derived from the biotope that best represents those taxa recorded in the benthic ecology Study Area of the Scottish TS – A5.151 '<i>Glycera lapidum</i>, <i>Thyasira spp.</i> and <i>Amythasides macroglossus</i> in offshore gravely sand' (Tillin and Watson, 2023). Direct placement of rock on this habitat, will locally alter the nature of the biotope, with a loss of the polychaete and bivalve community buried within the sediments. With a low recoverability, and no adaptability and tolerance to this impact, Receptor Group 2 has an assigned High sensitivity.	expected to be 5,716.8 m² to 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²), covering a very low proportion of overlap for all habitats. For Receptor Group 2 itself, this footprint is much smaller; the single crossing in the Scottish TS ranges between only 158.4 m²-270.4 m². Furthermore, the FFPV are dynamically positioned by DPS, where the vessel will deliver rock material in a controlled manner to the seabed, via a flexible fall-pipe, thereby maintaining control over the resulting footprint extent of rock placement. Magnitude of effect has been considered Negligible for Receptor Group 2.				
Permanent Habitat Change/Loss	Receptor Group 3: Offshore Circalittoral Sand (PMF: Offshore Subtidal Sands and Gravels). Physical disturbance from the pre-/post-installation rock placement activities will lead to the permanent habitat change / loss of benthic habitats. Sensitivity of offshore circalittoral sand has been derived from the biotope that best represents taxa expected to characterise these sediments – A5.272 '<i>Owenia fusiformis</i> and <i>Amphiura filiformis</i> in deep	Magnitude of permanent habitat change / loss is determined as the maximum extent of seabed impact associated with the pre-/post-installation rock placement activities that will directly impact the seabed. The total footprint extent of permanent habitat change/loss is expected to be 5,716.8 m² to 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²). In total, these areas cover an extremely small proportion of the total habitats present. Furthermore, the FFPV are dynamically positioned	Minor	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	circalittoral sand or muddy sand' (De-Bastos, 2023). Sensitivity of this habitat to permanent habitat change / loss is expected to be 'High' as it would lead to a localised change to the physical character of the substratum, where it has a very low recoverability, and adaptability and tolerance are considered to be none. Receptor Group 3 is considered to have a High sensitivity.	by DPS, where the vessel will deliver rock material in a controlled manner to the seabed, via a flexible fall-pipe, thereby maintaining control over the resulting footprint extent of rock placement. Receptor Group 3 itself has a very large regional extent (Figure 6-5), and, therefore, magnitude of potential effect is overall considered Low.				
Temporary increases in SSC and siltation	Receptor Group 1: Offshore Circalittoral Mud (PMF: Offshore Deep Sea Muds). Disturbance to seabed habitats associated with the placement of rock placement has the potential to mobilise sediments into the water column, therefore increasing SSC. Sensitivity has been assessed using reviews for the proxy level 5 biotope -A5.376 (De Bastos, 2016). This biotope is characterised by burrowing infauna (e.g. <i>Kurtiella bidentata</i> and <i>Thyasira</i> spp.) that are likely to be able to burrow through a 20 cm coverage of fine sediment, although coverage of >5 cm might temporarily lead to halting of feeding and respiration. Moreover, <i>Thyasira</i> spp. have highly extendable feet, enabling them to easily move and reborrow within	The pre- / post-installation rock placement works is unlikely to lead to elevated SSC and smothering rates, greater than those occurring naturally in the environment. This is due to the very small areas of habitat to be disturbed, and that it is expected that the placement of rock on the seabed, and thus risk of sediment suspension may be reduced through the controlled placement of rocks from the fall pipe. It will be occurring in discrete single events. While disturbance of finer sediments will likely disperse and extend beyond the 150 m buffer, this will be highly limited in volume, be temporary, and any potential effects highly reversible. There will be no prolonged exposure to risk from increases in SSC and deposition for Receptor Group 1 which is extensive in the region	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	sediments, away from a disturbance. Potential SSC increases and deposition will occur in discrete single events, unlikely to exceed pressure benchmarks. Furthermore, the habitat exhibits a very high recoverability due to the presence of burrowing infauna, and the adaptability and tolerance are considered to be high. Therefore, the sensitivity is Low .	(Figure 6-6). Magnitude is assessed as Negligible .				
Temporary increases in SSC and siltation	Receptor Group 2: Offshore Circalittoral Coarse Sediment (PMF: Offshore Subtidal Sands and Gravels). Disturbance to seabed habitats associated with the proposed works has the potential to mobilise sediments into the water column, and therefore, increase SSC. Sensitivity of offshore circalittoral coarse sediment has been derived from the level 5 biotope - A5.151 (Tillin and Watson, 2023). Characterising species (e.g. polychaete <i>G. lapidum</i> and <i>Thyasira</i> spp.) are considered tolerant of short-term increases in SSC and siltation. However, tolerance may be lower in areas where finer sediments settle, as these species are better adapted to coarser substrates. Despite this, the biotope is expected to exhibit high recoverability, given that any potential effects are likely to be	The post-installation rock placement occurring is unlikely to lead to elevated SSC and smothering rates greater than those occurring naturally in the environment. This is due to the highly localised spatial area in which the activities will occur in the Scottish TS (Figure 6-5). Disturbance of coarse habitats are unlikely to result in significant resuspension and dispersion, with deposition of sediments remaining local to the footprint of works. It will only occur in a single event across this habitat, as there is only a single crossing, and with no prolonged exposure occurring. The risk of sediment suspension may also be reduced through the controlled placement of rocks from the fall pipe. Magnitude is assessed as Negligible .	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	temporary. With medium tolerance and high recoverability, overall sensitivity of this receptor is assessed as Low .					
Temporary increases in SSC and siltation	Receptor Group 3: Offshore Circalittoral Sand (PMF: Offshore Subtidal Sands and Gravels). Disturbance to seabed habitats associated with the proposed works has the potential to mobilise sediments into the water column and therefore increase SSC. Sensitivity of the offshore circalittoral sand has been based on the biotope A5.272 (De-Bastos, 2023). Characterising species of this biotope are infaunal burrowers, likely to tolerate low levels of siltation (<5 cm). For instance, <i>Ophiura ophiura</i> are able to survive short term burial <32 days with less than 10% mortality of individuals. Overall, the biotope is considered to have a medium tolerance to temporary increases in suspended sediment and a high recoverability. Sensitivity has been assessed as Low.	The pre- / post-installation rock placement activities are unlikely to lead to elevated SSC and smothering rates greater than those occurring naturally in the environment. Pre- / post-installation rock placement and associated disturbance will occur on the seabed across very small areas, compared to the regional extent of this receptor (Figure 6-5). While disturbance and resuspension of these sandy habitats may result in dispersion extending beyond the 150 m buffer, such events will be highly infrequent, localised, and any effects temporary and reversible. The risk of sediment suspension may be reduced through the controlled placement of rocks from the fall pipe. Magnitude is assessed as Negligible .	Negligible	Not Significant	None Required	Not Significant
Potentially localised scour effects from rock placement	Receptor Group 1: Offshore Circalittoral Mud (PMF: Offshore Deep Sea Muds). Rock placement installed across the subsea cable crossing locations will	Localised scour of the seabed sediment around the edges of the rock berms is likely to occur due to altered hydrodynamic conditions. The extent of any impact is likely to be minimal due to the low-profile	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
on the seabed	be elevated above the seabed, and this may result in potentially localised scour effects in the surrounding habitat from changes in hydrodynamic regimes. As water flows over the berms it becomes turbulent and accelerated at the edges, leading to erosion of the seabed sediment. Scour causes potential effects such as lowering and abrasion of the surrounding habitats. Sensitivity of the Offshore Circalittoral Mud has been derived from the level 5 biotope - A5.376 (De Bastos, 2016). The biotope is characterised by burrowing infauna and so are afforded a degree of protection from potential effects of surface disturbance. However, bivalves require the surface for respiration and feeding, so this may be disrupted due to disturbance. The brittlestar <i>A. filiformis</i> also extend their arms to feed which may become vulnerable to damage by abrasion, however, it has been shown they can be resistant to damage and are capable of regeneration. Surface populations will suffer direct mortality and injury for some individuals. As the biotope is comprised of fine sediment, this will slow the recovery process. The biotope is assessed as having medium tolerance, but low	dimension of the berms (height: 0.8 m to 2.8 m, slope: 1:3). Whilst exposure is long-term, impacts at the subsea cable crossing locations are likely to only occur within 5 m of the rock berms, therefore, potential spatial effect is minimal in consideration of the extent of this receptor (Figure 6-5). Overall, magnitude is considered Negligible.				

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	recoverability. Therefore, overall sensitivity is assessed as Medium .					
Potentially localised scour effects from pre- / post-installation rock placement on the seabed	Receptor Group 2: Offshore Circalittoral Coarse Sediment (PMF: Offshore Subtidal Sands and Gravels). Rock placement installed across the subsea cable crossing locations will be elevated above the seabed, and likely to cause scour effects in the surrounding habitat due to changes in hydrodynamic conditions. As water flows over the berms it becomes turbulent and accelerated at the edges, leading to erosion of the seabed sediment. Scour causes potential effects such as lowering and abrasion of the surrounding benthic habitats. Sensitivity of offshore circalittoral coarse sediment has been derived from the level 5 biotope - A5.151 (Tillin and Watson, 2023). Potential effects of abrasion on the surface sediments reduce abundances, biomass, and diversity. However, opportunistic species are likely to become prevalent in disturbed areas as they are able to recolonise quickly. With a greater resilience in infaunal community, they have the capacity to recover rapidly, so recovery is assessed as high, while tolerance is medium. Overall, sensitivity is Low.	Localised scour of the seabed sediment around the edges of the berms can occur due to altered hydrodynamic conditions. The extent of impact is likely to be minimal due to the low-profile dimension of the rock berms at the single subsea cable crossing (height: 0.6 m – 0.8 m, slope: 1:3). Whilst exposure will be long-term, any potential impact is likely to occur only within 5 m of the rock berms, and at only the single power cable crossing in the Scottish TS. Potential spatial effects are likely to be highly localised considering the extent of the receptor in the region (Figure 6-5). Overall, magnitude is Negligible.	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
Potentially localised scour effects from pre- / post-installation rock placement on the seabed	Receptor Group 3: Offshore Circalittoral Sand (PMF: Offshore Subtidal Sands and Gravels). Rock placement installed across crossing locations will be elevated above the seabed, and may cause potential scour effects in the surrounding habitat, due to changes in hydrodynamic conditions. As water flows over the berms it becomes turbulent and accelerated at the edges, leading to erosion of seabed sediments. Scour causes potential effects such as lowering and abrasion of the surrounding benthic habitats. Sensitivity of offshore circalittoral sand has been based on the level 5 biotope A5.272 (De-Bastos, 2023). There are numerous burrowing species within the habitat that can avoid this disturbance, however, a proportion of the population is likely to be damaged or removed; reducing densities. <i>A. filiformis</i> rely upon extending their arms to feed, and are sensitive to potential effects of abrasion, with potential for loss of, or damage, although they are able to regenerate. The soft, unconsolidated nature of the sediments may exacerbate potential scour effects, as fine sands are easily displaced and resuspended. As the fine sand material may become more easily displaced and	Localised scour of the seabed sediment around the edges of the berms is likely to occur due to altered hydrodynamic conditions. The extent of the impact is likely to be minimal due to the low-profile dimension of the berms (heights: 0.8 m - 2.8 m, slope: 1:3). Whilst exposure is long-term, the impact is likely to be highly localised, only occurring within 5 m of the rock berms, so any potential spatial effect is minimal considering the extent of the receptor in the region (Figure 6-5). Overall, magnitude is considered Negligible.	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	resuspended, this may lead to greater potential effects of sediment instability and extended recoverability. The receptor has a medium tolerance and a low recoverability and is assessed as Medium .					
Introduction and spread of INNS	Receptor Group 1: Offshore Circalittoral Mud (PMF: Offshore Deep Sea Muds). The introduction and spread of INNS within the habitat may lead to ecological disturbance. INNS can be introduced via project vessels during offshore operations, or through the introduction of artificial hard substrate during rock placement activities on the seabed. If INNS become established, they may disrupt the structure and function of the habitat, often disrupting trophic dynamics and leading to long-term impacts on biodiversity. The sensitivity of the Offshore Circalittoral Mud has been derived from the level 5 biotope - A5.376 (De Bastos, 2016). Although, there is no known record of introduction of INNS in this biotope, it will likely have a medium tolerance and low adaptability to INNS burrowing species of polychaete, bivalve or amphipod. Therefore, it is precautionary assessed as Medium.	The introduction and spread of INNS via vessel and rock placement activities is considered highly unlikely. The International Maritime Organisation (IMO) International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted 2004, came into force 2017) requires ballast water to be treated and discharged in compliance with international guidelines. The spatial area of the rock placement is very small (approximately 0.006 km² to 0.009 km²) in relation to the rest of the Offshore Circalittoral Mud habitat. Furthermore, the risk of spread and establishment of INNS is very low as there is limited hard substrate across the habitat, thus preventing colonisation. Finally, the material to be used for the rock placement is freshly crushed Norwegian granite, which will minimise contamination risks for environmentally sensitive areas of the seabed. Overall, the magnitude has been assessed as Negligible.	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
Introduction and spread of INNS	Receptor Group 2: Offshore Circalittoral Coarse Sediment (PMF: Offshore Subtidal Sands and Gravels). The introduction and spread of INNS within the habitat may lead to ecological disturbance. INNS species can be introduced via project vessels during offshore operations, or through the introduction of artificial hard substrate during rock placement activities on the seabed. If INNS become established, they may disrupt the structure and function of the habitat, often disrupting the trophic dynamics and leading to long-term impacts on biodiversity. The sensitivity of the Offshore Circalittoral Coarse Sediment has been derived from the level 5 biotope - the level 5 biotope - A5.151 (Tillin and Watson, 2023). The coarse substrate of the A.151 biotope means that it is thought to be too mobile for colonisation and therefore, unsuitable for most invasive species recorded in the UK. Although, the slipper limpet <i>Crepidula fornicata</i> does have a preference for gravelly habitats and could colonise this coarse habitat (Tillin and Watson, 2023). <i>C. fornicata</i> has the potential to lead to the loss of the biotope due to modification of the community	The introduction and spread of INNS via vessel and rock placement is considered highly unlikely. The IMO International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted 2004, came into force 2017) requires ballast water to be treated and discharged in compliance with international guidelines. The spatial area of the rock placement is very small (approximately 0.006 km² to 0.009 km²) in relation to the rest of the Offshore Circalittoral Coarse Sediment habitat. Furthermore, the risk of spread and establishment of INNS is very low as there is limited hard substrate across the habitat, thus preventing colonisation. Finally, the material to be used for the rock placement is freshly crushed Norwegian granite which, will minimise contamination risks for environmentally sensitivity areas of the seabed. Overall, the magnitude has been assessed as Negligible.	Minor	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	and habitat via the introduction of <i>C. fornicata</i> shell biomass, silt, pseudofaeces and faeces (Tillin <i>et al.</i>, 2020). However, it is noted that this species has a limited distribution currently in Scottish waters compared to southern regions of the UK (NBN Atlas, 2025). The receptor has a low tolerance and a low recoverability and is assessed as High.					
Introduction and spread of INNS	Receptor Group 3: Offshore Circalittoral Sand (PMF: Offshore Subtidal Sands and Gravels). The introduction and spread of INNS within the habitat can lead to ecological disturbance. INNS can be introduced via project vessels during offshore operations, or through the introduction of artificial hard substrate during rock placement activities on the seabed. If INNS become established, they may disrupt the structure and function of the habitat, often disrupting the trophic dynamics and leading to long-term impacts on biodiversity. The sensitivity of Offshore Circalittoral Sand has been based on the level 5 biotope A5.272 (De-Bastos, 2023). Although, there is no known record of introduction of invasive species into this biotope, it will likely have a	The introduction and spread of INNS via vessel and rock placement is considered highly unlikely. The IMO International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted 2004, came into force 2017) requires ballast water to be treated and discharged in compliance with international guidelines, preventing the spread of INNS. The spatial area of the rock placement is very small (approximately 0.006 km² to 0.009 km²) in relation to the rest of the Offshore Circalittoral Sand habitat. Furthermore, the risk of spread of INNS is very low as there is limited hard substrate across the habitat, thus preventing colonisation. Finally, the material to be used for the rock placement is freshly crushed Norwegian granite,	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	medium tolerance and low adaptability to INNS burrowing species of polychaete, bivalve or amphipod (De Bastos, 2023). Therefore, it is precautionary assessed as Medium .	which will minimise contamination risks for environmentally sensitive areas of the seabed Overall, the magnitude has been assessed as Negligible .				

6.2.5 ASSESSMENT SUMMARY

The potential impacts on benthic ecology associated with the pre- and / or post-installation rock placement activities at the subsea cable crossing locations are permanent habitat change/loss, temporary increases in SSC and siltation, potentially localised scour effects from rock placement on the seabed, and the introduction and spread of INNS. Whilst some impacts are long-term to permanent (e.g. habitat change/loss), they are all highly localised/of limited spatial extent within the benthic ecology Study Area.

In conclusion, the **Low** to **High** sensitivity for all receptors, combined with the **Negligible** to **Low** magnitude, results in an overall **Negligible** to **Minor** risk. The overall potential effect on benthic and ecology is considered to be **Not Significant**, and no additional mitigation is proposed.

6.3 FISH AND SHELLFISH ECOLOGY

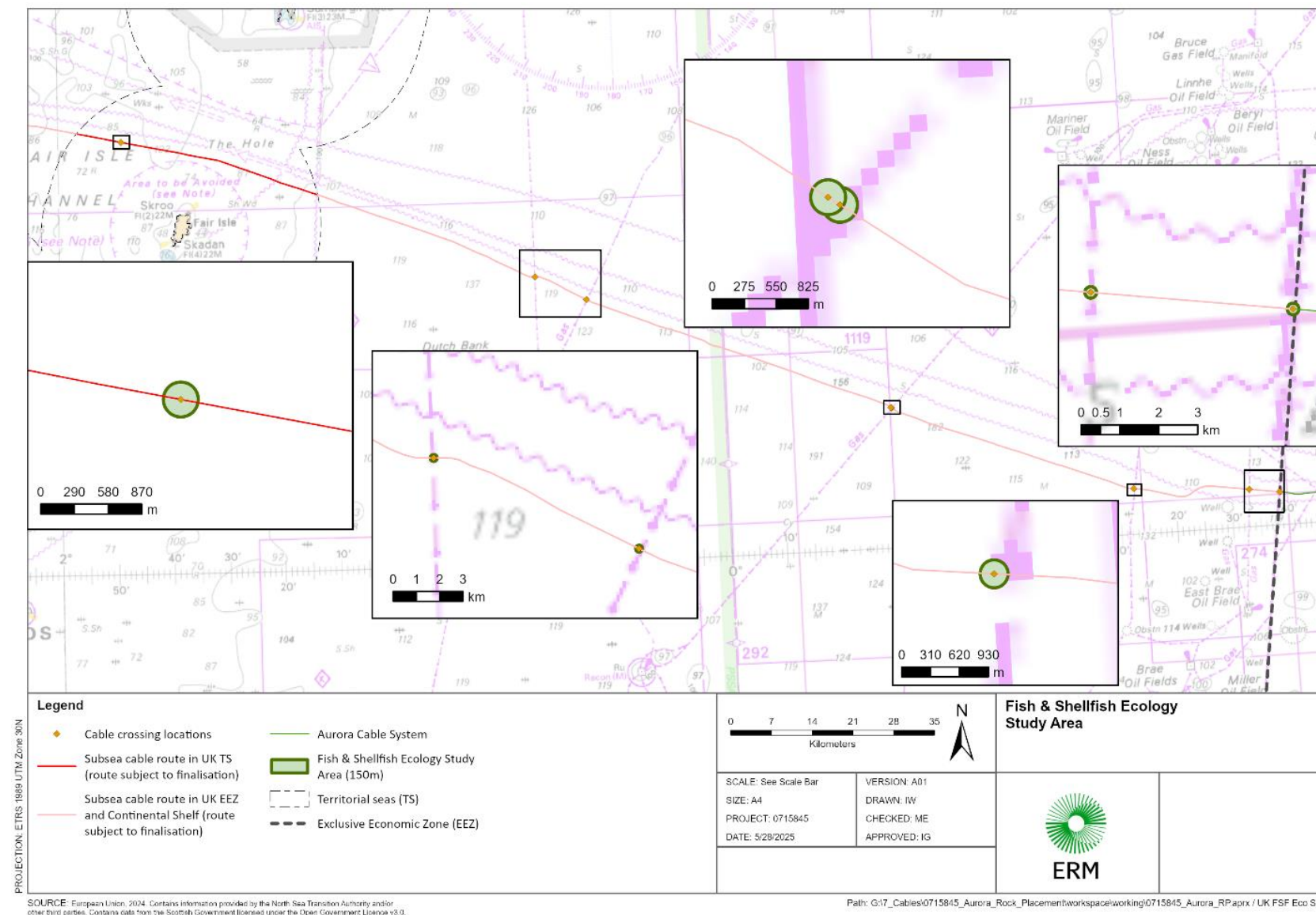
6.3.1 INTRODUCTION

This section will assess the potential effects of the pre- and / or post-installation rock placement activities on fish and shellfish ecology. The subsea cable traverses between Orkney and the Shetland Islands, passing through the UK EEZ and the Scottish TS, as demonstrated in **Figure 6-7**.

6.3.2 FISH AND SHELLFISH ECOLOGY STUDY AREA

The fish and shellfish ecology Study Area has been delineated around the direct footprint of the proposed pre- and / or post-installation rock placement locations along the subsea cable. It is extended beyond this to include a buffer area of 150 m within the Scottish TS and UK EEZ, as demonstrated in **Figure 6-7**. The rock placement locations are within the ICES statistical rectangles 47F0, 47F1, 47E9, 48E9, and 48E8. This report identifies the potential impacts to the fish and shellfish receptors within the Study Area.

FIGURE 6-7 FISH AND SHELLFISH ECOLOGY STUDY AREA



6.3.3 BASELINE ENVIRONMENT

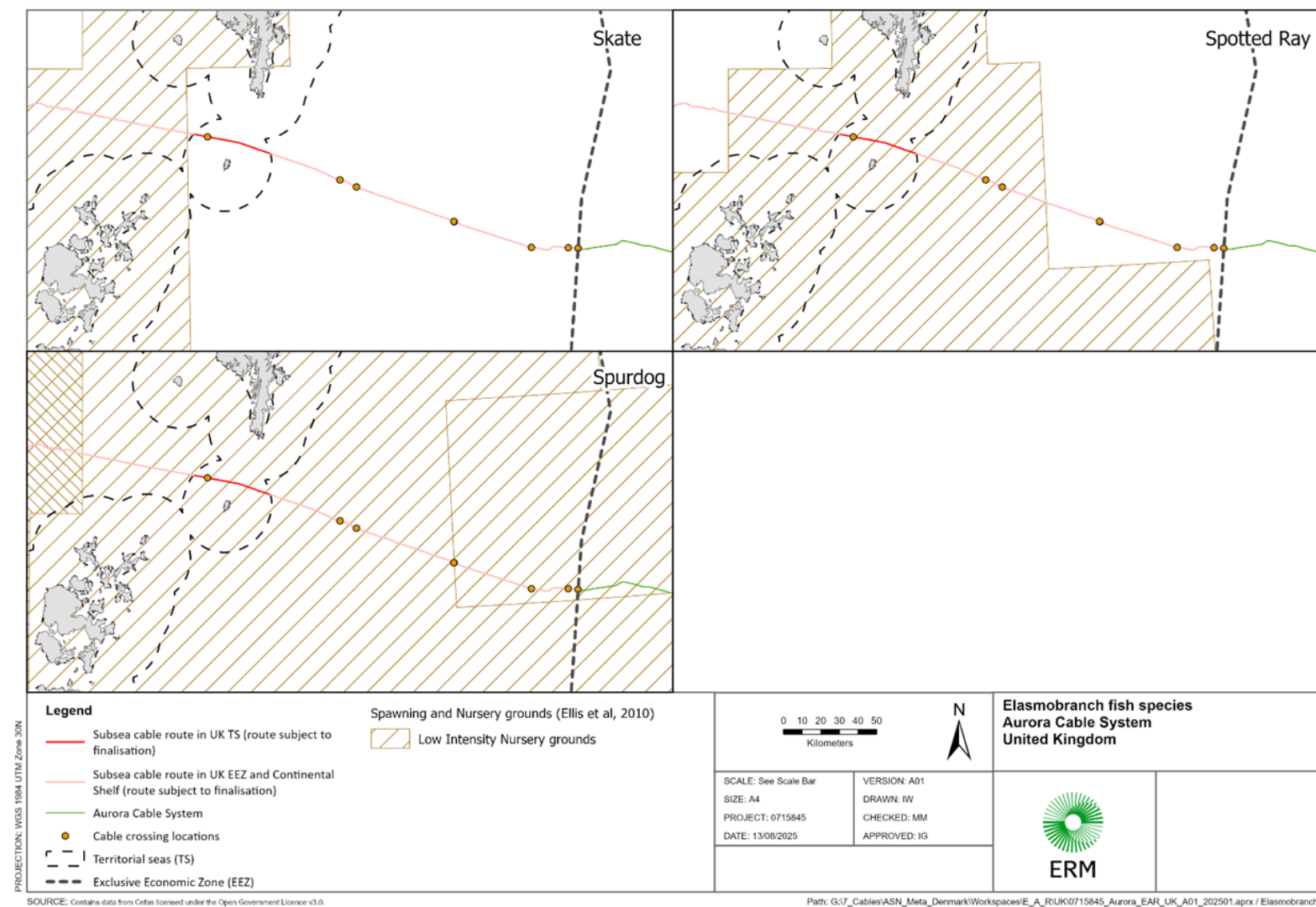
In order to determine the fish and shellfish ecology baseline of the Study Area, the Coasts and Seas of the United Kingdom reports for regions 1 (Shetland), 2 (Orkney), 3 (north-east Scotland: Cape Wrath to St Cyrus), and 15 and 16 (north-west Scotland: the Western Isles and west Highland) (JNCC, 1998) were used in addition to the known spawning and / or nursery grounds of elasmobranch, demersal and pelagic fish species as described in Coull *et al.*, (1998) and Ellis *et al.*, (2012).

The fish and shellfish ecology receptors used within this assessment can be categorised into five (5) groups:

- Elasmobranchs;
- Demersal fish;
- Pelagic fish;
- Shellfish;
- Migratory fish; and
- Sandeel / herring spawning grounds.

Elasmobranch species found to have nursery grounds along or within close proximity to the subsea cable route are common skate (*Dipturus batis*), spotted ray (*Raja montagui*) and spurdog (*Squalus acanthias*) (Coull *et al.*, 1998, Ellis *et al.*, 2012) (**Figure 6-8**). Furthermore, lesser spotted dogfish (*Scyliorhinus canicula*), thornback ray (*Raja clavata*) and cuckoo ray (*Raja naevus*) are important elasmobranch species which are likely to be present in the Study Area (JNCC, 1998). In addition, leafscale gulper shark (*Centrophorus squamosus*), gulper shark (*Centrophorus granulosus*) and Portuguese dogfish (*Centroscymnus coelolepis*) are present within the deeper waters of west Scotland, particularly within the West of Scotland MPA where they are a designated feature (JNCC, 2020). Elasmobranch species are slow growing, slow to reach reproductive maturity and long living. As such, elasmobranch populations are particularly vulnerable to anthropogenic impacts. Elasmobranch species spawn at various times of the year and have different diets and habitat preferences.

FIGURE 6-8 ELASMOBRANCH NURSERY GROUNDS

Source: Ellis *et al.*, 2012

Demersal fish found to have spawning and / or nursery grounds along or within close proximity to the subsea cable route are anglerfish (*Lophius piscatorius*), Atlantic cod (*Gadus morhua*), European hake (*Merluccius merluccius*), haddock (*Melanogrammus aeglefinus*) (**Figure 6-9**), common ling (*Molva molva*), sandeel *Ammodytidae* spp., whiting (*Merlangius merlangus*) and blue whiting (*Micromesistius poutassou*) (Coull *et al.*, 1998, Ellis *et al.*, 2012) (**Figure 6-10**). Furthermore, lemon sole (*Microstomus kitt*), Norway pout (*Trisopterus esmarki*), saithe (*Pollachius virens*), pollack (*Pollachius pollachius*), European plaice (*Pleuronectes platessa*), common dab (*Limanda limanda*), long rough dab (*Hippoglossoides platessoides*), dover sole (*Solea solea*), turbot (*Psetta maxima*), brill (*Scophthalmus rhombus*), megrim (*Lepidorhombus whiffiagonis*), witch flounder (*Glyptocephalus cynoglossus*), Atlantic halibut (*Hippoglossus hippoglossus*), European flounder (*Platichthys flesus*), conger eel (*Conger conger*) and gurnards *Triglidae* spp. are also likely to be present in the Study Area (JNCC, 1998).

Blue ling (*Molva dypterygia*), orange roughy (*Hoplostethus atlanticus*) and round-nose grenadier (*Coryphaenoides rupestris*) are also known to be present in the area. However, these fish species are only likely to be found within the deeper waters of west Scotland, particularly within the West of Scotland MPA where they are a designated feature (JNCC, 1998; JNCC, 2020). Demersal fish species are generally found close to or within the benthic environment and as such may be vulnerable to anthropogenic changes to that environment such as seabed sediment disturbance or the placement of infrastructure.

Pelagic fish found to have spawning or nursery grounds along or within close proximity to the subsea cable route are Atlantic herring (*Clupea harengus*), Atlantic mackerel (*Scomber scombrus*) and sprat (*Sprattus sprattus*) (Coull *et al.*, 1998, Ellis *et al.*, 2012) (**Figure 6-11**). Furthermore, horse mackerel (*Trachurus trachurus*) may be present along the subsea cable route (JNCC, 1998).

FIGURE 6-9 ANGLERFISH, COD, HAKE AND HADDOCK SPAWNING AND/OR NURSERY GROUNDS

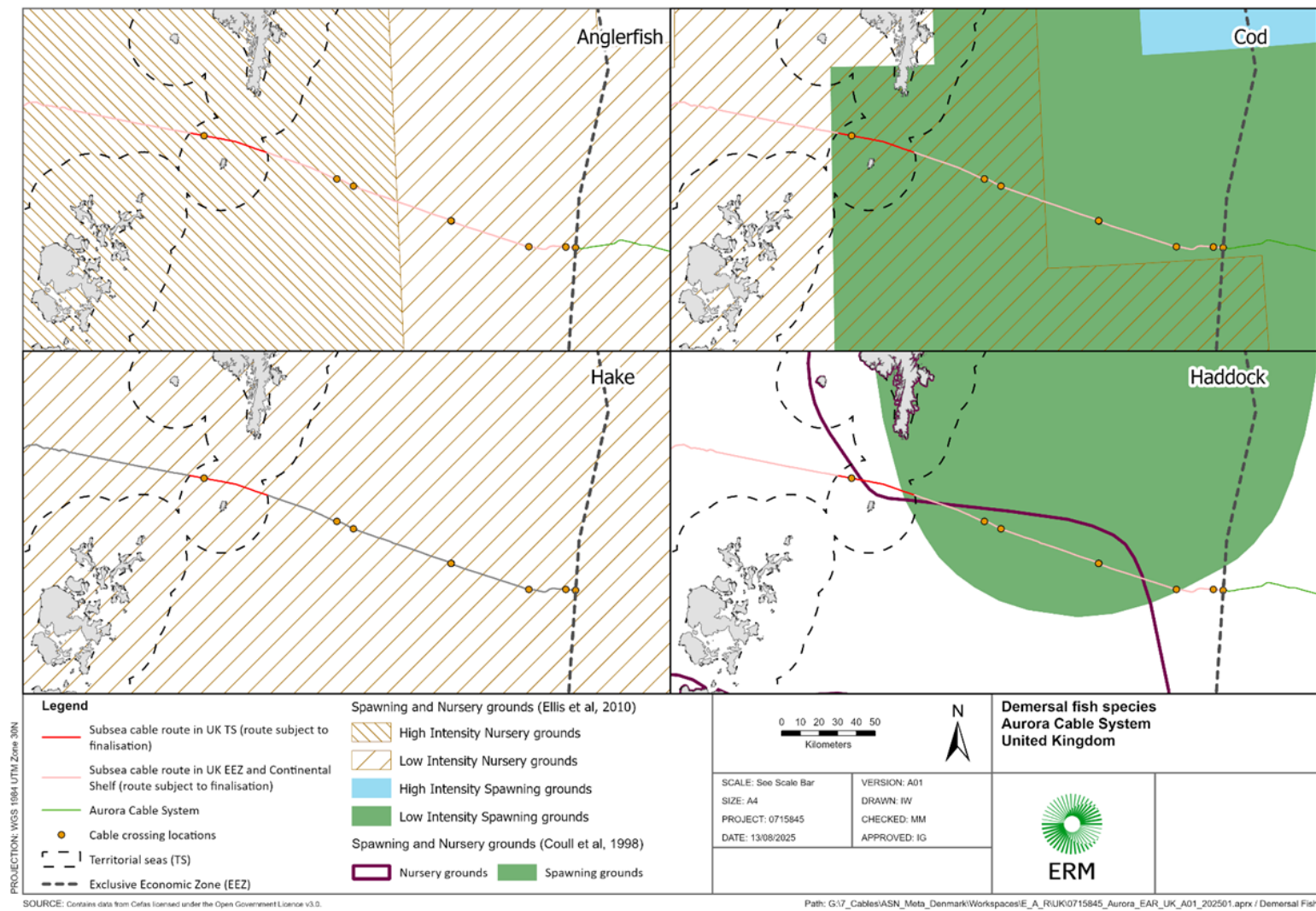
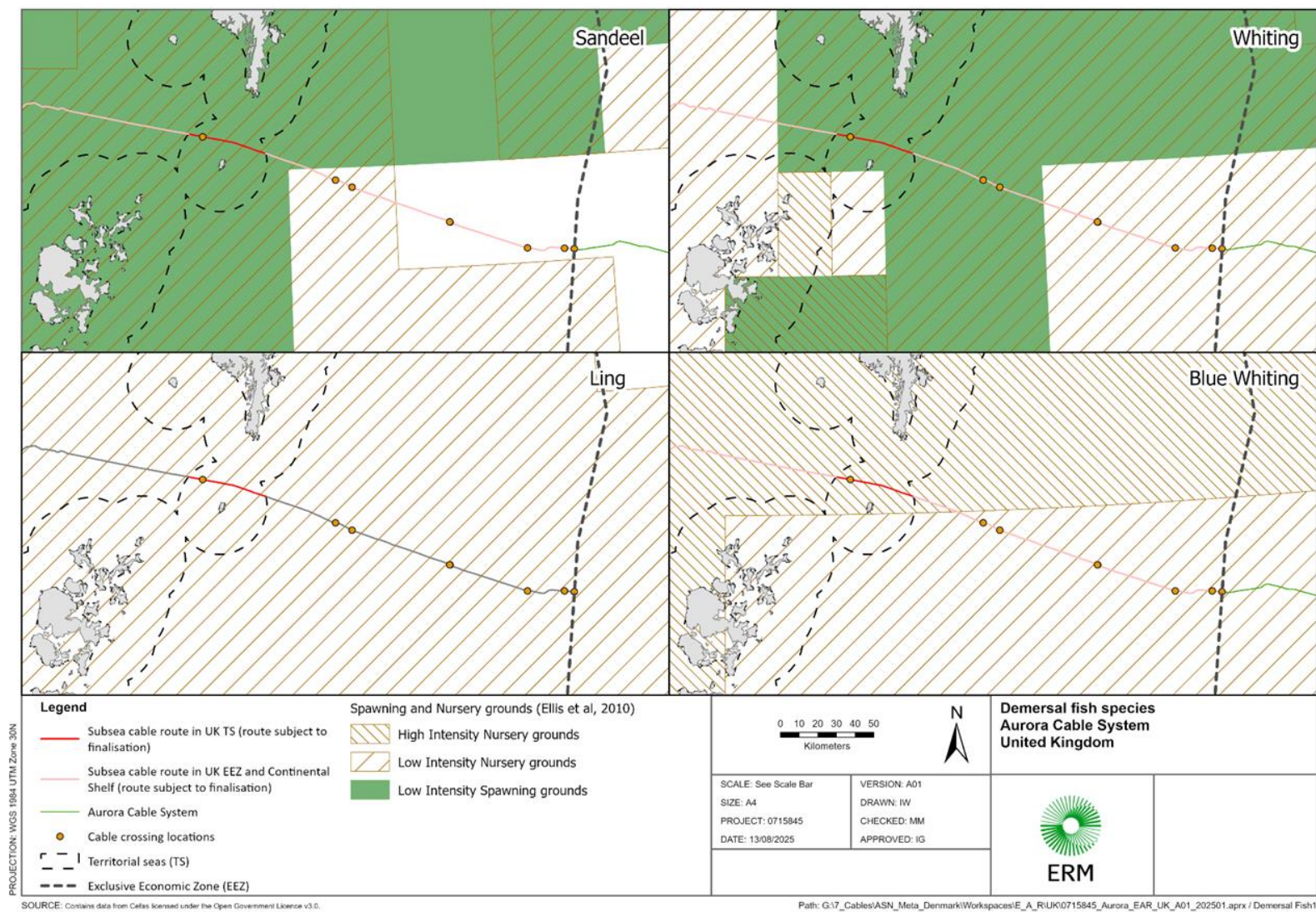
Source: Coull *et al.*, 1998, Ellis *et al.*, 2012

FIGURE 6-10 SANDEEL, WHITING, LING AND BLUE WHITING SPAWNING AND/OR NURSERY GROUNDS



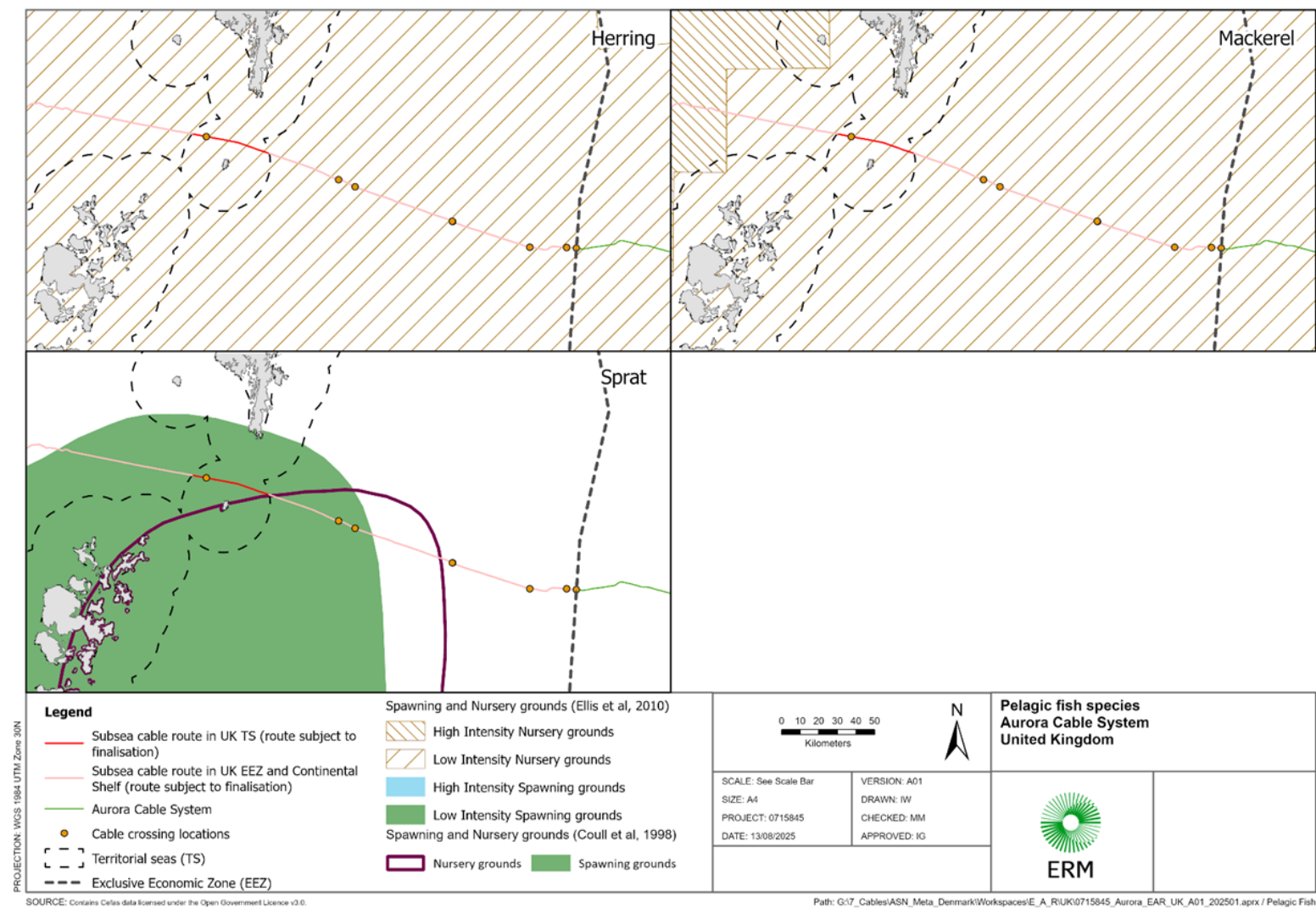
Source: Ellis *et al.*, 2012



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FIGURE 6-11 HERRING, MACKEREL AND SPRAT SPAWNING AND/OR NURSERY GROUNDS



Source: Coull *et al.*, 1998, Ellis *et al.*, 2012

No spawning and / or nursery grounds of shellfish species were identified along or within proximity to the subsea cable route. However, there is evidence to suggest that Norway lobster (*Nephrops norvegicus*), which is of commercial importance and ocean quahog (*Arctica islandica*), which is of conservational importance could be present along the subsea cable route. Ocean quahog is known to be present in ICES rectangles 47F0, 47F1, 47E9, 48E9, and 48E8 (Marine Scotland, 2025). Furthermore, various other shellfish species including cockles, crabs, lobsters, mussels, periwinkles, scallops, shrimp, squid and whelk are likely to be present along the subsea cable route (JNCC, 1998).

Migratory fish which may enter the Study Area during their migration routes include Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta m. trutta*), European eel (*Anguilla anguilla*), allis shad (*Alosa alosa*), twaite shad (*Alosa fallax*), European sea sturgeon (*Acipenser sturio*) and sea lamprey (*Petromyzon marinus*) (JNCC, 1998).

6.3.3.1 RECEPTORS FOR ASSESSMENT

A total of 159, 108, and 166 species of exploited and unexploited fish species are present in the waters surrounding Shetland, Orkney, and north-east Scotland: Cape Wrath to St. Cyrus, respectively (JNCC, 1998). This includes notable elasmobranch species such as spurdog, lesser spotted dogfish, thornback ray and spotted ray. There are also notable pelagic species present including mackerel, herring, horse mackerel and sprat. Benthic fish species known to be in the waters surrounding Shetland include anglerfish, cod, European hake, haddock, lemon sole, ling, Norway pout, saithe, sandeel, whiting, blue whiting, pollack, plaice, dab, long rough dab, dover sole, turbot, brill, megrim, witch, halibut, flounder, conger eel and gurnards (JNCC, 1998; Coull *et al.*, 1998; Ellis *et al.*, 2012).

As previously mentioned in **Section 6.3.3**, some of these species, such as herring and sandeel have spawning and/or nursery grounds in the region which are sensitive to benthic disturbance (**Figure 6-10** and **Figure 6-11**).

Migratory fish of importance to Shetland's marine region are Atlantic salmon, sea trout, eel, allis shad, twaite shad, sturgeon and sea lamprey (JNCC, 1998). These migratory species would potentially be sensitive to barrier effects associated with the Aurora Project.

Furthermore, various shellfish species including cockles, crabs, lobsters, mussels, periwinkles, scallops, shrimp, squid and whelk are of importance to Shetland's marine region (JNCC, 1998). Some of the less mobile shellfish species such as cockles and mussels are sensitive to smothering.

As such, the following receptor groups are to be assessed:

- **Receptor Group 1:** Elasmobranchs;
- **Receptor Group 2:** Demersal fish;
- **Receptor Group 3:** Pelagic fish;
- **Receptor Group 4:** Shellfish;
- **Receptor Group 5:** Migratory fish; and
- **Receptor Group 6:** Sandeel / herring spawning grounds.

6.3.4 IMPACT ASSESSMENT

6.3.4.1 POTENTIAL IMPACTS

The rock placement activities involved with the Aurora Project described in **Section 4** may potentially impact the ecology of fish and shellfish in the following ways:

- Direct harm / damage;
- Permanent habitat change / loss; and
- Temporary increases in SSC and siltation.

The potential impacts have been assessed based on the realistic worst-case parameters outlined within the Project Description (see **Section 4.3**).

Pre- and /or post-installation rock placement activities will be conducted using one (1) vessel at eight (8) locations, i.e. one (1) in the Scottish TS and seven (7) in the UK EEZ, covering a combined total of 5,716.8 m² to 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²). No additional seabed disturbance is expected following completion of rock placement. Whilst disturbance will be localised to a small area of seabed, rock placement activities may overlap with habitats of fish and shellfish species.

6.3.4.2 IMPACT ASSESSMENT

The assessment of the impacts outlined in **Section 6.3.4.1** is presented in **Table 6-5**.

TABLE 6-5 IMPACT ASSESSMENT FOR FISH AND SHELLFISH ECOLOGY RECEPTORS

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
Direct harm / damage	Receptor Groups 1, 2 and 3 The activities associated with pre- / post-installation rock placement have the potential to directly harm fish and shellfish receptors or potentially cause mortality. Most elasmobranch, demersal, pelagic and migratory fish receptors are mobile and have capacity to avoid direct potential effects of rock placement activities. As such, elasmobranch, demersal, and pelagic fish receptors are determined to have a Low sensitivity to direct harm / damage associated with the pre- / post-installation rock placement at subsea cable crossings.	Direct harm to receptors will be restricted to individuals present at the rock placement sites during the operations. Potential effects may occur within the direct footprint of the rock placement within the Scottish TS and UK EEZ, which covers a total area of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²). This is a small proportion of the total habitat available to fish and shellfish species in the region. The areas impacted are expected to be highly localised, limited to within the 150 m buffer applied at all rock placement sites at the subsea cable crossing locations. The disturbance will occur for a short period of time, with activities taking place over 14 days within a six (6) month period. Therefore, magnitude is considered Low .	Negligible	Not Significant	None required	Not Significant
	Receptor Group 4 The activities associated with pre- / post-installation rock placement have the potential to directly harm fish and shellfish receptors or potentially cause mortality. Although shellfish species are usually sessile and are therefore prone to direct harm, they have high rates of fecundity and fast growth rates with direct harm caused to individuals likely to recover rapidly, and not be noticeable at a population scale. As such, shellfish are also determined to have a Low sensitivity to direct harm / damage associated with the rock placement activities.		Negligible	Not Significant	None required	Not Significant
	Receptor Group 5 The activities associated with pre- / post-installation rock placement have the		Negligible	Not Significant	None required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	potential to directly harm fish and shellfish receptors or potentially cause mortality. Most elasmobranch, demersal, pelagic and migratory fish receptors are mobile and have capacity to avoid direct potential effects of rock placement activities. As such, migratory fish receptors are determined to have a Negligible sensitivity to direct harm / damage associated with the pre- / post-installation rock placement at subsea cable crossings.					
Permanent habitat change / loss	Receptor Group 1 Rock placement activities will lead to the permanent habitat change / loss across the seven (7) locations in the UK EEZ and one (1) location in the Scottish TS. Most elasmobranch, pelagic, and migratory fish species are not sensitive to change or loss of seabed habitat due to their ability to relocate into new areas, and their lack of association with the seabed. As such, elasmobranch receptors are determined to have a Negligible sensitivity.	Habitat change/loss will be restricted to potentially direct effects within the rock placement site footprints, and potentially indirect effects, which are within the precautionary 150 m buffer. As a result, habitat change/loss is expected to be highly localised, with the total footprint of the rock placement within the Scottish TS and UK EEZ covering a total area of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²). This is a small proportion of the total habitat available to fish and shellfish species in the region. Therefore, magnitude is considered Low .	Negligible	Not Significant	None required	Not Significant
	Receptor Groups 2 and 4 Rock placement activities will lead to the permanent habitat change / loss across the seven (7) locations in the UK EEZ and one (1) location in the Scottish TS. Demersal fish and shellfish species are considered to have a lower tolerance of habitat change / loss than elasmobranch, pelagic and migratory fish species due to their greater dependence on the seabed. However, given the large amount of habitat		Negligible	Not Significant	None required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	available to demersal and shellfish species in UK waters relative to the small proportion of habitat affected by the rock placement activities (5,716.8 m² to 8,745.6 m²; i.e. approximately 0.006 km² to 0.009 km²), a change or loss of habitat may potentially impact individual organisms, but it is unlikely to result in impacts at a population level. Despite the rock placement occurring at sites within spawning and nursery grounds of various species, most of these are of low intensity and no shellfish spawning and/or nursery grounds were identified (Coull <i>et al.</i>, 1998, Ellis <i>et al.</i>, 2012). Furthermore, most fish species are associated with pelagic paters in their early life stages and as such benthic habitat disturbance during the spawning and nursery seasons is unlikely to affect them. As such, the sensitivity of demersal fish and shellfish to habitat change/loss is determined to be Low.					
	Receptor Group 3 and 5 Rock placement activities will lead to the permanent habitat change / loss across the seven (7) locations in the UK EEZ and one (1) location in the Scottish TS. Most elasmobranch, pelagic, and migratory fish species are not sensitive to change or loss of seabed habitat due to their ability to relocate into new areas, and their lack of association with the seabed. As such, pelagic and migratory fish receptors are determined to have a Low sensitivity to habitat change/loss.		Negligible	Not Significant	None required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	Receptor Group 6 Rock placement activities will lead to the permanent habitat change / loss across the seven (7) locations in the UK EEZ and one (1) location in the Scottish TS. There are some fish species which are strongly associated with the seabed in their early life stages, including herring, which lay their eggs on the seabed but are pelagic for the majority of their life; and sandeel which lay their eggs on the seabed and are strongly associated with it throughout the majority of their life history. Therefore, these species are considered to have a low tolerance to accommodate habitat loss and low ability to recover or adapt, resulting in a Medium sensitivity.		Minor	Not Significant	None required	Not Significant
Temporary increases in SSC and siltation	Receptor Groups 1-6 Disturbance to seabed habitats associated with the proposed works has the potential to mobilise sediments into the water column, and therefore increase suspended sediment concentrations. Suspended sediment can impact fish and shellfish receptors through: reductions in visibility, which can impair hunting behaviour; or due to subsequent sediment deposition, which may smother and clog gills and breathing organs; as well as the smothering of eggs and larvae. However, the adult life stages of elasmobranchs, pelagic, migratory and some demersal fish are highly mobile and as such have the ability to move away from areas of elevated suspended sediments. Additionally, some demersal fish	The pre- / post-installation rock placement activities are unlikely to lead to elevated SSC and siltation rates greater than those occurring naturally in the environment. Any resulting sediment plumes are expected to be highly localised, limited to within the 150 m buffer. The disturbance will occur for a short period of time, with activities taking place over 14 days within a six (6) month period, covering a total area of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²).	Negligible	Not Significant	None required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	such as sandeel are well adapted to tolerate smothering. The eggs of many species are vulnerable to smothering, however, the locations of the proposed rock placement activities are not expected to overlap with large portions of spawning areas and the spawning areas it will overlap with are classed as low intensity (Coull <i>et al.</i>, 1998, Ellis <i>et al.</i>, 2012). Shellfish species are also at increased risk of impact from smothering due to settlement of suspended sediments, particularly during spawning season. However, buried crustaceans have the ability to move out of areas with high sediment deposition rates. As such, the sensitivity of all receptor groups to smothering due to suspended sediments has been determined to be Low.	The settlement / deposition of sediments and resultant smothering is dependent on the hydrodynamic regimes at the time of operations as well as the sediment type. The homogeneous areas of coarse sediment that characterise the Scottish TS, within which the proposed works will take place, will be rapidly re-deposited close to the works location footprint leaving only a plume of sands and fine-grained sediments. Fine suspended sediments, including those at rock placement locations in the UK EEZ, will settle on the seabed within a short period or may remain in suspension and be transported away from the works locations. Therefore, magnitude is considered Low.				

6.3.5 ASSESSMENT SUMMARY

The potential impacts associated with the pre- and / or post-installation rock placement activities at specified locations along the subsea cable route are direct harm / damage, permanent habitat change / loss, and temporary increases in SSC and siltation. These potential impacts are localised to the fish and shellfish Study Area, are short term and not substantial enough to detrimentally impact fish and shellfish receptors.

In conclusion, the **Negligible / Low to Medium** sensitivity for all receptors, combined with the **Low** magnitude, results in an overall **Negligible to Minor** risk. The overall effect on fish and shellfish receptors is considered to be **Not Significant**.

6.4 MARINE MEGAFAUNA

6.4.1 INTRODUCTION

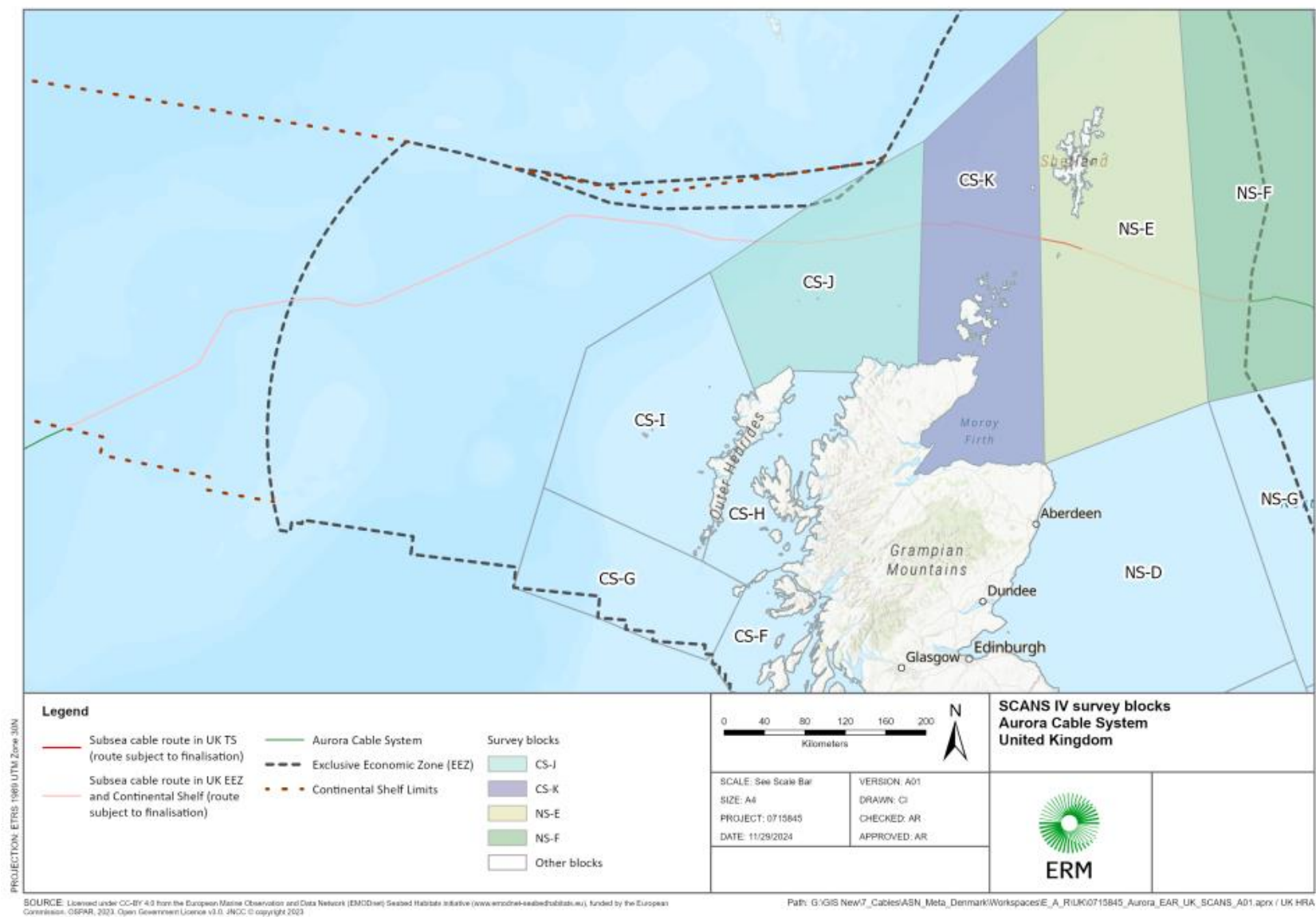
This section will assess the effects of the pre- and / or post-installation rock placement activities associated with the Aurora Project on marine megafauna. Marine megafauna are transient species that inhabit very large areas moving between different areas seasonally and to hunt. The rock placement activities associated with the Aurora Project will take place between Orkney and the Shetland Islands, passing through the UK EEZ and Scottish TS, including the SCANS IV survey blocks which will be used as a reference for marine mammal densities within this section, as demonstrated in **Figure 6-12**. The locations of the rock placement activities are highlighted in **Figure 4-1**.

6.4.2 MARINE MEGAFAUNA STUDY AREA

The marine megafauna Study Area has been primarily defined as comprising of the eight (8) pre- and / or post-installation rock placement locations along the subsea cable route, with consideration of potential secondary effects such as potential impacts on benthic ecology (**Section 6.2**) and / or potential impacts to fish and shellfish ecology (**Section 6.3**) which could potentially impact prey availability to marine megafauna. Vessel presence could cause disturbance, avoidance and collision risk. In combination, the vessel presence and rock placement activities could raise underwater noise beyond the baseline level causing disturbance to marine megafauna receptors within the Study Area.

A buffer of 50 km which encompasses all eight (8) rock placement activities locations across the UK EEZ and Scottish TS within the SCANS IV survey blocks was used to highlight any designated marine megafauna features in any SACs or NCMPAs within the 50 km buffer from which receptors could potentially be impacted by the rock placement activities. **Figure 6-12** shows the marine megafauna Study Area and the encompassing SCANS-IV survey blocks.

FIGURE 6-12 MARINE MEGAFAUNA STUDY AREA



6.4.3 BASELINE ENVIRONMENT

6.4.3.1 CETACEANS

The most common cetacean species in the Scottish TS and UK EEZ are harbour porpoise *Phocoena phocoena*, common bottlenose dolphin *Tursiops truncatus*, white-beaked dolphin *Lagenorhynchus albirostris*, common dolphin *Delphinus delphis*, Risso's dolphin *Grampus griseus*, minke whale *Balaenoptera acutorostrata*, and killer whale *Orcinus orca*.

Humpback whale *Megaptera novaeangliae*, fin whale *Balaenoptera physalus*, long-finned pilot whale *Globicephala melas*, fin whale *Balaenoptera physalus*, beluga whale *Delphinapterus leucas*, and sperm whale *Physeter macrocephalus* have been sighted during land-based shore watch surveys, performed by Whale and Dolphin Conservation between 2005-2019 (Hague *et al.*, 2020); however, they are rare and not considered resident species within the region.

Abundance and density estimates for the marine megafauna Study Area can be extracted from the Small Cetaceans in European Atlantic waters and the North Sea (SCANS) surveys in 2022 (SCANS-IV; Gilles *et al.*, 2023). The aim of these survey programmes is to provide abundance estimates of cetacean species in shelf and oceanic waters of the European Atlantic to enable effective and efficient future monitoring, and to enable management of cetacean populations at favourable conservation status (Hammond *et al.*, 2002). The Offshore Survey Area overlaps Block CS-K, NS-E, and NS-F of the most recent SCANS surveys (SCANS-IV; Gilles *et al.*, 2023). Abundances and densities of the species observed within those survey blocks are presented in **Table 6-6**.

TABLE 6-6 PRESENT CETACEAN DISTRIBUTION FROM SCANS IV REPORT

Species	Abundance (n) in SCANS Block			Species Density (animals/km ²) in SCANS Block			Abundance (n) by UK portion of Management Unit (MU) ^a
	CS-K	NS-E	NS-F	CS-K	NS-E	NS-F	
Harbour Porpoise	11,357	33,735	26,383	0.281	0.516	0.439	159,632 (NS) 24,305 (WS)
Atlantic White-sided Dolphin	NR	958	NR	NR	0.015	NR	12,293 (CGNS)
White-beaked Dolphin	5,460	11,611	18,350	0.135	0.178	0.306	34,025 (CGNS)
Risso's Dolphin	1,519	4,589	NR	0.038	0.070	NR	8,687 (CGNS)
Minke Whale	467	795	1,630	0.012	0.012	0.027	10,288 (CGNS)

Source: Gilles *et al.*, 2023 (SCANS data); IAMMWG, 2023 (MU data)

Key: NR = None recorded; NS = North Sea; WS = West Scotland; GNS = Greater North Sea; CGNS = Celtic and Greater North Sea

6.4.3.2 PINNIPEDS

There are two (2) pinniped species residents to the UK: harbour seal *Phoca vitulina* and grey seal *Halichoerus grypus*. The marine megafauna Study Area is encompassed within the Seal

Monitoring Unit (SMU) 4 (North Coast and Orkney) and SMU 5 (Shetland) as defined by the Special Committee on Seals (SCOS) in 2022. Whilst the SCOS 2024 report has been released, the survey data is incomplete for the aforementioned SMUs. Most recent August counts (between 2016 and 2021) of harbour seal at haul-out sites showed a decline in the North Coast and Orkney and Shetland SMUs (SCOS, 2022). Populations of grey seal in the North Sea continue to increase rapidly, though this is not echoed in Orkney (SCOS, 2022). Although there are designated haul-out zones for both grey and harbour seal on Orkney and Shetland, none of these are in proximity of the Aurora Project rock placement locations. (SCOS, 2022).

6.4.3.3 OTHER MEGAFUNA

Basking shark *Cetorhinus maximus* are the largest fish species found in UK waters and are assessed as Endangered on the IUCN Red List of Threatened Species (Rigby *et al.*, 2021). They follow a seasonal distribution, with increased sightings in the summer months, as sharks feed on plankton in the coastal surface waters near tidal fronts (Sims and Quayle, 1998; Witt *et al.*, 2016). In the summer, they are most common around the southwest coast of England, throughout the Irish Sea, and off the west coast of Scotland (Shark Trust, 2025). In winter, basking shark in the northeast Atlantic inhabit the waters of continental shelf and shelf edge, but do not hibernate or exhibit prolonged movements into open-ocean regions (Sims, 2008).

6.4.3.4 RECEPTORS FOR ASSESSMENT

The receptors that will be potentially impacted in the Scottish TS and UK EEZ include the cetacean species found in the NS-E and CS-K (see **Table 6-6**) including harbour porpoise, white-beaked dolphin, Risso's dolphin and minke whale (SCANS-IV; Gilles *et al.*, 2023). The pinniped species potentially impacted includes harbour seal and grey seal. Although there is designated haul-out zones for both grey and harbour seal on Orkney and Shetland, the closest haul out site is around 35 km from the most easterly rock placement location. (SCOS, 2022).

- **Receptor Group 1: Cetaceans** – The first receptor group will consist of cetaceans, including harbour porpoise, Risso's dolphin, white-beaked dolphin, orca, and minke whale. White-sided dolphin have been excluded due to the lack of sightings in the SCANS-IV surveys, which suggests that their presence in the area during operations is highly unlikely.
- **Receptor Group 2: Pinnipeds** – The second receptor group will consist of pinnipeds, including harbour seal and grey seal.
- **Receptor Group 3: Other Megafauna** – The third receptor group will consist of other megafauna, such as basking shark.

6.4.3.5 NATURE CONSERVATION FEATURES

The Southern Trench NCPA is designated for the conservation of minke whale and is located in the Moray Firth to the south of the Study Area. The Sea of the Hebrides MPA is currently the only NCPA in Scottish waters designated for the protection of basking shark, with shark hotspots recorded particularly around Coll, Tiree, Skerryvore, and Hyskier (Witt *et al.*, 2016; see **Appendix C**).

Harbour seal are a designated feature in one (1) SAC on Shetland (Mousa SAC), there is a second SAC outside of the screening area (Yell Sound Coast SAC). Bottlenose dolphin and grey seal are designated features in SACs (Moray Firth SAC and Faray and Holm of Faray SAC,

respectively) however these are outside of the screening distance. See **Appendix B** for further information.

6.4.4 IMPACT ASSESSMENT

6.4.4.1 POTENTIAL IMPACTS

There will be a direct interaction between the proposed rock placement activities and the marine megafauna habitats within the marine megafauna Study Area. There is potential for displacement, disturbance, collision risk, and loss of foraging habitat due to seabed disturbance.

The following potential impacts relevant to marine megafauna are assessed:

- Temporary localised disturbance of seabed habitats;
- Vessel-related disturbance, avoidance, and collision risk; and
- Underwater noise-related disturbance.

The potential impacts have been assessed based on the worst-case parameters outlined within the Project Description (See **Section 4**).

Rock placement activities will require one vessel at eight (8) locations (i.e. one [1] in the Scottish TS and seven [7] in the UK EEZ), covering a combined total of between 5,716.8 m² and 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²). The disturbance will occur for 14 days over a period of six (6) months. Once the pre- and post-installation rock placement activities are complete for the Aurora Project, there will be no further disturbance to the seabed. While this will be localised to a small area at any one time the rock placement activities may overlap with habitats of marine megafauna species.

Humpback whale, long-finned pilot whale, fin whale, beluga whale, and sperm whale have been scoped out due to their rarity and unlikelihood to be present in the marine megafauna Study Area during the time of operations.

Additionally, although known for inhabiting coastal areas in the spring / summer period (Shark Trust, 2025), basking shark are more likely to be found off the west coast of Scotland (Shark Trust, 2025). As they are unlikely to be found within the marine megafauna Study Area during installation, basking shark (Receptor Group 3), have been scoped out of the impact assessment.

On the other hand, due to the likelihood of presence in the marine megafauna Study Area the following receptors groups have been scoped in:

- **Receptor Group 1:** Cetaceans; and
- **Receptor Group 2:** Pinnipeds

6.4.4.2 IMPACT ASSESSMENT

The assessment of the impacts outlined in **Section 6.4.4.1** is presented in **Table 6-7**.

TABLE 6-7 IMPACT ASSESSMENT FOR MARINE MEGAFAUNA RECEPTORS

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
Temporary localised disturbance of seabed habitats	Receptor Group 1 Cetaceans within the marine megafauna Study Area have a wide, varied diet (de Pierrepont <i>et al.</i> , 2003). Harbour porpoise tend to forage on the top one or two abundant species in a local area (NRW, 2016). Key prey species are all pelagic fish and No Significant Effect has been determined for any of these species (Refer to Section 6.3). The marine megafauna Study Area is only a small percentage of the total foraging range available to cetaceans which are transient species and once the rock placement activities are complete the area is likely to return to baseline conditions. Therefore, the sensitivity of cetaceans to temporary localised disturbance of seabed habitats is Low .	Pre- and / or post-installation rock placement activities will be conducted at eight (8) locations covering a combined total of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²). This represents a small fraction of the available foraging area. The disturbance will be limited to 14 days within a six (6)-month period, the majority of the species will not be present in the area during the winter months. The magnitude is assessed as Low . There will be no long-term impact to the receptors prey availability.	Negligible	Not Significant	None Required	Not Significant
	Receptor 2 Harbour seal can use different foraging strategies to hunt in	Pre- and / or post-installation rock placement will be conducted at eight (8) locations covering a combined total of 5,716.8 m ²	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	different environments. Harbour seals forage up to 60 km away from their haul-out zones with variation in their foraging areas and terrestrial distribution (Thompson <i>et al.</i>, 1996). Grey seal typically hunt in deeper waters, and more exclusively on benthic prey than harbour seal (McConnell <i>et al.</i>, 1999). Both species' diets consist of sandeels, gadoids, flatfish, and cephalopods (Thompson <i>et al.</i>, 1996), all of which may be potentially impacted by the operations, reducing prey availability through benthic habitat loss. As mentioned in Sections 6.2 and 6.3, (respectively), there are No Significant Effects or mitigation required for both benthic and fish communities. Furthermore, the operations area is only a small percentage of the total foraging range available to pinnipeds. Therefore, they can easily adapt to, and recover from, temporary, localised	to 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²). This represents a small fraction of the available foraging area. The disturbance will be limited to 14 days within a six (6)-month period. For both grey and harbour seal, this is outside of the birthing season and there is a vast range of alternative foraging habitat available. The magnitude is assessed as Low. There will be no long-term impact to the receptors prey availability.				

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	disturbance of seabed habitats. Therefore, the sensitivity for pinnipeds to temporary localised disturbance of seabed habitats is Low .					
Vessel related disturbance, avoidance, and collision risk	Receptor Group 1 A potential source of impact from vessel activity is collision with a boat or ship, resulting in mortality, injury, or stress. However, marine mammals are highly mobile, and vessel noise is within their audible range, therefore, they are largely able to detect and subsequently avoid collision. Furthermore, collision risk is considered highest for large vessels (>80 m) that display erratic behaviour and travel at speeds >14 knots (Laist <i>et al.</i>, 2001). The one vessel used during rock placement operations will be stationary or travelling at slow speeds, thus minimising risk of collision. Disturbance from the physical presence of vessels is a possibility and	The realistic worst-case scenario entails one vessel being present at the marine megafauna Study Area over a maximum period of 14 days across six (6) months. Exposure of the receptors will be highly localised and will occur over a short time period with a wide range of alternative foraging habitat available. Therefore, the magnitude of this impact has been assessed as Low for all receptors.	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	may lead to some avoidance and changes in behaviour, such as diving or swimming away from distances as far away as 4 km (Benhemma-Le Gall <i>et al.</i>, 2021). Any disturbance related to vessel presence will, however, be short-term and limited to the duration of the works (maximum of 14 days). Avoidance is also likely to be localised to the area directly around the vessel; vessel avoidance distances for harbour porpoise range between 300 m and 4 km (Benhemma-Le Gall <i>et al.</i>, 2021; Frankish <i>et al.</i>, 2023). This represents a small proportion of the area available to marine mammals and presence of vessels will not create a barrier to movement or prevent access to foraging areas. While some level of stress or behavioural related response is possible in relation to vessel presence, there is minimal risk of collision, and slow-moving or					

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	stationary vessels will not prevent access to foraging areas or lead to long-term population level impacts. Therefore, the sensitivity for cetaceans to vessel related disturbance, displacement, and collision risk is Low .					
	Receptor Group 2 There is potential that harbour and grey seal may collide with vessels deployed for the operations, or may be displaced from the area, potentially prompting a behavioural and / or stress related response, injury, or mortality. It is considered unlikely that stress or behavioural related responses could result in potential impacts to individual animals or will result in potential ecological impacts on the wider population, or the ability of those individuals to function. Furthermore, Wilson <i>et al.</i> (2017) noted that seal collisions were rare in relation to the frequency of seal encounters and identified a significant	The realistic worst-case scenario entails one vessel being present at the marine megafauna Study Area over a maximum period of 14 days across six (6) months. Exposure of the receptors will be highly localised and will occur over a short time period with a wide range of alternative foraging habitat available. Therefore, the magnitude of this impact has been assessed as Low for all receptors.	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	reduction in the number of seal collisions for vessels travelling at <4 knots. Seals are also considered to be curious and intelligent, becoming habituated to marine traffic in heavy shipping areas (Bowles and Anderson, 2012). As a result of this they are considered to have a high tolerance to vessel presence, as well as a high adaptability due to their ability to avoid the vessel by moving away (ERM Ltd, 2010). Therefore, the sensitivity of pinnipeds to vessel related disturbance, displacement, and collision risk is Low .					
Underwater noise related disturbance	Receptor Group 1 Cetaceans rely on sound for foraging, navigation, and communication. Potential impacts from exposure to underwater noise include auditory damage, masking, behavioural disturbance, and habitat avoidance (Richardson <i>et al.</i> , 1995; Erbe <i>et al.</i> , 2018). The extent of disturbance depends on various	While some disturbance from noise is likely, potential impacts will be short-term; cetaceans will only be affected whilst they are within the area of potential effect of vessel operations and rock placement activities. The realistic worst-case scenario entails one vessel being present for a period of 14 days over six (6) months.	Negligible	Not Significant	Mitigation is not required. However, monitoring procedures will be in place based on JNCC best practice guidelines (JNCC, 2017). When conditions allow, a crew member should monitor for marine mammals in the	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	factors, including intensity and frequency of the noise, environmental conditions, and sensitivity of the receptor (Richardson <i>et al.</i>, 1995; Erbe <i>et al.</i>, 2018). Vessel noise is predominantly low frequency and low intensity; source levels from rock placement activities vessel are between 165-180 dB re 1 μPa SPL_{RMS} and frequencies below 1 kHz (OSPAR Commission, 2009). The Ultra-Short Baseline (USBL) device will be operated at a frequency of 20-34 kHz with an SPL_{PEAK} of 194 dB re 1 μPa. The operating frequency falls below the peak sensitivity of Very High Frequency (VHF) cetaceans (125 kHz) and noise is not likely to be generated at levels that will potentially have significant negative effects on communication or hunting activities. The SPL_{PEAK} will remain below the 210 dB re 1 μPa Permanent Threshold Shift (PTS) threshold	Cetaceans are highly mobile opportunistic feeders. They have a wide foraging range available, and their distribution varies naturally depending on variations in the environment. The area of potential effect is negligible in the context of the total habitat available to cetaceans in the region; thus, the magnitude of potential effect has been assessed as Low.			vicinity of the equipment before the USBL is activated. Once the marine mammal has left the area, the USBL can be turned on, and work can commence.	

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	based on Southall <i>et al.</i> , 2019. This is also below the risk level for Temporary Threshold Shift (TTS). Therefore, the sensitivity of cetaceans to underwater noise related disturbance is Low .					
	Receptor Group 2 Vessel noise is predominantly low frequency and low intensity; source levels from rock placement activities vessel are between 165-180 dB re 1 μPa SPL_{RMS} and frequencies below 1 kHz (OSPAR Commission, 2009). The USBL device will be operated at a frequency of 20-34 kHz with an SPL_{PEAK} of 194 dB re 1 μPa. The operating frequency falls below the peak sensitivity of VHF pinnipeds and noise is not likely to be generated at levels that will have potentially significant negative effects on communication or hunting activities. The SPL_{PEAK} will remain below the 210 dB re 1 μPa PTS threshold based on Southall <i>et al.</i>, 2019. This is also below	The realistic worst-case scenario entails one vessel being present for a period of 14 days over six (6) months. While some disturbance from noise is likely, potential impacts will be short-term; pinnipeds will only be affected whilst they are within the area of potential effect of vessel operations and rock placement activities, and the nearest haul-out site is 35 km from the works. Pinnipeds are highly mobile and are known to forage over wide ranges, up to 50 km from haul-out sites for harbour seal and up to 100 km from haul-out sites for grey seal (Carter, <i>et al.</i>, 2022). The area of potential effect is negligible in the context of the total habitat available to pinnipeds in the region; thus, the magnitude of potential effect has been	Negligible	Not Significant	Mitigation is not required; however, monitoring procedures will be in place based on JNCC best practice guidelines (JNCC, 2017). When conditions allow, a crew member should monitor for marine mammals in the vicinity of the equipment before the USBL is activated. Once the marine mammal has left the area, the USBL can be turned on, and work can commence.	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	the risk level for TTS. Therefore, the sensitivity of pinnipeds to underwater and above water noise related disturbance is Low. The noise may, however, fall within the audible range for both species, so there is potential for masking of communication signals, which in water vary between 0.1-40 kHz and 0.02-24 kHz for grey seal and harbour seal, respectively (Southall, <i>et al.</i>, 2019). In air, vocalisation ranges are 0.25-6 kHz and 0.1-9 kHz for grey seal and harbour seal, respectively (Southall, <i>et al.</i>, 2019). Unlike cetaceans, pinnipeds are not reliant on sound for foraging. Vocalisations are social and used mainly for communication and during the breeding season. The nearest seal haul-out site is 35 km from the rock placement activities. Works will occur outside of the breeding season, and both species are habituated to foraging	assessed as Low for all pinniped receptors.				

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	in areas with vessel traffic. Therefore, any interference with vocalisations is anticipated to be minimal. The overall sensitivity to vessel and rock placement noise has been assessed as Low.					

6.4.5 ASSESSMENT SUMMARY

The potential impacts associated with the rock placement activities at specified locations along the subsea cable route are temporary localised disturbance of seabed habitats, vessel related disturbance, avoidance, and collision risk, and underwater noise related disturbance. The impacts are localised to the marine megafauna Study Area, are short term and not substantial enough to detrimentally affect marine megafauna receptors.

In conclusion, the **Low** sensitivity for all receptors, combined with the **Low** magnitude, results in an overall **Negligible** risk. The overall potential effect on marine megafauna receptors combined with the recommended mitigation where required is considered to be **Not Significant**.

6.5 ORNITHOLOGY

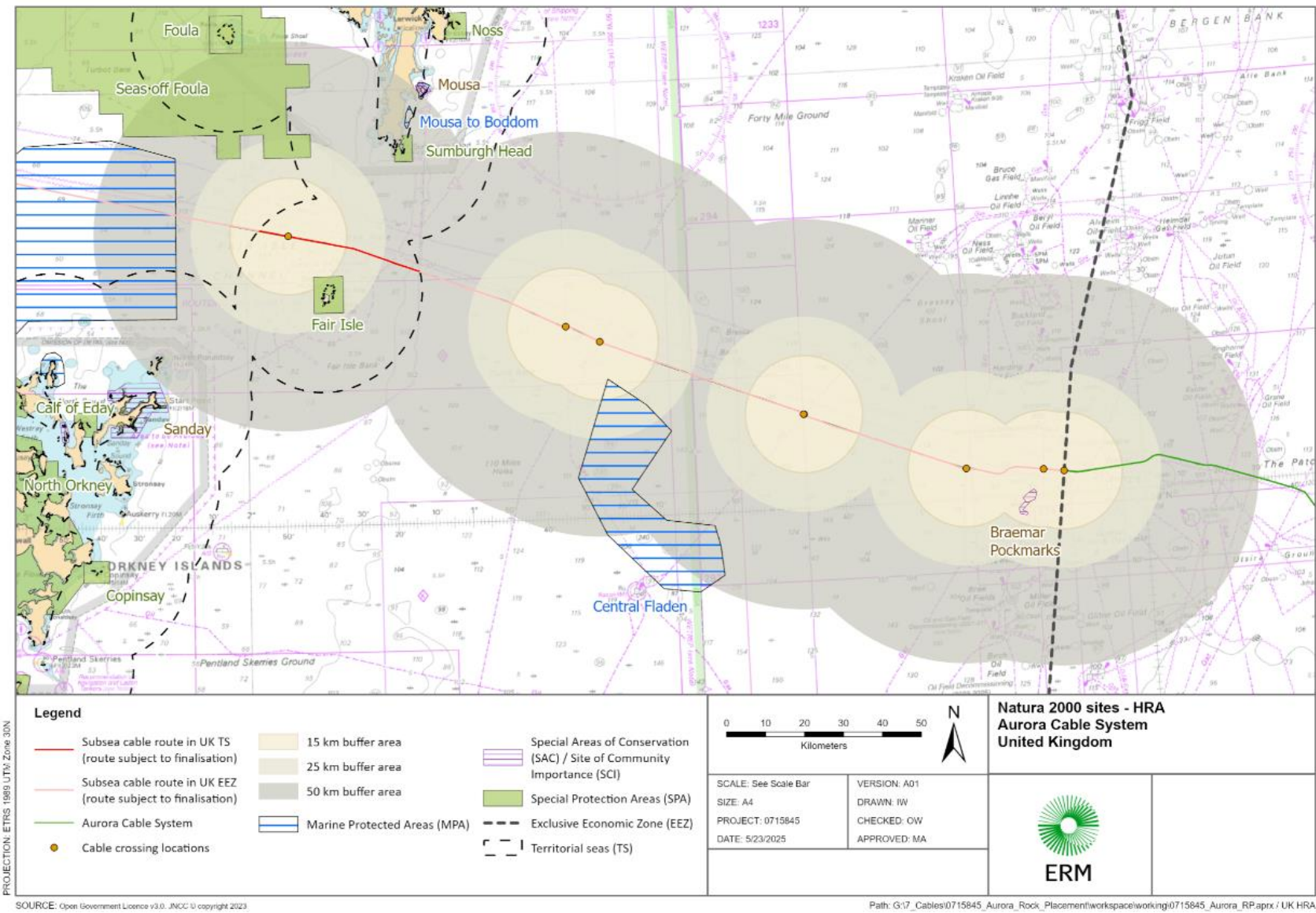
6.5.1 INTRODUCTION

This section assesses potential effects of the potential pre- and / or post-installation rock placement effects associated with the Aurora Project on ornithological species. The rock placement activities will take place between Orkney and the Shetland Islands, passing through the UK EEZ and the Scottish TS, as demonstrated in **Figure 6-13**.

6.5.2 ORNITHOLOGY STUDY AREA

The ornithological Study Area has been primarily defined as comprising of the eight (8) pre- and / or post-installation rock placement locations along the subsea cable route, with consideration of potential secondary impacts such as potential impacts on benthic ecology (**Section 6.2**) and / or potential impacts to fish and shellfish ecology (**Section 6.3**) which could potentially impact prey availability to ornithological receptors. Increases in localised suspended sediment as a result of the rock placement activities associated with the Aurora Project at depths below 80 m could limit prey availability for ornithological receptors. Vessel presence could disturb and displace ornithological receptors within the Study Area. A buffer of 50 km which encompasses all eight (8) rock placement sites across the UK EEZ and Scottish TS is demonstrated in **Figure 6-13**. **Figure 6-13** also highlights any Special Protection Areas (SPAs) within the 50 km buffer from which ornithological receptors could potentially be affected by the rock placement activities associated with the Aurora Project.

FIGURE 6-13 ORNITHOLOGICAL STUDY AREA WITH 50 KM BUFFER



6.5.3 BASELINE ENVIRONMENT

Deep-diving and / or benthic-feeding seabird species are likely to have the highest interaction with the seabed and are most likely to be affected by impacts to benthic habitats. Key receptors in the offshore ornithology Study Area (i.e. 50 km buffer around the rock placement locations) have been identified through review of third-party data and studies, such as Kober *et al.* (2010) and Waggitt *et al.* (2020) modelled seabird distributions. Key receptors which may be affected by impacts to benthic habitats at the pre- and post-installation rock placements include European shag *Gulosus aristotelis*, black-headed gull *Chroicocephalus ridibundus*, common gull *Larus canus*, common guillemot *Uria algae*, razorbill *Alca torda*, Atlantic puffin *Fratercula arctica*, black guillemot *Cepphus grylle*, red-throated diver *Gavia stellata*, great northern diver *G. immer*, and great cormorant *Phalacrocorax carbo* (Kober *et al.*, 2010; Waggitt *et al.*, 2020).

Pelagic- and surface-feeding seabirds often have wider usage areas, with modelled densities showing distributions further out into the North Sea (Waggitt *et al.*, 2020). Such species are unlikely to be affected by changes in benthic habitat at water depths of >80 m over small spatial scales. However, pelagic- and surface-foraging birds may interact with operational vessels during the Aurora Project's rock placement activities (Fliessbach *et al.*, 2019). Key receptors identified in the Study Area include black-legged kittiwake *Rissa tridactyla*, great black-backed gull *L. marinus*, European herring gull *L. argentatus*, lesser black-backed gull *L. fuscus*, sandwich tern *Thalasseus sandvicensis*, little tern *Sternula albifrons*, common tern *Sterna hirundo*, Arctic tern *S. paradisaea*, great skua *Stercorarius skua*, Arctic skua *S. parasiticus*, northern fulmar *Fulmarus glacialis*, and northern gannet *Morus bassanus* (Kober *et al.*, 2010; Waggitt *et al.*, 2020).

Some of these species are listed as qualifying features of SPAs, RAMSAR Sites, and NCMPAs within the Study Area. The SPAs within the 50 km buffer zone of the eight (8) rock placement locations include the Fair Isle, Seas of Foula. Sumburgh Head and Foula which include only breeding populations. Potential impacts to designated sites and their protected features are discussed in **Appendix C**.

6.5.3.1 RECEPTORS

The key receptors identified in **Section 6.5.3** have been assigned to receptor groups based on similarities in autecology. It should be noted that only auks species have been screened in as an ornithological receptor for the impact assessment, further details are provided below.

Receptor 1: Auks

This receptor group will comprise of the auk species including guillemot, razorbill and puffin which feed at depths of 80+ m. Auks may be sensitive to vessel related disturbance and displacement (Furness, 2013).

Scoped out Receptors

All other ornithological species have been scoped out due to these species unlikely being present during the installation period or are potentially not impacted by the pre- and / or post-installation rock placement as the installation activities are deeper than their diving depths or they are not sensitive to vessel presence (Furness, 2013; Fliessbach *et al.*, 2019). These species are also not listed as over wintering populations in the SPAs included in the 50 km

buffer of the Aurora Project's rock placement locations. These species include black-legged kittiwake, black-headed gull, common gull, great black-backed gull, European herring gull, lesser black-backed gull, sandwich tern, little tern, common tern Arctic tern, great skua, Arctic skua, Atlantic puffin northern fulmar and northern gannet.

6.5.4 IMPACT ASSESSMENT

6.5.4.1 POTENTIAL IMPACTS

There will be a direct interaction between the rock placement activities for the Aurora Project and the ornithological habitats within the ornithological Study Area. There is potential for displacement, disturbance and loss of foraging habitat due to seabed disturbance.

The following potential impacts relevant to ornithological receptors are assessed:

- Temporary localised disturbance of seabed habitats; and
- Vessel related disturbance, avoidance, and displacement.

The potential impacts have been assessed based on the worst-case parameters outlined within the Project Description (See **Section 4**).

Pre- and / or post-installation rock placement will be undertaken by one vessel at eight locations, one (1) in the Scottish TS and seven (7) in the EEZ, covering a combined total of 5,716.8 m² to 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²). Once the pre- and post-installation rock placement is complete there will be no further disturbance to the seabed. While this will be localised to a small area at any one time the subsea cable laying area may overlap with activities of the ornithological receptors.

Due to the impact to the seabed only covering a maximum of approximately 0.008 km² this only comprises a tiny fraction of the available habitat. This represents a negligible proportion of the ornithological Study Area and is unlikely to measurably affect prey availability. The benthic ecology (**Section 6.2**) and fish and shellfish ecology (**Section 6.3**) impact assessments concluded that the potential effects were **Not Significant**, therefore the temporary localised disturbance of seabed habitats to ornithological receptors can be screened out.

6.5.4.2 IMPACT ASSESSMENT

The assessment of the impacts outlined in **Section 6.5.3.1** is presented in **Table 6-8**.

TABLE 6-8 IMPACT ASSESSMENT FOR ORNITHOLOGICAL RECEPTORS

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
Vessel related disturbance, avoidance, and displacement	Receptor 1: Auks Auks may be more sensitive to the presence of vessels during foraging (Fliessbach <i>et al.</i>, 2019). However, this is unlikely to occur since the rock placement activities are scheduled to take place outside the breeding season as auks migrate south along the coast of the UK after their post-breeding moulting period (September to November) (Furness, 2015). Only one (1) vessel will be used at any given time, which will not significantly raise disturbance levels above the baseline environment. Any auks present will be habituated to and tolerant of the heavy marine traffic in the North Sea. Therefore, the sensitivity for auks to vessel related disturbance, displacement, and collision risk is Medium.	Auks Pre-and / or post-installation rock placement will occur at eight (8) locations covering a combined total of 5,716.8 m² to 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²). This represents a tiny fraction of the available foraging area. The disturbance will take place over 24 hours across 14 days of work, which may overlap with a tiny portion of the breeding and migratory season. Therefore, the magnitude of this impact has been assessed as Negligible for all receptors.	Negligible	Not Significant	None Required	Not Significant

6.5.5 ASSESSMENT SUMMARY

In conclusion, the **Medium** sensitivity of the receptors, combined with the **Low** magnitude, results in an overall **Negligible** risk. There is no recommended mitigation required, therefore overall potential effect on ornithological receptors is considered to be **Not Significant**.

6.6 OTHER USERS

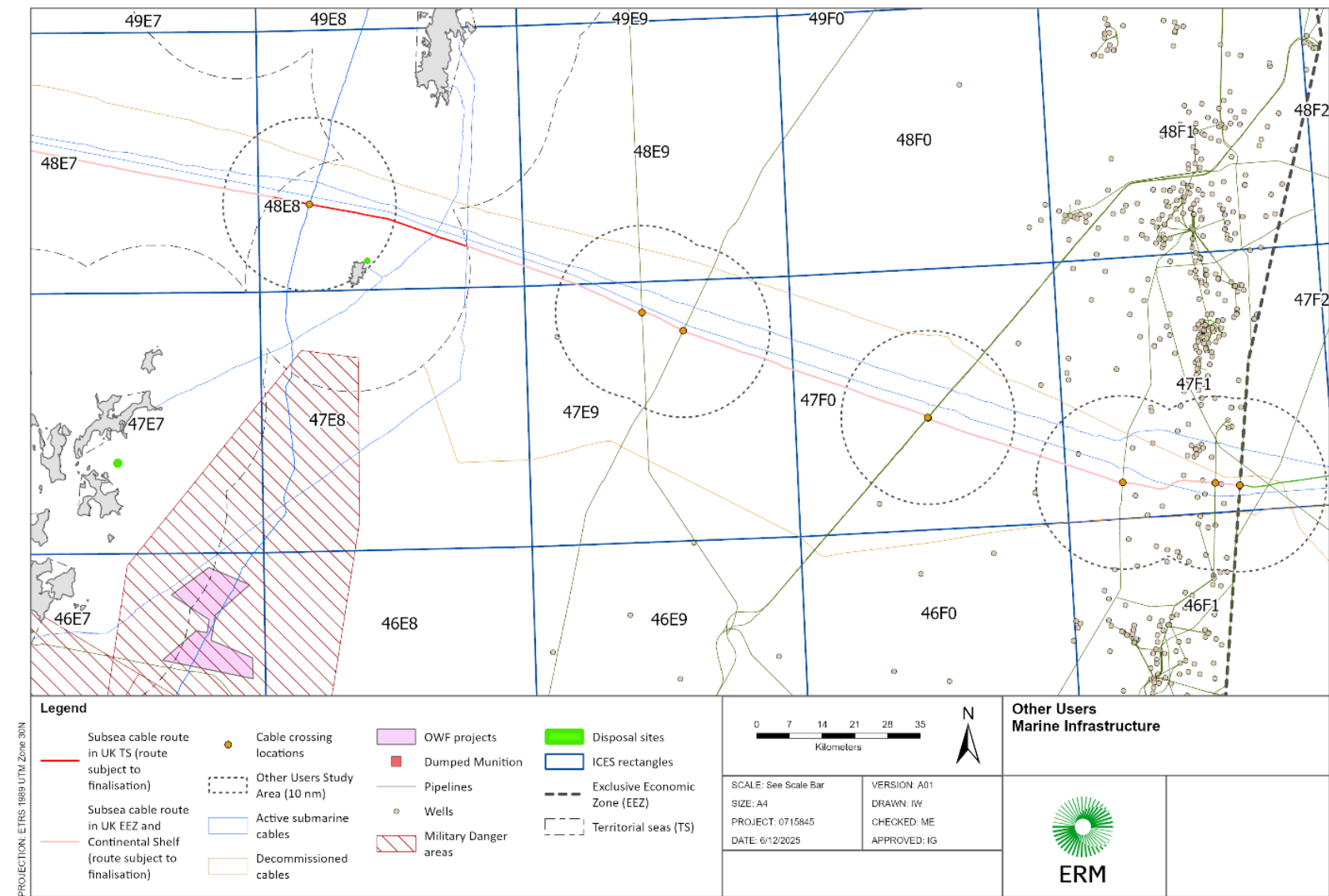
6.6.1 INTRODUCTION

This section will assess the potential effects of the pre- and post-installation rock placement on other users, describing the baseline environment and EA for other users, including other infrastructure, developments, passenger vessel activity, recreational usage, commercial fisheries activity, and shipping and navigation activity, defined within the other users Study Area. The subsea cable traverses between Orkney and the Shetland Islands, passing through the UK EEZ and Scottish TS, as demonstrated in **Figure 6-14**.

6.6.2 OTHER USERS STUDY AREA

The other users Study Area is defined as the area within the 10 nm region surrounding the pre- and post-installation rock placement locations associated the Aurora Project. **Figure 6-14** presents the other users Study Area including overlapping ICES Rectangles 48E8, 47E9, 47F0 and 47F1, and marine infrastructure receptors identified within the region. The other users Study Area is designed to encompass other infrastructure, developments, vessel activity and recreational users which have the potential to be affected during the pre- and post-installation rock placement activities associated with the Aurora Project.

FIGURE 6-14 OTHER USERS STUDY AREA INCLUDING ICES RECTANGLES



6.6.3 BASELINE ENVIRONMENT

Receptors within the other users Study Area across the UK EEZ and Scottish TS around Shetland have been identified under three groupings:

- Other users and infrastructure;
- Commercial fisheries; and
- Shipping and navigation.

6.6.3.1 OTHER USERS AND INFRASTRUCTURE

No aquaculture sites, Carbon Capture Sequestration (CCS) storage sites, offshore renewable energy developments or dumped munitions sites are identified within the other users Study Area.

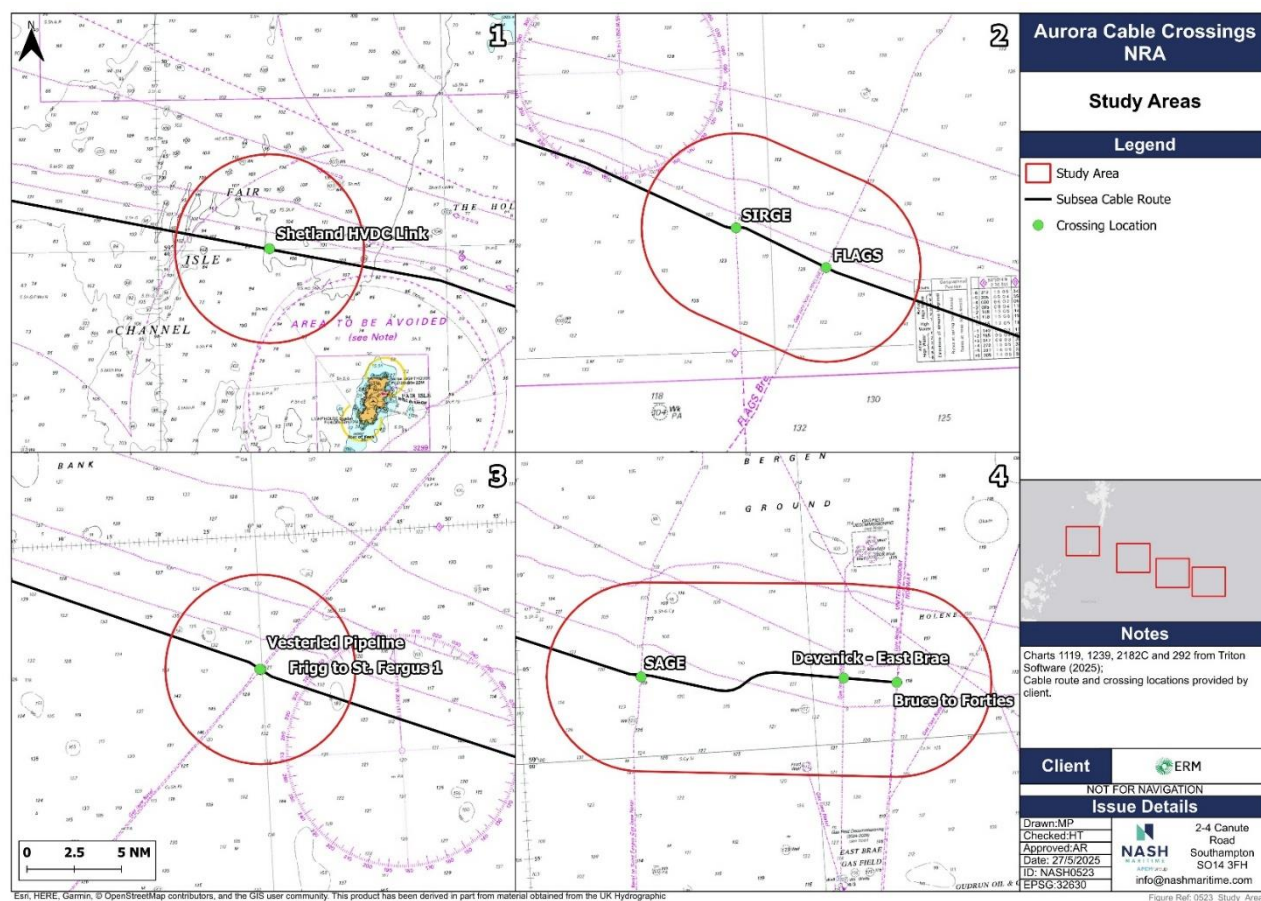
The majority of O&G infrastructure present within the other users Study Area is located at the subsea cable crossings within the eastern extent of the UK EEZ, where there is a concentrated region of O&G wellbores and oilfields (**Figure 6-14**).

Eight (8) pipelines intersect the subsea cable route, as identified within the NRA (**Appendix F**). The intersecting assets have been identified in **Table 4-1**.

The Shetland HVDC Link was installed during 2023/2024 and became fully commissioned in August 2024, however nautical charts have not been updated to reflect this yet. **Figure 6-15** outlines the cable crossing intersections identified, and categorises the intersections into four (4) separate Study Areas along the subsea cable route. The Shetland HVDC link crosses the Aurora Project within Scottish TS (Study Area 1) (**Figure 6-15**) (NASH, 2025).

Two (2) other submarine cables intersect all Study Areas, passing at the closest point approximately 0.7 nm north of the SIRGE pipeline crossing location within Study Area 2 (**Figure 6-15**) (NASH, 2025). Intersecting Study Area 4, there are two (2) additional pipelines at 2.2 nm from the Bruce to Forties (easternmost) crossing location and one (1) submarine cable at 1.1 nm north. These cables and pipelines are marked on nautical charts (**Figure 6-15**) (NASH, 2025).

FIGURE 6-15 AURORA PROJECT CROSSING LOCATIONS



Source: NASH, 2025

Three (3) ferry routes are identified to cross the other users Study Area, and have been identified to run daily services to and from destinations on the Lerwick to Kirkwall and Lerwick to Aberdeen routes (see **Appendix F**) (NASH, 2025). Figure 13 of **Appendix F** (NASH, 2025) demonstrates the densities and routes of these ferry crossings in relation to the subsea cable route. Recreational vessel activity is generally low throughout the other users Study Area, however a medium density route was observed between the Shetland Islands (and Fair Isle) approximately 8.9 nm from the crossing location shown in Study Area 1 in Figure 14 of **Appendix F** (NASH, 2025). Other recreational activities such as sailing, cruising, angling and boating are also present, however these are generally restricted within the Scottish TS around Shetland Islands (and Fair Isle).

The Hebrides Military Danger Area, D701F, intersects within the vicinity of the other users Study Area as highlighted in **Figure 6-14**. No overlap is identified with the subsea cable crossings, however, the Hebrides Military Danger Area is operated by QinetiQ on behalf of the MOD for short to long range munitions testing of modern weapons systems, hence the additional range and airspace required, making the PEXA larger in comparison to other Military PEXA.

One dredge disposal site, FI110 – North Haven, intersects within the vicinity of the other users Study Area to the north of Fair Isles as highlighted in **Figure 6-14**.

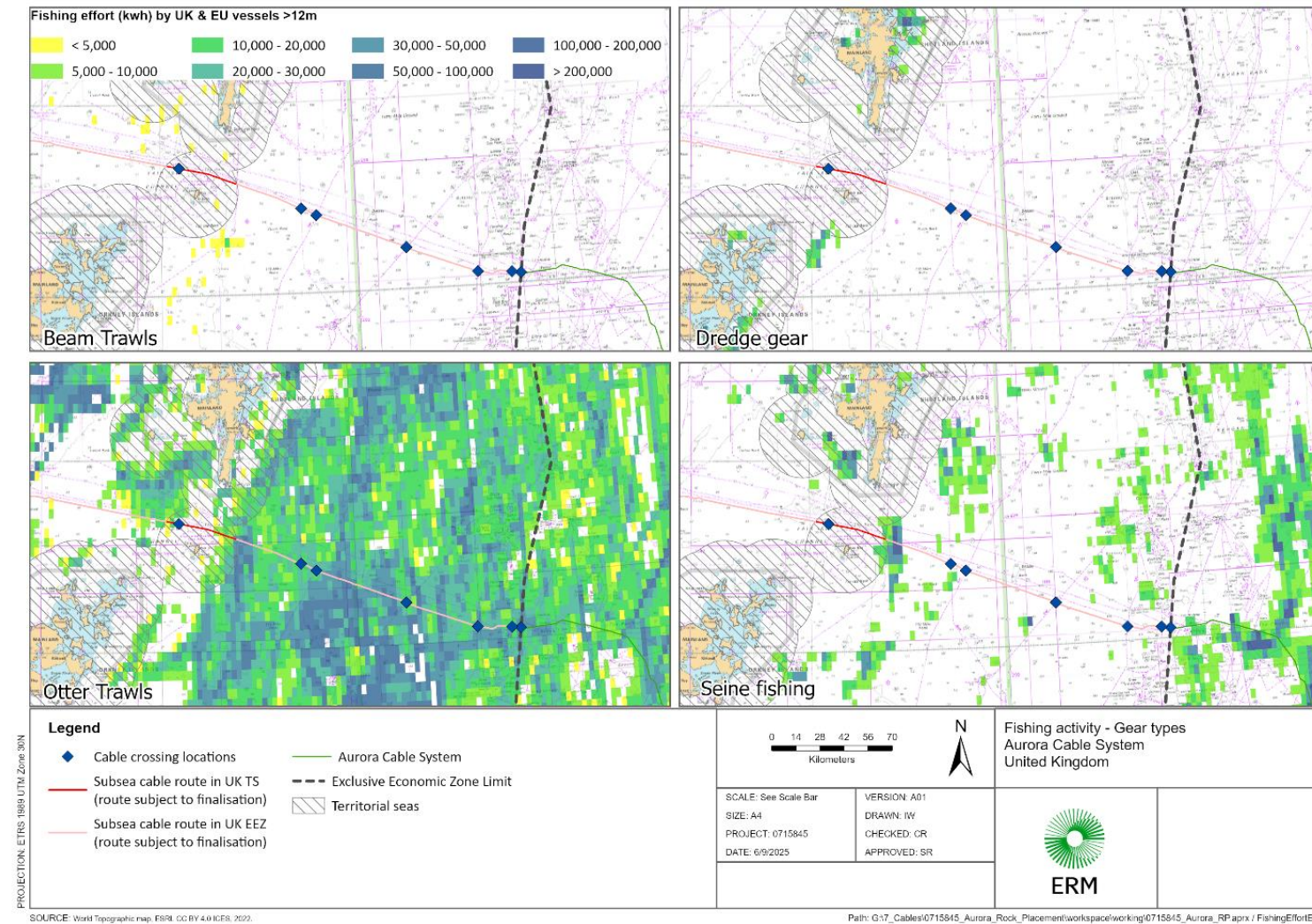
6.6.3.2 COMMERCIAL FISHERIES

The primary gear types used within the other users Study Area between 2019 to 2023 are pelagic trawls (98,574 tonnes), demersal trawls (32,716 tonnes), pelagic seine (15,241 tonnes), and demersal seine (3,028 tonnes) (MMO, 2025). Minor landings from static vessels were recorded utilising pots and traps (255 tonnes) between 2019 to 2023 (MMO, 2025). A total sum of 150,857 tonnes was landed within the other users Study Area between 2019 to 2023, attaining a total landed value of £187,934,267 (MMO, 2025).

The primary fisheries landed in the other users Study Area are pelagic species, mackerel, herring and whiting, and demersal species, cod and haddock (MMO, 2025). The majority of the fishing activity within the other users Study Area is undertaken by fishing vessels from Scotland, England, and Northern Ireland (MMO, 2025).

Figure 6-16 highlights fishing vessel effort by gear type observed within vicinity of the proposed pre- and / or post-installation rock placement locations, in both the Scottish TS and UK EEZ, between 2017-2020 (ICES, 2021). No beam trawl, dredge gear or seine fishing activity was observed across the rock placement locations. However, otter trawl activity was observed to overlap with all pre- and / or post-installation rock placement locations, with effort ranging from 5,000 to 100,000 kwh (ICES, 2021).

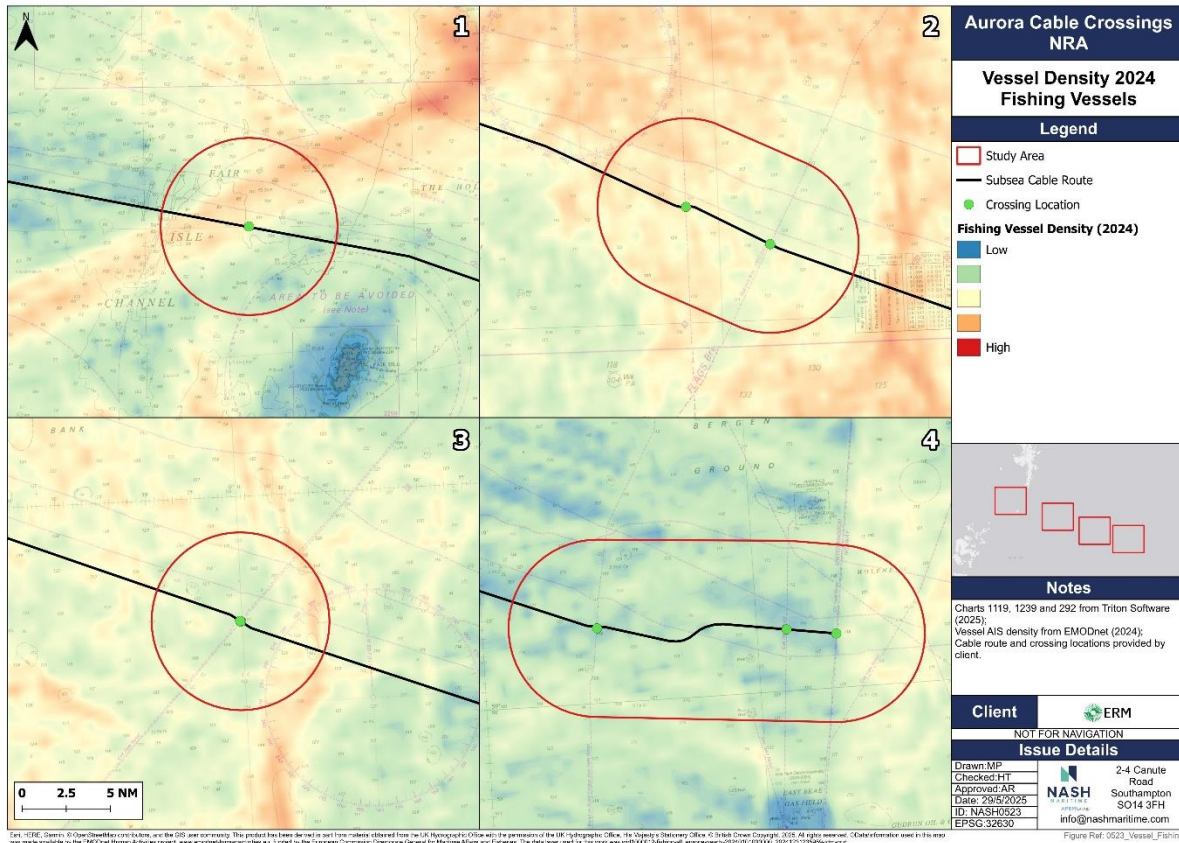
FIGURE 6-16 UNITED KINGDOM AND NON-UNITED KINGDOM FISHING VESSEL EFFORT BY GEAR TYPE, 2017-2020



Source: ICES, 2021

Appendix F identified that one (1) fishing vessel route northeast-southwest was observed crossing within Study Area 1 and crossing the Shetland HVDC Link crossing location (**Figure 6-17**) (NASH, 2025). Medium fishing vessel density was observed in Study Areas 2 and 3; Study Area 4 contains low to medium fishing vessel density (**Figure 6-17**) (NASH, 2025).

FIGURE 6-17 VESSEL DENSITY 2024 (FISHING VESSELS)

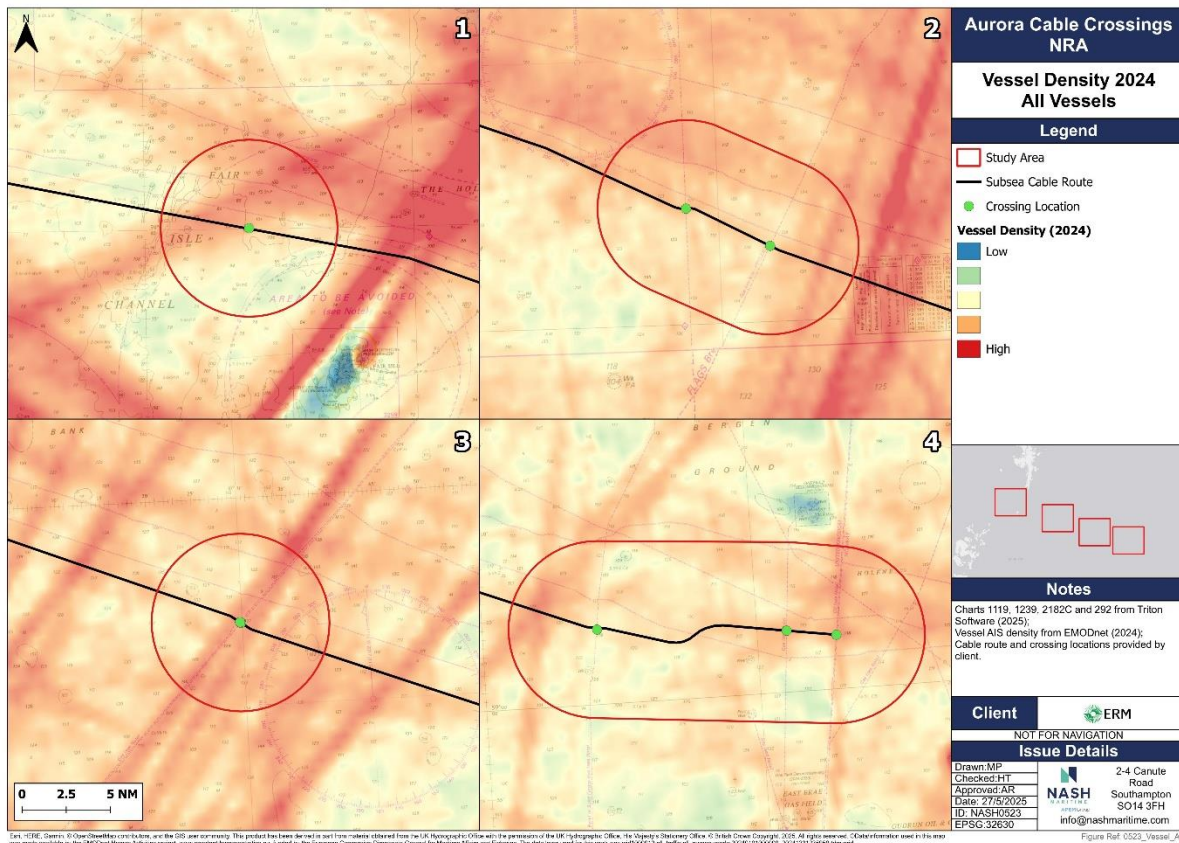


Source: NASH, 2025

6.6.3.3 SHIPPING AND NAVIGATION

Annualised vessel traffic density as highlighted in **Figure 6-18**, showed that high density routes were observed crossing the subsea cable route to and from the Shetland Islands and North Sea O&G fields (NASH, 2025). Vessel traffic density was generally moderate in all Study Areas, with moderate-high density routes intersecting Study Areas 1, 2 and 4 (NASH, 2025).

FIGURE 6-18 VESSELS DENSITY 2024 (ALL VESSEL TYPES)



Source: NASH, 2025

Vessel traffic analysis for individual vessel types can be found within **Appendix F** (NASH, 2025). Broadly, analysis showed that a number of ferry, cargo and passenger routes operate in proximity to the other users Study Area (NASH, 2025). Cargo vessel routes were observed in proximity to all of the Study Areas included within the NRA, whilst medium-high tanker density was only observed in proximity to Study Areas 1 and 4 of the NRA (NASH, 2025). Recreational activity was generally low across the Other Users Study Areas, with the exception of Study Area 1 of the NRA (NASH, 2025).

6.6.4 IMPACT ASSESSMENT

6.6.4.1 POTENTIAL IMPACTS

There will be a direct interaction between the proposed pre- and post-installation rock placement activities associated with the Aurora Project, and the other users receptors identified in **Section 6.6.3**.

The following potential impacts relevant to other users are assessed:

- Other Users and Infrastructure:
 - Temporary loss of access;
 - Collision risk between vessels and other sea users; and
 - Direct damage to assets of other users.
- Commercial Fisheries:

- Disruption or displacement of fishing activity into other areas; and
- Loss of access to fishing grounds;
- Snagging of anchors and fishing gear; and
- Potential impacts to commercially important species.
- Shipping and Navigation:
 - Potential impacts on commercial vessel and / or small craft routing;
 - Increased vessel-to-vessel collision risk;
 - Potential impacts on emergency response / search and rescue operations; and
 - Navigational impacts on recognised sea lanes.

The potential impacts have been assessed based on the worst-case parameters outlined within the Project Description (See **Section 4**).

Please note that direct harm / damage, permanent habitat change / loss, and temporary increases in SSC and siltation impacts on commercially important fish and shellfish receptors have been assessed in **Section 6.3**.

6.6.4.2 IMPACT ASSESSMENT

The assessment of the potential impacts outlined in **Section 6.6.4.1** is presented in **Table 6-9**.

TABLE 6-9 IMPACT ASSESSMENT FOR OTHER USERS

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
Other Users and Infrastructure	Temporary loss of access	There is a potential for loss of access or displacement to other users, as a result of the pre- and post-installation rock placement. Given the mobile nature of boating and recreational users, they are considered tolerant and can adapt to temporary changes if needed. Existing pipelines and cables are <i>in situ</i> and typically are not accessed on a regular basis by their operators. Therefore, access to these areas of the assets listed is unlikely to be required during installation activities and considered of low value and low sensitivity. Therefore, the overall sensitivity is Low .	Any loss of access or displacement to other users during rock placement activities, will be short-term, temporary and over a small spatial scale compared to the surrounding area used by other users. The proposed rock placement activities are estimated to take 14 days over a period of six (6) months and will be undertaken by one (1) vessel, and a temporary exclusion zone will be confirmed by the on board Captain. Therefore, the magnitude is deemed Negligible .	Negligible	Not Significant	None Required	Not Significant

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	Collision risk between vessels and other sea users	There is an increased collision risk created during the installation phase for all passing traffic due to the presence of a rock placement installation vessel (NASH, 2025). This may be either due to the direct risk of a passing vessel colliding with the rock placement installation vessel or could arise due to vessels altering their route due to the works and transiting in closer proximity to other passing vessels (NASH, 2025). Given the volume of traffic, distance between the subsea cable crossings and the existing navigational features in proximity, it is considered that there is adequate seabed should a passing vessel be required to	Pre-and post-installation rock placement will occur at eight (8) locations covering a combined total of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²), representing a small fraction of the overall subsea cable route. Any potential impacts will be of a temporary nature during the rock placement process which is anticipated to take up to 14 days in total over a period of six (6) months. Therefore, the magnitude is deemed Negligible .	Negligible	Not Significant	None Required	Not Significant

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
		undertake collision avoidance actions (NASH, 2025). Therefore, the sensitivity is deemed Low .					
	Direct damage to assets of other users	There is potential for damage to pre-existing infrastructure, including the subsea cable crossings identified. As the pre-existing infrastructure has no capacity to adapt or tolerate change, and are of high commercial value, their sensitivity is High .	Pre-and post-installation rock placement will occur at eight (8) locations covering a combined total of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²), representing a small fraction of the overall subsea cable route. Therefore, the magnitude is deemed Negligible .	High	Significant	All crossings of infrastructure will follow standard industry practice and subsea cable proximity and crossing agreements will be implemented and agreed with other asset owners.	Not Significant
Commercial Fisheries	Disruption or displacement of fishing activity into other areas	There is the potential for disruption or displacement of fishing activity into other areas as a result of the pre- and post-installation rock placement. The pelagic and demersal mobile gear receptor groups demonstrate a high tolerance to change and strong	Demersal mobile gear fleets may experience some disruption or displacement of fishing activity due to pre- and post-installation rock placement; however, these potential effects are expected to be limited in nature. This gear type typically operates across	Negligible	Not Significant	None Required	Not Significant

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
		spatial adaptability, as they typically operate across broad fishing grounds and can shift effort to alternative areas with relative ease. These groups also exhibit good recoverability due to their mobility and operational flexibility. The static gear receptor group, while possessing some capacity to adapt through gear modification or relocation, is more spatially constrained and therefore exhibits lower adaptability and recoverability. Nevertheless, given the overall operational characteristics and value of the fisheries, the sensitivity of all receptor groups is considered Low.	broad spatial areas and is characterised by high mobility, allowing it to adapt to temporary or localised changes in fishing grounds. For static gear fisheries, which are more spatially constrained, the scale and intensity of potential disruption is also considered low. The proposed rock placement activities would occur at eight (8) locations along the subsea cable route, covering a combined area of between 5,716.8 m² and 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²) — a small geographic extent relative to the overall operational area of affected fleets. The duration and frequency of disruption is expected to be limited to the periods immediately				

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
			surrounding the rock placement activities, and the activity is fully reversible outside the footprint of the deposited material. Given the defined and predictable nature of the works, and the low probability of unplanned events, the magnitude of impact is therefore considered to be Negligible for all receptors other than mobile demersal gear. The baseline review process established that only mobile demersal gear is observed to overlap with the rock placement, the magnitude of the potential impact for this receptor is considered to be Low .				
	Loss of access to fishing grounds	There is the potential for loss of access to fishing grounds as a result of the pre- and post-installation	Demersal mobile gear fleets may experience some loss of access to fishing grounds due to pre- and post-installation	Negligible	Not Significant	None Required	Not Significant

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
		rock placement. The pelagic and demersal mobile gear receptor groups demonstrate a high tolerance to change and strong spatial adaptability, as they typically operate across broad fishing grounds and can shift effort to alternative areas with relative ease. These groups also exhibit good recoverability due to their mobility and operational flexibility. The static gear receptor group, while possessing some capacity to adapt through gear modification or relocation, is more spatially constrained and therefore exhibits lower adaptability and recoverability. Nevertheless, given the overall operational characteristics and	rock placement; however, these potential effects are expected to be limited in nature. This gear type typically operates across broad spatial areas and is characterised by high mobility, allowing it to adapt to temporary or localised changes in fishing grounds. For static gear fisheries, which are more spatially constrained, the scale and intensity of potential disruption is also considered low. The rock placement activities would occur at eight (8) locations along the subsea cable route, covering a combined area of between 5,716.8 m² and 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²) — a small geographic extent relative to the overall operational				

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
		value of the fisheries, the sensitivity of all receptor groups is considered Low .	area of affected fleets. The duration and frequency of disruption is expected to be limited to the periods immediately surrounding rock placement activities, and the activity is fully reversible outside the footprint of the deposited material. Given the defined and predictable nature of the works, and the low probability of unplanned events, the magnitude of impact is therefore considered to be Negligible for all receptors other than mobile demersal gear. The baseline review process established that only mobile demersal gear is observed to overlap with the rock placement, the magnitude of the potential impact for this receptor is				

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
			considered to be Low .				
	Snagging of anchors and fishing gear	Subsea cables and any associated protection introduce a risk of snagging, either by vessel anchors or fishing gear (NASH, 2025). Within the vessel monitoring system (VMS) data, vessels were recorded used demersal gears, which have the highest potential to interact with subsea cables; medium to low fishing vessel density, of which are known to utilise demersal gear, was observed across a number of subsea cable crossings (Appendix F) (NASH, 2025). Appendix F concluded the risk rating of snagging to be low and broadly acceptable for all vessel types (NASH, 2025). Additionally, the subsea cable and	Pre-and post-installation rock placement will occur at eight locations covering a combined total of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²), representing a small fraction of the overall subsea cable route. Any potential impacts will be of a temporary nature during the rock placement activities which is anticipated to take up to 14 days in total for a period of six (6) months. Therefore, the magnitude is deemed Negligible for all receptor groups other than the demersal gear receptor groups. The baseline review process identified that only mobile demersal gear is observed to overlap with areas of rock	Negligible	Not Significant	None Required	Not Significant

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
		other subsea assets will be marked on nautical charts, so that fishermen can identify locations of crossings. Once rock placement activities are completed, the subsea cable crossings will be protected (NASH, 2025). Therefore, sensitivity is deemed Low .	placement. However, with appropriate notification of the locations of any potential snagging hazards, it is considered likely that fishers within this receptor group will adjust their operations accordingly, avoiding areas of proposed rock placement. As such, the magnitude of the potential impact on the demersal gear receptor group is considered to be Low .				
Shipping and Navigation	Impacts on commercial vessel and / or small craft routing	Whilst deviations may be required to route around rock placement activities, it is likely that these deviations will only be less than a minute given the localised nature and low spatial footprint of these activities (NASH, 2025). Minor amendments can be made by	Pre-and post-installation rock placement will occur at eight (8) locations covering a combined total of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²), representing a small fraction of the overall subsea cable route. Any impacts will be of a temporary nature	Negligible	Not Significant	None Required	Not Significant

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
		approaching vessels in advance to pass clear of the rock placement activities. Given the available seabed around the activities, and adaptability of vessels to deviate where necessary around Aurora project vessel where needed, the sensitivity is deemed Low .	during the rock placement activities which is anticipated to take up to 14 days in total over a period of six (6) months. Therefore, the magnitude is deemed Negligible .				
	Increased vessel-to-vessel collision risk	There is an increased collision risk created during the installation phase for all passing traffic due to the presence of the rock placement installation vessel (NASH, 2025). This may be either due to the direct risk of a passing vessel colliding with the Aurora Project vessel or could arise due to vessels altering their route due to the works and transiting in	Pre-and post-installation rock placement will occur at eight (8) locations covering a combined total of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²), representing a small fraction of the overall subsea cable route. Any impacts will be of a temporary nature during the rock placement activities which is anticipated to take up to 14 days in total over a	Negligible	Not Significant	None Required	Not Significant

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
		closer proximity to other passing vessels (NASH, 2025). Given the volume of traffic, distance between the subsea cable crossings and the existing navigational features in proximity, it is considered that there is adequate seabed should a passing vessel be required to undertake collision avoidance actions (NASH, 2025). Therefore, the sensitivity is deemed Low .	period of six (6) months. Therefore, the magnitude is deemed Negligible .				
	Impacts on emergency response / search and rescue operations	During the rock placement activities, the presence of the Aurora Project vessel has the potential to inhibit search and rescue operations should an incident occur in close proximity to the installation activities (NASH,	Pre-and post-installation rock placement will occur at eight (8) locations covering a combined total of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²), representing a small fraction of the overall subsea cable	Negligible	Not Significant	None Required	Not Significant

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
		2025). There is also potential for an increased need for emergency response should an accident occur aboard the Aurora Project vessel (NASH, 2025). Based on the review of incidents, it can be seen that the areas in proximity to the subsea cable crossings have experienced a relatively low rate of accidents in recent years (NASH, 2025). Therefore, the sensitivity is deemed Low .	route. Any potential impacts will be of a temporary nature during the rock placement activities which is anticipated to take up to 14 days in total over a period of six (6) months. Therefore, the magnitude is deemed Negligible .				
	Snagging of anchors and fishing gear	Subsea cables and any associated protection introduce a risk of snagging, either by vessel anchors or fishing gear (NASH, 2025). Within the VMS data, vessels were recorded used demersal gears, which have the highest potential to interact with subsea	Pre-and post-installation rock placement will occur at eight (8) locations covering a combined total of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²), representing a small fraction of the overall subsea cable route. Any potential impacts will be of a	Negligible	Not Significant	None Required	Not Significant

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
		cables; medium to low fishing vessel density was observed (Appendix F) (NASH, 2025). The subsea cable and other subsea assets will be marked on nautical charts so that fishermen can identify locations of crossings. Once rock placement is installed, the subsea cable crossings will be protected (NASH, 2025). Therefore, sensitivity is deemed Low .	temporary nature during the rock placement activities which is anticipated to take up to 14 days in total over a period of six (6) months. Therefore, the magnitude is deemed Negligible .				
	Navigational impacts on recognised sea lanes	There are IMO adopted recommended routes to the north and south of Fair Isle; the Aurora Project passes within the north channel between Fair Isle and the Shetland Islands (NASH, 2025). This area is only recommended for vessels travelling	Pre-and post-installation rock placement will occur at eight (8) locations covering a combined total of 5,716.8 m ² to 8,745.6 m ² (i.e. approximately 0.006 km ² to 0.009 km ²), representing a small fraction of the overall subsea cable route. Any potential impacts will be of a	Negligible	Not Significant	None Required	Not Significant

Receptor	Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
		west (NASH, 2025). Vessels travelling west also have the option to pass south of the Fair Isle as indicated on nautical charts (NASH, 2025). Where vessels require to transit north of Fair Isle, it is anticipated that their routes will not be disrupted, there is adequate seabed north of the cable crossings for these vessels to pass safely (NASH, 2025). Therefore, sensitivity is deemed Low .	temporary nature during the rock placement activities which is anticipated to take up to 14 days in total over a period of six (6) months. Therefore, the magnitude is deemed Negligible .				

6.6.5 ASSESSMENT SUMMARY

In conclusion, the sensitivity of all receptors identified, combined with the magnitude, results in an overall negligible risk. With the implementation of best practice mitigation as outlined within **Appendix D** and accompanying **Appendix F** the risk remains negligible, and the overall effect on other users receptors is considered to be **Not Significant**.

6.7 MARINE ARCHAEOLOGY

6.7.1 INTRODUCTION

This subsection describes and assesses the potential for significant effects that the installation of the proposed rock placement activities associated with the Aurora Project, across eight (8) sites planned within the Scottish TS and UK EEZ, may have on any marine archaeology and cultural heritage. This subsection should be read in conjunction with other influencing topics, such as **Section 6.1** (Marine Physical Processes).

The assessment of marine archaeology and cultural heritage assets must consider the potential effects to both known, and unknown assets that may be identified as a result of the proposed rock placement activities associated with the Aurora Project.

The known cultural heritage resource may be split between designated and non-designated assets. Designated marine assets may include:

- World heritage sites;
- Historical MPAs; and
- Protected World War Two (WWII) wrecks (including military remains).

Known non-designated assets may be of archaeological and cultural significance, but not necessarily qualified, at present, as a designated asset. Unknown assets include assets that have not as yet been identified or located but where there is potential for their presence.

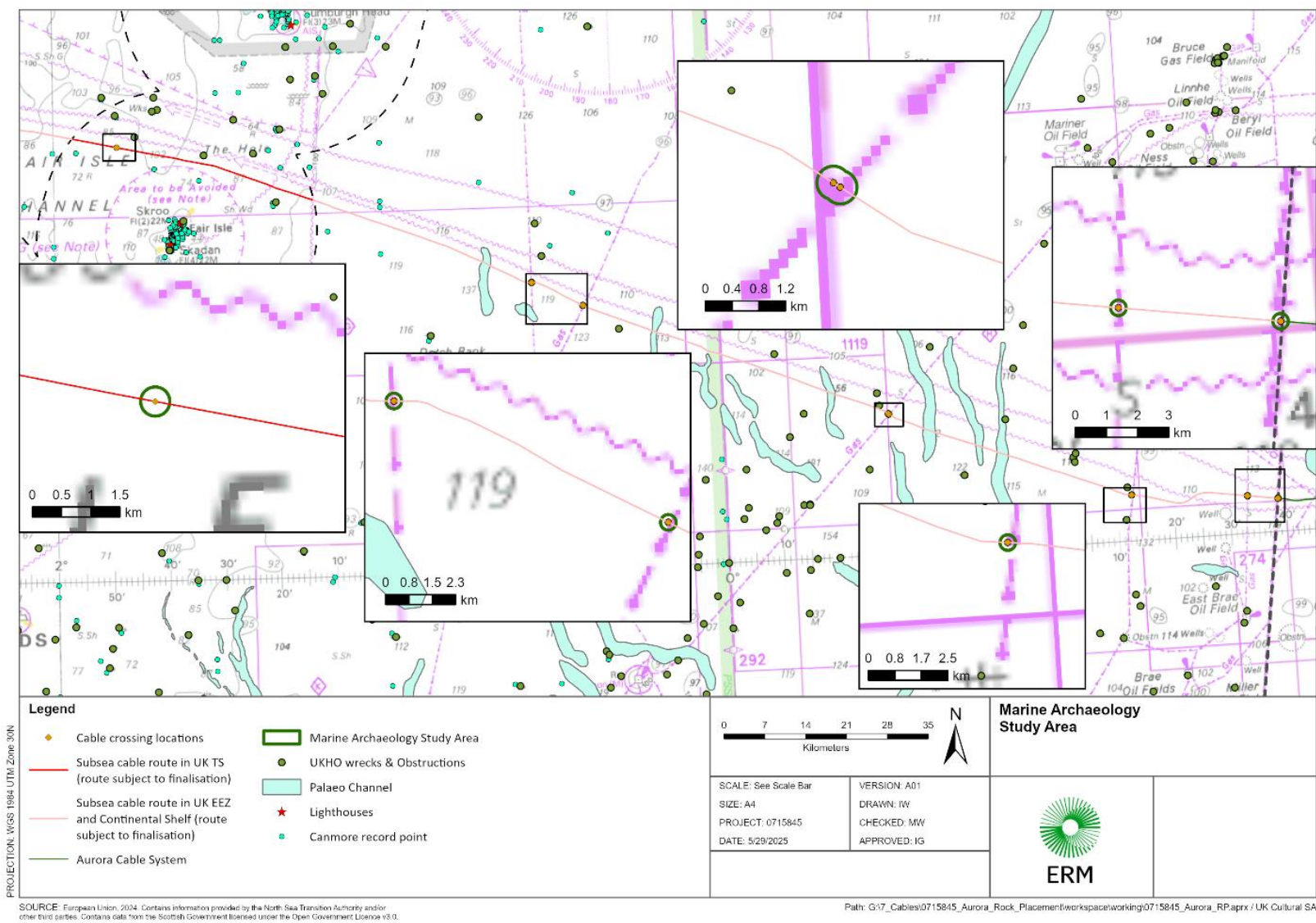
The types of marine heritage receptors can be grouped into the following categories:

- Submerged prehistory and landscapes;
- Terrestrial and marine archaeology; and
- Aviation archaeology.

6.7.2 MARINE ARCHAEOLOGY STUDY AREA

The marine archaeology Study Area consists of a 50 m buffer realistic worst-case scenario of all eight (8) pre- and / or post-installation rock placement locations associated with the Aurora Project, to understand potential direct impacts to known designated and non-designated assets. An additional wider 250 m buffer was added to provide contextual information on which potentially direct or indirect physical impacts may occur from the rock placement.

FIGURE 6-19 MARINE ARCHAEOLOGY STUDY AREA



6.7.2.1 ISSUES SCOPED OUT

The proposed rock placement activities associated with the Aurora Project will be conducted underwater, apart from the installation vessel. Any disruption to setting would be temporary, limited to the undertaking of placement works, and negligible in nature, therefore the requirement for settings assessment of terrestrial and marine receptors is scoped out, in line with the SLVA (**Section 5.1.2**).

Additionally, assessment of palaeolandscape features within the marine environment has also been scoped out, due to the rock placement activities not requiring excavation for its placement (or any potential associated plumes), and serves to 'seal' or act as a 'protective cap' atop any potential palaeolandscape features.

Any potential impact related to the development of scour would only occur on a discrete, local basis at the crossing which would form a discrete part of any potential palaeolandscape feature, and would therefore be considered a negligible impact at most.

6.7.3 BASELINE ENVIRONMENT

This assessment utilises freely available data provided from local councils, the United Kingdom Hydrographic Office (UKHO) wrecks and obstruction database (UKHO, 2025), Historic Environment Scotland (HES) (HES, 2025), Marine Scotland (Marine Scotland, 2025), and United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage List (UNESCO, 2025; The agency for Culture and Places, 2025). In order to develop a robust, appropriate and proportional baseline, these sources are contextualised to illustrate the known resource and wider potential for marine archaeology and cultural heritage in the Aurora Project area.

There is a high archaeological potential for sites of interest within the North Sea. Not only from the high potential of identifying historic wrecks in the area due to extensive trade, fishing, and military networks in the region, including aviation, but also in the form of prehistoric remains. Additionally, to the southeast of Orkney and Shetland the now submerged former landscape of the wider Scapa Flow environ, extending to the mainland of Scotland, has a high potential for prehistoric sites following the glacial recession, in addition to trade and defensive wreckage, as the North Sea has a long history of maritime navigation, exploration and harbour.

The submerged areas around Shetland and Orkney, have an elevated potential to find prehistoric settlements due to the regional sea level changes in the area (Dawson *et al.*, 2017). The formerly sub-aerial landscape near Shetland and Orkney was only submerged around 4,000 years ago, and the region was occupied by humans prior to that submergence. In the shallower waters of the Scottish shelf, site preservation is possible where anoxic conditions suitable for site preservation exist, at depths down to 45 m (Dawson *et al.*, 2017). These finds are likely to date to the Mesolithic and Neolithic and consist of submerged settlements. There is also a moderate potential for identifying finds relating to the Palaeolithic on lower stretches of the Scottish shelf and in the central northern North Sea across to Norway, although a lack of extensive study in the region means it is challenging to identify hotspots of activity in the area (Dawson *et al.*, 2017). Due to the repeated glaciations within the area the survival outside of an area of potential protection is scarce, however within some of the islands there are key features.

6.7.3.1 SITE SPECIFIC RECORDS AND DATA

Upon reviewing the records for the rock placement areas in the Scottish TS and UK EEZ, no known designated or non-designated assets were identified within the immediate locations of the rock placement activities (50 m), or wider Study Area.

A geophysical survey was completed by EGS in September 2024 for the Aurora Project within the Scottish TS and UK EEZ, and data were reviewed by the survey company for any anomalies. No archaeological assets were identified in the geophysical review within Scottish TS or the UK EEZ.

A further review of the survey data was undertaken ⁽¹⁾, available as site specific SSS and bathymetry data (figures of the data can be found in **Appendix E**). No clearly identifiable sites of archaeological interest within the Study Area were identified, however some features of possible anthropogenic origin were, linked to potential installation debris, possible fishing gear, or debris (a linear feature indicating potential fishing gear over the rock placement activities location within the Scottish TS).

6.7.3.2 MARINE ARCHAEOLOGY BASELINE SUMMARY

Although there are no known sites of archaeological interest within the Study Area, there is potential for identifying unknown submerged pre-history, marine archaeology, and aviation archaeology within the rock placement activities locations, as the Aurora Project passes through the North Sea near the Scottish Shelf, all locations with a long period of pre-historic settlement and historical marine trade and defensive routes.

6.7.4 IMPACT ASSESSMENT

According to the findings of the desk-based review of the datasets, no known marine archaeological or cultural heritage asset has been identified within the wider Study Area (**Table 6-10**). The impact assessment is therefore focused on the potential to introduce adverse effects as a result of potentially direct and indirect impacts on the unknown marine archaeological or cultural heritage assets.

The potential impact on the unknown archaeological or submerged cultural heritage assets within the proximity of rock placement activities locations in the UK EEZ, may include:

- Direct physical impacts – the damage or full removal of a cultural heritage asset e.g. rocks crushing a mast or mixing with rocks of a ballast pile; and
- Indirect physical impacts – the damage or full removal of a cultural heritage asset due to physical changes indirectly caused e.g. changes in seabed sediment level or current flow.

6.7.4.1 IMPACT ASSESSMENT

The assessment of the potential impacts outlined in **Section 6.7.4** is presented in **Table 6-10**.

⁽¹⁾ Site specific geophysical data were provided as processed deliverables – sidescan sonar mosaic (0.5 m resolution) and bathymetry as a gridded surface (5 m resolution); due to constraints full JSF sidescan files were not able to be accessed. Quality was variable with the presence of survey and processing artefacts.

TABLE 6-10 SUMMARY OF IMPACT ASSESSMENT FOR MARINE ARCHAEOLOGY RECEPTORS

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual significance
Direct physical impact to known sites of interest: submerged pre-historic sites, maritime or aviation archaeology	No known sites of archaeological interest were identified within the Study Area, therefore there is no sensitivity to this impact.	No Potential Impact	Negligible	Not Significant	None Required	Not Significant
Direct physical impact to unknown sites of interest: submerged pre-historic sites, maritime or aviation archaeology	The sensitivity of unknown cultural heritage sites including submerged prehistoric sites, maritime and aviation archaeology may range from Low to High depending on the specific asset. The sensitivity is linked to the value of a receptor, which is largely a product of its importance, as informed by legislation and policy, and as qualified by professional judgement. Unlike other receptors, any archaeological asset receiving a direct impact will likely incur damage, with no potential for recovery and limited tolerance.	The greatest potential impacts are predicted during the installation phase, the magnitude of change during this phase would be High because the rock placement activities could partially or wholly damage the receptor, resulting in a total or substantial change to an asset thereby equating to a loss or disturbance of defining features of the receptor. Recovery not expected nor can it be readily rectified.	Major	Potentially Significant	Where appropriate, develop a Written Scheme of Investigation (WSI) and ensure a Protocol for Archaeological Discoveries (PAD) is available to the Aurora Project team to ensure a method for reporting any finds, and completing appropriate mitigation for any new sites of interest. Should any site specific data, such as further geophysical survey data or ROV imagery / footage of the seabed, be	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual significance
					undertaken prior to installation, input from a heritage specialist should be used to target their focus, as appropriate. A review of the outputs should be undertaken by a heritage specialist, to understand any changes in the known baseline, that may be incorporated into the mitigation design, as a result of any identified potential for targeted site remediation of potential impacts to maritime or aviation archaeology, which cannot be avoided. These techniques will reduce the potential for loss and serve to mitigate the impact of the Aurora Project.	

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual significance
Indirect physical impact to known sites of interest: submerged prehistoric sites, maritime or aviation archaeology	No known sites of archaeological interest were identified within the Study Area, therefore there is no sensitivity to this impact.	No Potential Impact	Negligible	Not Significant	None Required	Not Significant
Indirect physical impact to unknown sites of interest: submerged prehistoric sites, maritime or aviation archaeology	As above, the sensitivity of unknown cultural heritage sites including submerged prehistoric sites, maritime and aviation archaeology may range from Low to High depending on the specific asset. The sensitivity is linked to the value of a receptor, which is largely a product of its importance, as informed by legislation and policy, and as qualified by professional judgement. Unlike other receptors, any archaeological asset receiving a direct impact will likely incur damage, with no potential for recovery and limited tolerance.	The greatest potential impacts are predicted during the operational phase. Anticipated impacts from the rock placement activities may include scour, which could result in slight change in the local hydrodynamics in any areas where additional subsea cable protection may be required; however, this is not expected to extend more than a few metres from the rock placement activities. The magnitude of change during this phase would be Low because any change in hydrodynamics would result in a minor alteration of the seabed surrounding an asset and have limited disturbance, the changes may be rectified.	Minor	Not Significant	None Required	Not Significant

6.7.5 ASSESSMENT SUMMARY

There are **no anticipated significant direct or indirect effects** to known marine archaeology or cultural heritage assets from the pre- and / or post-installation rock placement activities associated with the Aurora Project within the Scottish TS and UK EEZ, based on the currently understood baseline. However, there remains the **potential for significant direct adverse effects to unknown archaeology or cultural heritage assets**. Any potential impacts to unknown archaeology would likely be of high magnitude and likely result in significant effects.

A review of the geophysical and geotechnical data acquired from the CRS (completed in September 2024) at the rock placement activities locations associated with the Aurora Project was undertaken with no sites of archaeological interest identified, Aurora Project was undertaken with no sites of archaeological interest identified, although some features of anthropogenic origin were observed.

The possibility of encountering unknown archaeology during the rock placement activities cannot be discounted. The area of direct physical impact is small (noting post-installation and pre-installation rock berm profiles have not been finalised, they may cover roughly 100 m by 22 m in a cross formation whose arms are roughly 12 m in width); such that the likelihood of potential direct physical impact to unknown archaeology is small. The potential for impact can be further mitigated by review of any further investigation and data review, where available, avoidance via micro-siting and exclusion zones where receptors are identified, and the development of a WSI and PAD.

6.8 WATER FRAMEWORK DIRECTIVE AND ENVIRONMENTAL QUALITY

6.8.1 INTRODUCTION

This section provides an overview of the water and sediment quality baseline of the portion of the subsea cable where rock placement activities associated with the Aurora Project will occur. This section also assesses the potential effects from rock placement activities on water and sediment quality.

6.8.2 METHODOLOGY

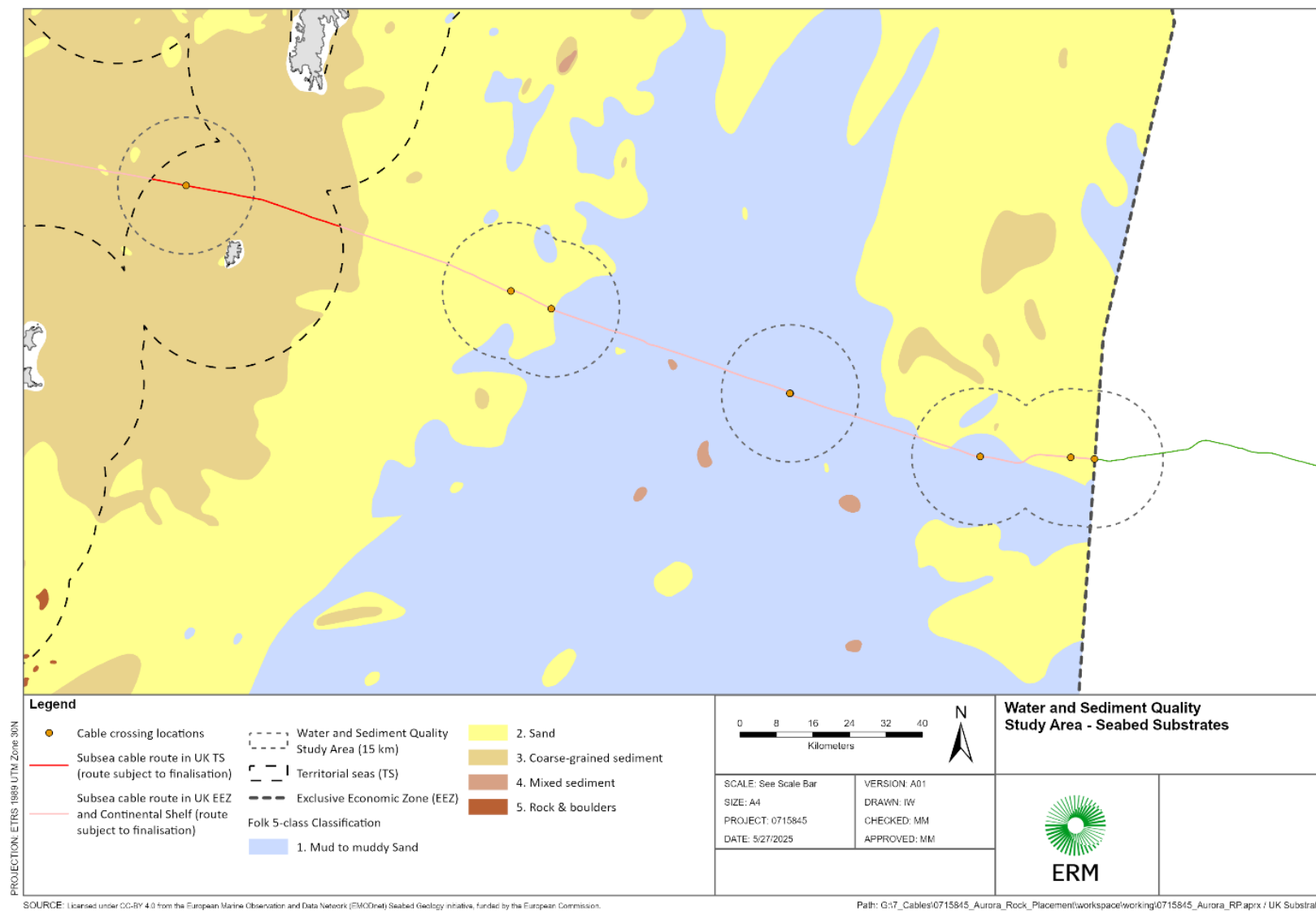
The closest WFD body of water to any of the rock placement locations is the Fair Isle (ID 200245), at a distance of approximately 10.2 km. To aid with screening, the extent of potential temporary fine sediment plumes was calculated as a highly conservative realistic worst-case scenario (see caveats below) based on mean peak spring tidal flow, to be 9.9 km ⁽²⁾. Therefore, there is no potential for overlap between the Fair Isle water body and the extent of potential fine sediment plumes, and the potential effects of rock placement activities associated with the Aurora Project on WFD designated water bodies has been scoped out of the assessment.

(2) Tidal excursion calculated as follows = (Mean Spring Peak Velocity (m/s) * (2/π) (sinusoidal approximation)) * (3,600 (s/h) * 6 h (estimated average tidal window in which the currents travel in any one direction)). The Mean Spring Peak Velocity (m/s) of 0.72 m/s was used for the calculation, from ABPmer renewables atlas (2025), available online at: <https://www.renewables-atlas.info/explore-the-atlas/>. This is a highly simplified 1D advection model. Significant limitations include a highly simplified current velocity profile and the model does not incorporate other environmental variables such as waves action, sediment characteristics and dynamics, density, diffusion, etc. This therefore represent a theoretical maximum distance a water molecule could travel under peak tide conditions.

6.8.2.1 STUDY AREA

The water and sediment quality Study Area has been defined on the basis of the area that may potentially be directly impacted by the rock placement activities associated with the Aurora Project, and adjacent area that may potentially be indirectly impacted (e.g. sediment plume dispersion and area of influence). This includes an additional buffer area of 15 km as shown in **Figure 6-20** extending in the UK EEZ and the Scottish TS.

FIGURE 6-20 SEABED SEDIMENT TYPES WITHIN THE WATER AND SEDIMENT QUALITY STUDY AREA



6.8.3 BASELINE ENVIRONMENT

The water and sediment quality baseline is related to the physicochemical properties (quality descriptors) of the water and sediment within the Study Area. The receptors considered in this baseline are:

- Sediment quality;
- Water quality; and
- WFD designated water bodies and their quality elements.

6.8.3.1 SEDIMENT CHARACTERISTICS

Sediment Type

Within the water and sediment quality Study Area, the sediment type is primarily composed of coarse-grained sediment between the Orkney and Shetland Islands, with small areas of sand. Additionally, areas of sand and mud to muddy sand are present towards the east of the water and sediment quality Study Area, towards the boundary of the UK EEZ (**Figure 6-20**).

6.8.3.2 WATER CHARACTERISTICS

The water quality composition within the water and sediment quality Study Area is anticipated to be identical to that recorded for unpolluted coastal and offshore northern North Atlantic and northern North Sea waters.

Salinity and Temperature

Data obtained from the Fair Isles between 2013 and 2017 indicates the salinity to be approximately 34.8 PSU which was considered to be low for the area (Dye *et al.*, 2020). The sea surface temperature (SST) of the area varies considerably between summer and winter months within the Scottish TS. The warmest month is August with a SST of approximately 13.21 degrees Celsius (°C) and the coldest month is March which has an average SST of 8.19 °C.

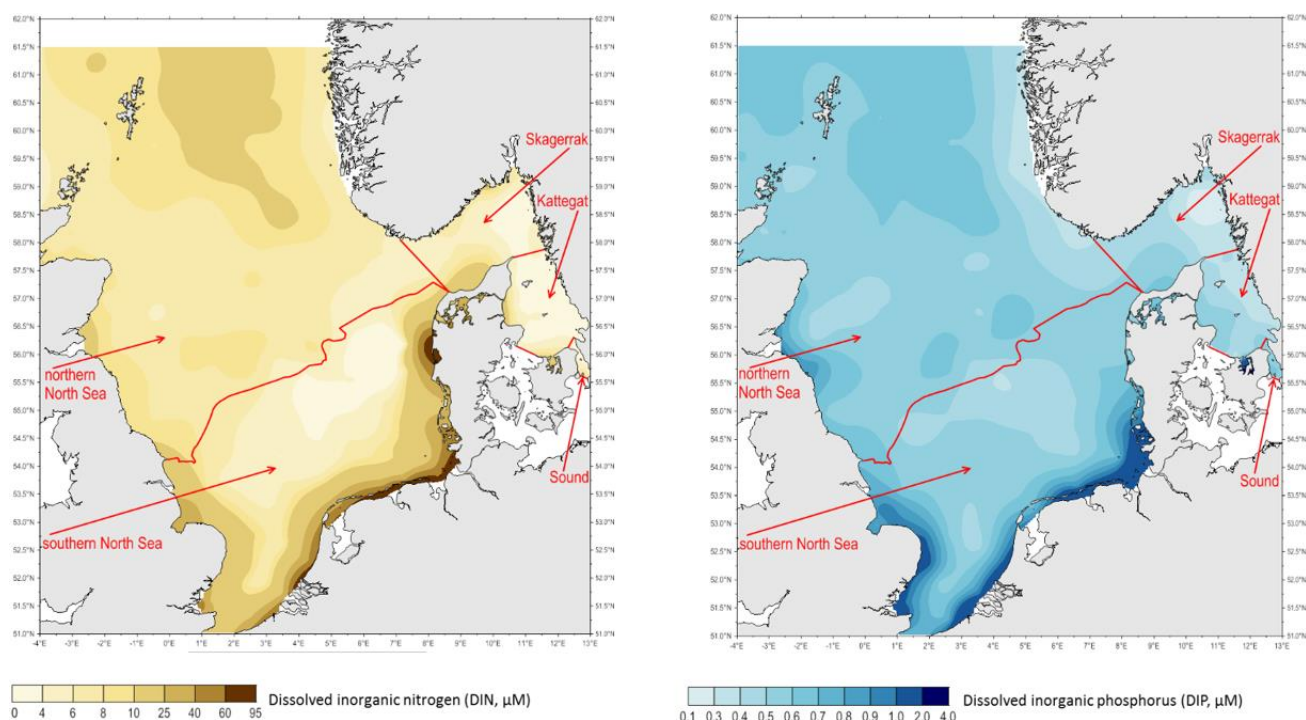
Suspended Sediment Concentration

Within the Scottish Continental shelf and the Rockall Trough and Bank area, SSCs are typically low (0.7 mg/l on average) and little seasonal variation occurs. This is a result of the coarse nature of the sediment (Cefas, 2018).

Nutrients and Primary Production

The northern North Sea's biogeochemical and primary production cycles are influenced by its seasonally stratified waters. The nutrients in the North Sea, including nitrogen, phosphorus and silicate, originate from various sources including agricultural runoff, weathering and direct discharge from natural and anthropogenic sources. As such, the amount of dissolved inorganic nitrogen (DIN) and dissolved inorganic phosphorus (DIP) during the winter is reflective of these sources. The average concentrations of DIN and DIP in the North Sea throughout the winter are presented in **Figure 6-21**.

FIGURE 6-21 DISSOLVED INORGANIC NITROGEN (LEFT) AND DISSOLVED INORGANIC PHOSPHORUS (RIGHT) CONCENTRATIONS IN THE NORTH SEA (1990-2014)



Source: OSPAR, 2017

Contaminants

The concentrations of metallic contaminants were recorded at monitoring stations in the east Shetland region as part of the Clean Seas Environment Monitoring Programme (CSEMP). Heavy metal contaminant concentrations were found to be relatively low, and no exceedances of Marine Scotland Action Levels 1 (AL1) or 2 (AL2) were detected. AL1 contaminants are not of concern and are unlikely to impact licensing decisions and AL2 contaminants are considered unsuitable for disposal at sea. Additionally, metal concentrations within sediments surrounding Shetland are generally lower than the rest of Scotland (Shucksmith, 2017).

6.8.3.3 WATER FRAMEWORK DIRECTIVE DESIGNATED WATER BODIES

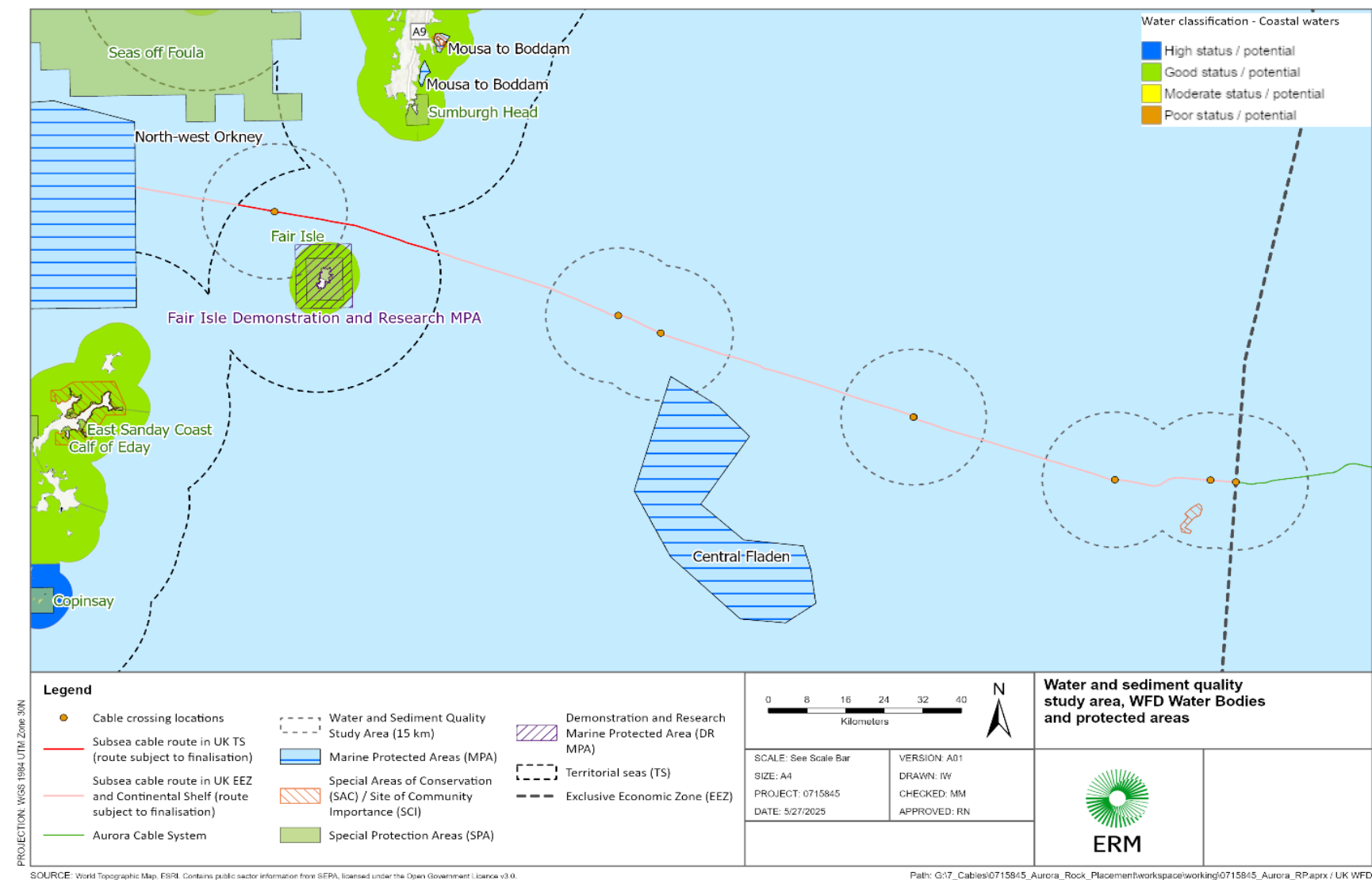
Designated Waters

The River Basin Management Plan under the Water Environment and Water Services (Scotland) Act 2003 designates surface waters. Under this act, projects which may interact with surface waters must consider the WFD to ensure the achievement or maintenance of a 'Good Ecological Status' (GES) or 'Good Ecological Potential' (GEP).

Water bodies in proximity to the rock placement activities associated with the Aurora Project are shown in **Figure 6-22**. The locations of the pre- and / or post-installation rock placement activities do not overlap with any designated water bodies, with the Fair Isle (ID 200245) being the closest, which is approximately 10.2 km from the nearest rock placement activities location. Additionally, the rock placement activities will not overlap with any designated bathing waters or any designated shellfish waters. Due to the distances of WFD water bodies and the suspended sediment plume and fine deposition as a result of rock placement

associated with the Aurora Project being predicted to not exceed 9.9 km from the sites, WFD water bodies have been scoped out and will not be assessed further.

FIGURE 6-22 WATER FRAMEWORK DIRECTIVE WATER BODIES WITHIN PROXIMITY TO THE ROCK PLACEMENT ACTIVITIES



6.8.4 IMPACT ASSESSMENT

Following establishment of baseline conditions present within the water and sediment quality Study Area and surrounding areas, and an understanding of the rock placement activities associated with the Aurora Project, it is possible to assess the potential effects on water and sediment quality receptors by identifying potential impact pathways.

The assessment criteria are outlined in **Section 5** (Environmental Assessment Methodology).

Designated WFD waterbodies have been scoped out of the assessment for potential impacts below and will not be assessed further (**Section 6.8.3.3**).

Overall, the majority of the plumes generated by the activity are expected to be localised and temporary. This is because the sediment at five (5) out of the eight (8) subsea cable crossings is composed predominantly of mixed sediment, where coarser particles can have significantly higher settling velocities than fine sediments (silts and / or clays). The coarser fractions will deposit rapidly, and the limited fine material present will be insufficient to form a persistent or extensive plume.

6.8.4.1 POTENTIAL IMPACTS

Rock placement associated with the Aurora Project will be undertaken by a single vessel across the eight locations of the UK EEZ and Scottish TS. The combined footprint of rock placement will range between 5,716.8 m² to 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²) The period of seabed disturbance will occur over 14 days in total, across a six (6)-month period.

Potential impacts to water and sediment quality as a result of the rock placement activities associated with the Aurora Project include:

- Deterioration of water and sediment quality due to resuspension of sediment;
- Deterioration of water and sediment quality due to the potential resuspension of contaminants;
- Deterioration of water and sediment quality due to vessel discharges;
- Deterioration of sediment quality due to permanent deposits; and
- Deterioration of water and sediment quality due to accidental events from unplanned fuel spills due to collisions or equipment.

6.8.4.2 IMPACT ASSESSMENT

The assessment of the potential impacts outlined in **Section 6.8.4.1** is presented in **Table 6-11**.

TABLE 6-11 SUMMARY OF IMPACT ASSESSMENT FOR WATER AND SEDIMENT QUALITY RECEPTORS

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
Deterioration of water and sediment quality due to resuspension of sediment	Low - Disturbance to the seabed associated with the proposed works has the potential to mobilise sediments and increase SSC in the water column. The sediments in proximity to the subsea cable crossing locations are mud to muddy sand, sand or mixed sediment, therefore SSC would likely be limited due to the amount of coarse sediments present. Water clarity and sediments physical properties will be affected by this impact. However, water and sediment quality can be tolerant to temporary increases of SSC as the receptors are adapted to natural fluctuations in the water column. Water and sediment quality receptors within the Study Area are expected to recover quickly from temporary increases in SSC and the particles will be dispersed and re-deposited over a short period of time due to the dynamic and high energy environment.	Low – Increased SSC is expected to affect water clarity and subsequent deposition can also alter the physical properties of the seabed such as by altering particulate grain size composition. The sediment plume generated through seabed disturbance is expected to be temporary and localised, occurring to a maximum distance of 9.9 km in the realistic worst-case scenario. However, it is unlikely that the coarser sediments present will travel this distance and the plume will dissipate and settle rapidly (within 1-2 tidal cycles). Additionally, the plume intensity is predicted to be small due to the restricted spatial area potentially impacted by the disturbance. The intensity of the plume is also not expected to exceed the increases which can occur naturally (e.g. under storm driven condition).	Negligible	Not Significant	None Required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
Deterioration of water and sediment quality due to resuspension of contaminants	Low - Disturbance to the seabed associated with the proposed works has the potential to remobilise contaminants present in the resuspended sediments and cause the receptors' deterioration. The receptors have some tolerance to accommodate minor potential effects / impacts. The large volume of the receiving environment, with the capacity for dilution and flushing, greatly favours adaptability and recoverability. No contaminated sediments are expected at the rock placement activities locations and therefore no potential impact pathway has been identified.	Low – Heavy metal contaminant concentrations were found to be relatively low, and no exceedances of Marine Scotland Action Levels 1 (AL1) or 2 (AL2) were detected. Due to the low concentrations of contaminants in the region, any disturbance is expected to be minimal.	Negligible	Not Significant	None Required	Not Significant
Deterioration of water and sediment quality due to vessel discharges	Low – Increased vessel traffic in the area, as a result of the proposed works, has the potential to introduce vessels discharges (i.e. sewage, grey water, bilge water and deck waste) into the water column. The receptors have some tolerance to accommodate minor effects / potential impacts and will be able to recover or adapt due to the high energy and dynamic environment, where the large volume of the receiving	Low - Discharges from Aurora Project vessel will be small and will not take place close to land in accordance with MARPOL Annex IV. Embedded mitigation measures will be in place (Appendix D). Waste management during the rock placement activities associated with the Aurora Project will comply with applicable legislation and the International Convention for the Prevention of Pollution	Negligible	Not Significant	None required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
	environment and natural processes such as dilution, flushing and sedimentation, aid rapid recovery from small scale vessel discharges.	from Ships (MARPOL) 73/78. The vessel involved shall be required to meet the requirements of MARPOL 73/78, which includes requirements to avoid and minimise the discharge of harmful substances to the marine environment. Ballast water discharges from the installation vessel will be managed in accordance with the Ballast Water Management (BWM) Convention.				
Deterioration of sediment quality due to permanent deposits	Medium – Physical disturbance from the rock placement will lead to permanent loss of natural areas of the seabed, leading to receptor deterioration. However, the permanent seabed deposits will remain localised with a limited footprint. The receptors have some tolerance to accommodate minor potential effects/impacts, and although some localised permanent damage to the seabed will occur, it will not affect the water quality receptor and the overall integrity or the health and value of the sediment quality receptor.	Low - This will be confined to the eight rock placement locations which are relatively small in comparison to the rest of the seabed in the region, with the total footprint of the rock berms being 8.7 km ² .	Minor	Not Significant	None required	Not Significant

Impact	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual Significance
Deterioration of water and sediment quality due to accidental events from unplanned fuel spills due to collisions or equipment	Low – Increased vessel traffic in the area, as a result of the proposed works, has the potential to introduce accidental releases of hydrocarbons into the water column. See “Deterioration of water and sediment quality due to vessel discharges” sensitivity cell.	Low – Any unintentional hydrocarbon discharge during the rock placement activities will be limited to the vessel's inventory. Diesel, due to its low viscosity, will spread quickly, forming a thin surface sheen that disperses rapidly through spreading and evaporation. It is unlikely to remain in the water column or reach the seabed, meaning sediment and seabed features are unlikely to be affected. Embedded mitigation measures and an emergency response plan for the Aurora Project will reduce the risk of accidental events from occurring and will implement measures to contain any possible spill.	Negligible	Not Significant	None required	Not Significant

6.8.5 ASSESSMENT SUMMARY

In conclusion, no WFD compliance assessment was required as no impact pathway has been identified.

Additionally, the potential effects of the rock placement activities associated with the Aurora Project on water and sediment quality were considered to be temporary and localised and therefore, **Not Significant**.

6.9 CUMULATIVE IMPACTS

6.9.1 OVERVIEW

Cumulative impacts are considered to be potential impacts on receptors caused by an action in combination with other planned projects / activities, such as the installation, operation and maintenance, and decommissioning of other offshore development projects. This CIA considers combined potential impacts of the pre- and / or post-installation rock placement activities associated with the Aurora Project with the potential impacts from a number of different projects, on the same single receptor / resource. Furthermore, the CIA will also consider the potential impacts of the rock placement activities in-combination with the potential impacts associated with the subsea cable burial of the Aurora Project (Reference Number: MS-00011067). In line with the CIA methodology described in **Section 5.2.2.5**, a two (2) staged approach to assessing potential cumulative impacts has been undertaken.

6.9.2 CUMULATIVE IMPACTS WITH OTHER PROJECTS

6.9.2.1 SCREENING OF PROJECTS FOR CONSIDERATION

Projects included within the CIA are those identified within 10 nm of each subsea cable crossing location (CIA Study Area), aligning with the spatial extent utilised for the assessment undertaken in **Section 6.6** (Other Users). Potential cumulative impacts have been assessed where a common pressure-receptor pathway between the rock placement activities and other projects has been identified. For each of the topics scoped into this EA Report assessed under the CIA for common pressure-receptor pathways, a topic-specific Study Area has been defined for each assessment and can be found in the respective topic section of this EA Report.

Where possible, the Aurora Project subsea cable route has been planned to avoid other marine developments such as aquaculture sites, offshore renewables application areas and active offshore wind sites and tidal energy sites. No other planned projects or developments have been identified within 10 nm of each subsea cable crossing locations, aligning with what was already found in the EA Report specifically for the installation and operation of the Aurora Project (Reference Number: MS-00011067).

The presence of eight (8) cable and pipeline crossings as shown in **Figure 4-1** give rise to the requirement for pre- and / or post-installation rock placement activities, and the works associated with the rock placement activities have been scoped into the CIA. However, as these projects are already in operation, only activities associated with the operation and maintenance phase (such as repair and maintenance / routine inspection surveys) of these projects are included and assessed cumulatively with the rock placement activities.

As outlined in **Section 6.6** (Other Users), the subsea cable route passes through an area with a high density of shipping routes, including vessels for commercial fisheries which utilise

bottom trawling fishing techniques. These receptors can potentially be affected by the potential cumulative impacts of the operation and maintenance of the identified power cable and pipelines that cross the rock placement activities locations associated with the Aurora Project.

6.9.2.2 CUMULATIVE IMPACTS

With consideration to the scoped in projects and density of vessel movements and fishing activity outlined in **Section 6.9.2** above, the potential cumulative impacts on sensitive receptors include:

- Impacts to sensitive species resulting from increased collision risk and underwater noise generated from vessel sources (e.g. project vessels transiting through the CIA Study Area);
- Impacts to commercial fisheries receptors with respect to changes to access to fishing grounds and displacement of fishing vessels to other areas within the CIA Study Area; and
- Impacts to commercial and recreational vessels and associated receptors due to increased vessel movements during the rock placement activities.

Pre- and / or post-installation rock placement activities will be undertaken by a single vessel at eight (8) locations, one (1) in the Scottish TS and seven (7) in the UK EEZ, covering a combined area of 5,716.8 m² to 8,745.6 m² (i.e. approximately 0.006 km² to 0.009 km²). Once both the pre- and post-installation rock placement activities are complete there will be no further disturbance to the seabed.

Impacts to Sensitive Species

As outlined in **Section 6.4** (Marine Megafauna), increased vessel traffic during the rock placement activities has the potential for cumulative increased collision risk to marine mammals associated with the operation and maintenance activities of identified projects, as well as increased noise and vibration generated disturbance.

Common pressure – receptors pathways between the rock placement activities and other projects identified and included within this CIA associated with potential impacts to sensitive species, as outlined in **Section 6.4** (Marine Megafauna), are:

- Vessel displacement and collision to pinnipeds and cetaceans (assessed as a negligible risk on the installation and operation of the Aurora Project alone [Reference Number: MS-00011067]); and
- Noise and vibration to pinnipeds and cetaceans (assessed as a negligible risk on the installation and operation of the Aurora Project alone [Reference Number: MS-00011067]).

There is potential that marine mammals may collide with the single vessel deployed for the rock placement activities or may be displaced from the area, potentially prompting a behavioural or stress related response, injury or mortality. There is a potential increased risk to these receptors when factoring in potential cumulative impacts from vessel movements associated with the operation and maintenance of the other projects. It is anticipated that the extent of vessel movements associated with the operation and maintenance of the scoped in projects will be limited to infrequent repair and maintenance and routine inspection surveys. These activities are expected to include a small number of operating vessels over a short period. Taking this into account, it is considered that the risk to marine mammals will be no

greater than that of the Aurora Project alone, therefore the potential cumulative effect of increased collision risk with vessels is considered **Negligible** and therefore **Not Significant**.

The rock placement activities will contribute to underwater noise in the region during installation. This additional noise could temporarily increase the zone within which marine mammals will avoid loud noises, beyond existing projects, and therefore give rise to a potential cumulative effect. It is expected that noise generated by the rock placement activities in combination with noise generated from operation and maintenance activities associated with the scoped in projects will be in line with other vessels operating in the region with species already accustomed to the underwater noise generated from vessel traffic. Taking this into account, it is considered that the risk to marine megafauna will be no greater than that of the rock placement activities alone and cumulatively with the subsea cable burial of the Aurora Project installation, therefore the potential cumulative effect of underwater noise and vibration to sensitive species with other project activities is considered **Negligible** and therefore **Not Significant**.

Impacts to Commercial Fisheries

As outlined in **Section 6.6.3.2** (Other Users: Commercial Fisheries), there is the potential for temporary loss or restricted access to fishing grounds as a result of activities relating to the rock placement activities which may contribute to potential cumulative impacts in line with the operation and maintenance activities of other identified projects. Additionally, there may be displacement of fishing vessels to other areas as a result of increased vessel movements during the rock placement activities. which may contribute to potential cumulative impacts.

Common pressure – receptors pathways between the rock placement activities and the operation and maintenance of other projects identified and included within this CIA associated with disturbance to commercial fisheries operations, as outlined in **Section 6.6.3.2** (Other Users: Commercial Fisheries), are:

- Loss or restricted access to fishing grounds (assessed as a negligible risk for the rock placement activities alone); and
- Displacement of fishing activity to other areas (assessed as a negligible risk for the rock placement activities alone).

Given the rock placement activities' short timeframe, it is considered that the risk to access to fishing ground and displacement of fishing activity to other areas cumulatively with the vessel movements associated with the operation and maintenance of the other identified assets, will be no greater than that of the rock placement activities alone. Therefore, the potential cumulative effects to commercial fisheries operations is considered **Negligible** and therefore **Not Significant**.

Impacts to Commercial and Recreational Vessels

As outlined in **Section 6.6.3.3** (Other Users: Shipping and Navigation), it is expected that commercial vessels and ferries and small crafts may be required to re-route due to the presence of installation vessel and the requested safe passing distance. Additionally, there is an increased collision risk created during the rock placement activities for all passing traffic due to the presence of the installation vessel, either due to the direct risk of a passing vessel colliding with the installation vessel, or vessels altering their route and transiting in closer proximity to other vessels. Any cumulative increase in collision risk could have subsequent

potential impacts on search and rescue operations and ports and harbours within the CIA Study Area. These pathways to potential impacts may further contribute to potential cumulative impacts.

Common pressure – receptors pathways between all phases of the rock placement activities associated with the Aurora Project and the operation and maintenance of the other projects identified and included within this CIA associated with disturbance to commercial and recreational vessels, as outlined in **Section 6.6.3.3** (Shipping and Navigation), are:

- Impacts to commercial vessel, ferry routes, small craft routing and recreational vessels and activities (assessed as a negligible risk for the rock placement activities alone);
- Increase in vessel-to-vessel collision risk (assessed as a negligible risk for the rock placement activities alone);
- Impacts to search and rescue operations (assessed as a negligible risk for the rock placement activities alone); and
- Increase snagging risk, either by vessel anchors or fishing gear (assessed as a negligible risk for the rock placement activities alone).

Given the rock placement activities' short timeframe combined with the low probability and short duration of any necessary repairs for the identified subsea cable crossings, it is considered that the risk to access to commercial vessels and ferry routes, small craft routing / recreational vessels and activities, search and rescue operations and snagging risk by the subsea cable will be no greater than that of the rock placement activities alone.

Therefore, the potential cumulative effects to commercial and recreational vessel operations is considered **Negligible** and therefore **Not Significant**.

6.9.3 CUMULATIVE IMPACTS IN COMBINATION WITH CABLE BURIAL CAMPAIGN

This section specifically looks at the potential cumulative impacts of the rock placement activities, in-combination with the works associated with the subsea cable burial and installation as outlined in the Aurora Project EA Report (Reference Number: MS-00011067). The potential cumulative impacts of identified common pressure-receptor pathways for each of the topics scoped in to the assessment are discussed below.

Marine Physical Processes

Potential impacts on marine physical processes associated with the subsea cable burial and installation of the Aurora Project, as assessed in the Aurora Project EA Report (Reference Number: MS-00011067) included:

- Changes to seabed or coastal morphology (assessed as negligible in the Aurora Project EA Report [Reference Number: MS-00011067]);
- Increased suspended sediment concentration (assessed as negligible in the Aurora Project EA Report [Reference Number: MS-00011067]);
- Changes to the sediment transport (assessed as negligible in the Aurora Project EA Report [Reference Number: MS-00011067]); and
- Changes to the wave regime or oceanic currents (assessed as negligible in the Aurora Project EA Report [Reference Number: MS-00011067]).

These four (4) same receptors were also assessed as part of the rock placement activities associated with the Aurora Project (**Section 6.1**). Due to the small-scale, and temporary nature of the activities associated with the rock placement activities, potential cumulative impacts to marine physical processes as a result of the rock placement activities in combination with the potential impacts associated with the works for the installation of the Aurora Project will be temporary and highly localised; therefore, the cumulative effects are considered **Negligible** and **Not Significant**.

Benthic Ecology

Potential impacts on benthic ecology associated with the installation of the Aurora Project, as assessed in the Aurora Project EA Report (Reference Number: MS-00011067) included:

- Temporary habitat loss or disturbance (assessed as minor in the Aurora Project EA Report [Reference Number: MS-00011067]); and
- Temporary disturbance via increase in SSC and associated deposition (assessed as minor in the Aurora Project EA Report [Reference Number: MS-00011067]).

The proposed pre- and / or post-installation rock placement activities on the subsea cable crossing locations will potentially result in the following potential impacts to benthic ecology, as discussed in **Section 6.2** (Benthic Ecology):

- Permanent habitat change/loss (assessed as minor within this report);
- Temporary increases in SSC and siltation (assessed as minor within this report); and
- Potentially localised scour effects from rock placement on the seabed (assessed as minor within this report).

Due to the small-scale, and temporary nature of the activities associated with the rock placement activities, potential cumulative impacts to benthic ecology as a result of the rock placement activities in combination with the potential impacts associated with the works for the Aurora Project installation will be temporary and highly localised, and no greater than the potential impacts of either the subsea cable burial, or the rock placement activities alone. Therefore, cumulative effects are considered **Minor** and **Not Significant**.

Fish and Shellfish Ecology

Potential impacts on fish and shellfish associated with the Aurora Project installation, as assessed in the Aurora Project EA Report (Reference Number: MS-00011067) included:

- Direct harm / damage (assessed as negligible in the Aurora Project EA Report [Reference Number: MS-00011067]);
- Habitat disturbance (assessed as negligible in the Aurora Project EA Report [Reference Number: MS-00011067]);
- Smothering due to suspended sediments (assessed as negligible in the Aurora Project EA Report [Reference Number: MS-00011067]); and
- Underwater noise (assessed as negligible in the Aurora Project EA Report [Reference Number: MS-00011067]).

The proposed pre- and / or post-installation rock placement activities on the subsea cable crossing locations will potentially result in the following potential impacts to fish and shellfish ecology, as discussed in **Section 6.3** (Fish and Shellfish Ecology):

- Direct harm / damage (assessed as negligible within this report);
- Permanent habitat change / loss (assessed as minor within this report); and
- Temporary increases in SSC and siltation (assessed as negligible within this report).

Due to the small-scale, and temporary nature of the activities associated with the rock placement activities, potential cumulative impacts to fish and shellfish ecology as a result of the rock placement activities in combination with the potential impacts associated with the works for the Aurora Project installation will be temporary and highly localised, and no greater than the potential impacts of either the subsea cable burial, or the rock placement activities alone. Therefore, potential cumulative effects considered **Minor** (for permanent habitat change / loss), and **Negligible** (for all other potential impacts) and **Not Significant**.

Marine Megafauna

Potential impacts on marine megafauna associated with the Aurora Project installation, as assessed in the Aurora Project EA Report (Reference Number: MS-00011067) included:

- Installation vessel displacement and collision (assessed as negligible in the Aurora Project EA Report [Reference Number: MS-00011067]);
- Noise and vibration (assessed as negligible in the Aurora Project EA Report [Reference Number: MS-00011067]); and
- Temporary loss of habitat and foraging opportunities (assessed as negligible in the Aurora Project EA Report [Reference Number: MS-00011067]).

These three (3) same receptors were also assessed as part of the rock placement activities (**Section 6.4**) and were all assessed as negligible. Due to the small-scale, and temporary nature of the activities associated with the rock placement activities, potential cumulative impacts to marine megafauna as a result of the rock placement activities in combination with the potential impacts associated with the works for the Aurora Project installation will be temporary and highly localised; therefore, cumulative effects are considered **Negligible** and **Not Significant**.

Ornithology

Ornithology was scoped out of the assessment of the Aurora Project EA Report (Reference Number: MS-00011067) due to minimal potential effects as a result of works associated with the installation, operation and maintenance and decommissioning of the Aurora Project. Therefore, an in-combination assessment with potential impacts associated with the rock placement activities is unable to be undertaken in line with the assessment carried out in **Section 6.5**.

Marine Archaeology

For marine archaeology, it was concluded that there are **no anticipated significant indirect effects** to known marine archaeology or cultural heritage assets, however, there is the **potential for significant direct adverse effects to unknown archaeology or cultural heritage assets**. This assessment conclusion was made for both the Aurora Project EA Report (Reference Number: MS-00011067), and within **Section 6.7** of this report. The potential cumulative impacts associated with the potential in-combination effects of both the Aurora Project installation and rock placement activities will not affect these individual conclusions, and draw the same assessment conclusion when considered in-combination with each other.

Habitat Regulation Appraisal and Nature Conservation Marine Protected Area Sites

Cumulative and in-combination assessments with consideration to HRA and NCMPA Sites have been undertaken separately and discussed within their respective chapters (**Appendix B: HRA** and **Appendix C: NCMPA Assessment**).

Water and Sediment Quality

Potential impacts on water and sediment quality associated with the Aurora Project installation as assessed in the Aurora Project EA Report (Reference Number: MS-00011067) included:

- Deterioration of water and sediment quality due to resuspension of sediment;
- Deterioration of water and sediment quality due to resuspension of contaminants;
- Deterioration of water and sediment quality due to vessel discharges; and
- Deterioration of water and sediment quality due to accidental events from unplanned fuel spills due to collisions or equipment.

These four (4) same receptors were also assessed under the WFD Assessment as part of the rock placement activities (**Section 6.8**), and were all assessed as negligible. An additional potential impact (deterioration of sediment quality due to permanent deposits) was also assessed as part of the WFD Assessment, and was assessed to be a minor impact, not significant. Due to the small-scale, and temporary nature of the activities associated with the rock placement activities, potential cumulative impacts to water and sediment quality as a result of the rock placement activities in combination with the potential impacts associated with the Aurora Project installation will be temporary and highly localised, and no greater than the potential impacts of either the subsea cable burial, or the rock placement activities alone. Therefore, potential cumulative effects are considered **Minor** and **Not Significant**.

6.9.4 ASSESSMENT SUMMARY

The activities associated with the rock placement activities for the Aurora Project have the potential to cause impacts to sensitive receptors cumulatively with disturbance from operation and maintenance activities in other offshore marine developments and associated users. Based on the assessment of cumulative impacts of the Aurora Project combined with the other projects (scoped into the CIA) it is concluded that the identified potential impacts will be no greater than those assessed for the rock placement activities alone; hence the cumulative potential effects are considered to be **Negligible** and therefore are **Not Significant**.

Potential cumulative effects from the rock placement activities in-combination with the activities associated with the Aurora Project installation have also been assessed. It is concluded that the identified potential impacts will be no greater than those assessed for the rock placement activities or the Aurora Project installation alone; hence the cumulative, in-combination effects are considered to be no greater than **Minor** and therefore are **Not Significant**.

7. CONCLUSION

The Aurora Project will be carrying out pre- and post-installation rock placement activities at one (1) power cable crossing in the Scottish TS and seven (7) pipeline crossing locations in the UK EEZ. The Project Description presented in **Section 4** outlines these activities in more detail. This allows for a realistic worst-case impact assessment to be undertaken, informed by specific footprints and durations, but which retains the flexibility required for the rock placement activities' design and execution phases.

On the basis of known sensitivities, proposed pre- and / or post-installation rock placement activities and stakeholder feedback, specific impact assessments were undertaken for the following topics:

- Marine Physical Processes (**Section 6.1**);
- Benthic Ecology (**Section 6.2**);
- Fish and Shellfish Ecology (**Section 6.3**);
- Marine Megafauna (**Section 6.4**);
- Ornithology (**Section 6.5**);
- Other Users (**Section 6.6**);
- Marine Archaeology (**Section 6.7**);
- WFD and Environmental Quality (**Section 6.8**);
- CIA (**Section 6.9**);
- HRA (**Appendix B**); and
- NCMPA (**Appendix C**).

Where relevant, these impact assessments have considered interactions with protected sites, potentially indirect impacts on other receptors and the potential for cumulative impacts. As outlined in the above sub-sections and appendices, it is predicted that there will be No Significant Effects on the receptors identified as a result of the pre- and / or post-installation rock placement activities associated with the Aurora Project. This is primarily due to potential impacts being localised and short term, as such it is anticipated that potentially affected receptors will recover quickly and are not anticipated to be impacted at a population level.

A range of control and mitigation measures will also be implemented so that any potential impacts are limited to an acceptable level. Embedded mitigation measures are provided in **Appendix D**. The mitigation measures highlighted in this EA Report are specific to the rock placement activities, only. The mitigation measures associated with the Aurora Project are provided in the Marine Licence (Reference Number: MS-00011067).

A summary of potential effects from this EA Report can be found in **Table 7-1** below.

TABLE 7-1 SUMMARY OF POTENTIAL EFFECTS

Topic	Assessment Conclusion
Marine Physical Processes	No Significant Effect
Benthic Ecology	No Significant Effect
Fish and Shellfish	No Significant Effect

Topic	Assessment Conclusion
Marine Megafauna	No Significant Effect
Ornithology	No Significant Effect
Marine Archaeology	No Significant Effect to known archaeology or cultural heritage assets
Other Users	No Significant Effect
WFD and Environmental Quality	No Significant Effect
CIA	No Significant Effect
HRA	No Significant Effect
NCMPA Assessment	No Significant Effect

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APPENDICES

APPENDIX A TECHNICAL NOTE



Aurora: United Kingdom

Rock Placement – Technical Note

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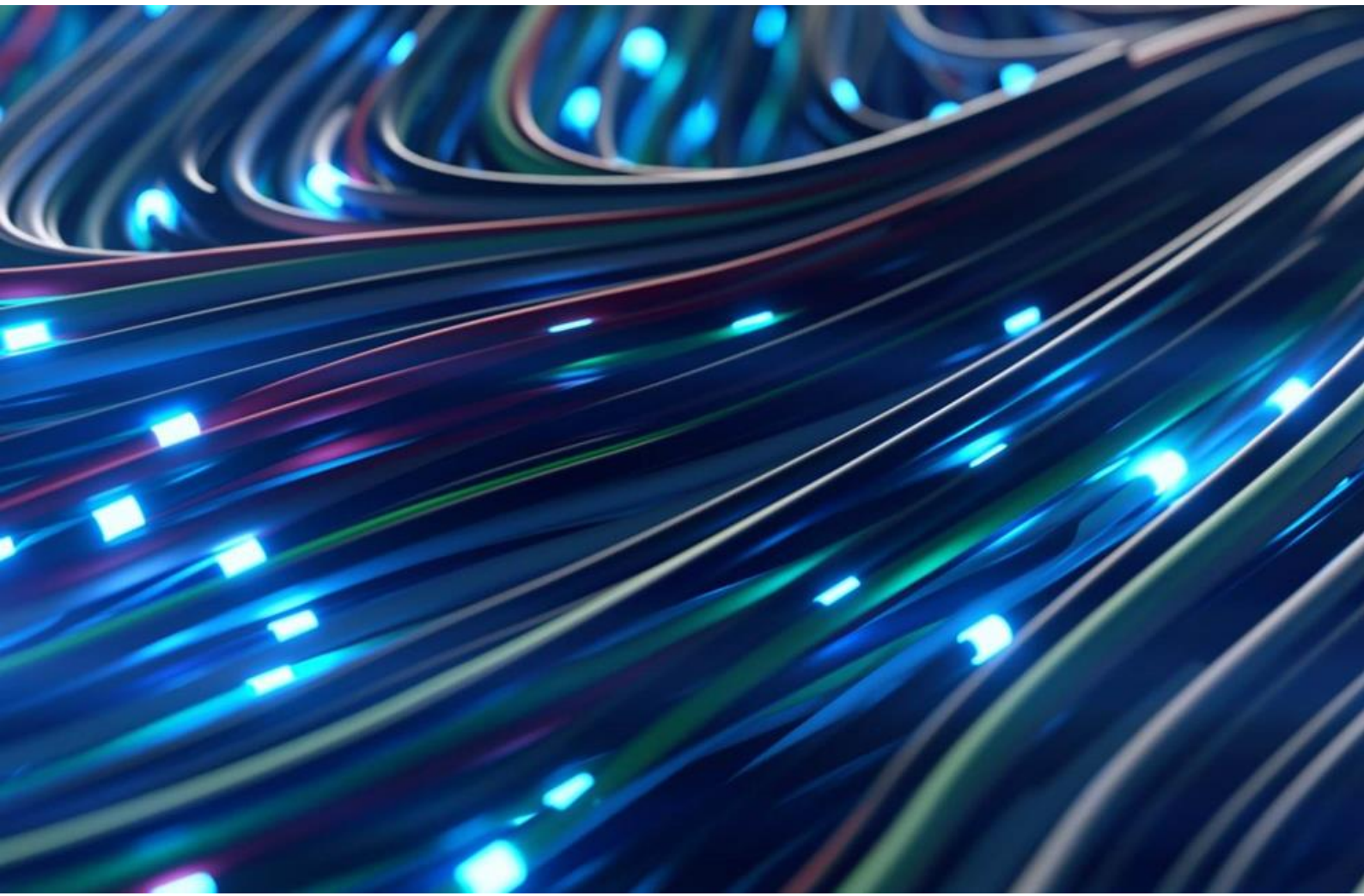


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[Redacted]

Jonathan Perry

Partner

Environmental Resources Management Ltd
6th Floor
102 West Port
Edinburgh
Scotland
EH3 9DN

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
ASN	Alcatel Submarine Networks
CES	Crown Estate Scotland
CIA	Cumulative Impact Assessment
DGPS	Differential Global Positioning Systems
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EPS	European Protected Species
ERM	Environmental Resources Management
FLAGS	Brent A to St. Fergus
FPROV	Flexible Fall Pipe Remote Operated Vehicle
HRA	Habitats Regulations Appraisal
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effects
MaCAA	Marine and Coastal Access Act
MCA	Maritime and Coastguard Agency
MD-LOT	Marine Directorate Licensing Operations Team
MHWS	Mean High Water Springs
MLA	Marine Licence Application
MOD	Ministry of Defence
NCMPA	Nature Conservation Marine Protected Area
NFTA	Northeast Fishermen's Training Association
NLB	Northern Lighthouse Board
NMP	National Marine Plan
NSTA	North Sea Transition Authority
PLB	Post-Lay Burial
PLIBs	Post-Lay Inspection and Burials
RNLI	Royal National Lifeboat Institution
RSPB	Royal Society for the Protection of Birds

Acronym	Definition
RYA	Royal Yachting Association
SAC	Special Areas of Conservation
SAGE	Scottish Area Gas Evacuation
SCFF	Scottish Creel Fishermen's Federation
SEPA	Scottish Environment Protection Agency
SFA	Shetland Fishermen's Association
SFF	Scottish Fishermen's Federation
SFO	Scottish Fishermen's Organisation
SIRGE	Shetland Island Gas Export
SLVIA	Seascape, Landscape and Visual Amenity
SPA	Special Protection Areas
SPFA	Scottish Pelagic Fishermen's Association
SSMO	Shetland Shellfish Management Organisation
STFA	Shetlands Training Fishermen's Association
SWFPA	Scottish White Fish Producers Association
TS	Territorial Seas
UK	United Kingdom
WFD	Water Framework Directive

1. INTRODUCTION

1.1 PROJECT OVERVIEW

Aurora is a planned subsea fibre optic telecommunication cable system (hereafter referred to as 'the Aurora Project', or the subsea cable), with a total estimated length of 7,230 kilometres (km). The Aurora Project will connect landings at Manasquan, New Jersey in the United States (US) and Blaabyerg in Denmark, traversing through both United Kingdom (UK) and Norwegian waters, and is expected to go live in 2027/2028.

In January 2025, the Aurora Project submitted a Marine Licence Application (MLA) to the Marine Directorate Licensing Operations Team (MD-LOT), for the installation and operation of the Aurora Project in the UK Territorial Seas (TS) (hereafter referred to as the 'Scottish TS'). The location and extent of the Aurora Project is shown in **Figure 1-1**.

The Aurora Project crosses a total of 10 existing cables and pipelines within the Scottish TS and UK Exclusive Economic Zone (EEZ), of which there are two (2) fibre optic cables and one (1) power cable crossing in the Scottish TS, and seven (7) pipeline crossings within the UK EEZ. It should be noted that rock placement will not be required for the fibre optic cable crossings in the Scottish TS. **Therefore the descriptions in this Technical Note will only be referring to one (1) existing power cable in the Scottish TS and seven (7) existing pipelines within the UK EEZ.**

To support crossing agreements with asset owners for existing infrastructures, the Aurora Project is proposing pre- and / or post-installation rock placement for protection of existing assets at the eight (8) crossing locations as shown in **Table 1-1** and in **Figure 1-2**. The purpose of the pre-installation rock placement is to protect the existing infrastructure from installation activities associated with the Aurora Project, and the post-installation rock placement is to protect the Aurora Project from external damage.

The rocks will be deployed via a Flexible Fall Pipe Remote Operated Vehicle (FPROV) (**Figure 4-6**), consisting of a carbon steel space frame with a vertical tunnel through the centre to accommodate the fall pipe. The FPROV will monitor the quantity of rocks deployed at each crossing and build the agreed profile (normally 1:3 side slopes and to agreed minimum height above top of existing asset and / or over top of the subsea cable).

At each crossing location, before laying the subsea cable over the existing infrastructure, 100 m of the subsea cable will be encased in Uraduct®, consisting of polyurethane, an inert material, to provide a protective barrier and separation between the subsea cable and the existing assets.

The scope of work for the rock placement activities is divided in two (2) different campaigns. One (1) campaign for the pre-installation and one (1) for the post-installation of the subsea cable. Further information can be found in **Section 4**.

TABLE 1-1 UNITED KINGDOM ASSET CROSSING LOCATIONS

System Name	Latitude	Longitude	Timing for Rock Placement
Shetland HVDC Link	59° 40.039' N	001° 48.398' W	Post-Installation
Shetland Island Gas Export System (SIRGE)	59° 26.553' N	000° 33.569' W	Pre-Installation and Post-Installation
Frigg to St. Fergus 1	59° 12.968' N	000° 29.868' E	Pre-Installation and Post-Installation
Scottish Area Gas Evacuation (SAGE)	59° 04.225' N	001° 12.566' E	Pre-Installation and Post-Installation
Bruce to Forties	59° 03.041' N	001° 38.674' E	Post-Installation
Brent A to St. Fergus (FLAGS)	59° 24.276' N	000° 24.408' W	Pre-Installation and Post-Installation
Vesterled Pipeline	59° 13.006' N	000° 29.764' E	Pre-Installation and Post-Installation
Devenick – East Brae	59° 03.464' N	001° 33.268' E	Pre-Installation and Post-Installation

Note: WGS84 Datum in degrees decimal minutes.

1.2 COMPANY BACKGROUND

Alcatel Submarine Networks (ASN) has been contracted to design, build and install the Aurora Project, and Environmental Resources Management (ERM) have been appointed by ASN to obtain the necessary permits for the installation of the Aurora Project in UK waters. This includes the application of the MLA and supporting Environmental Assessment (EA) associated with the licensable activity for the proposed rock placement activities.

1.3 PURPOSE OF THIS DOCUMENT

This Technical Note has been prepared to inform consultees of the proposed rock placement activities planned to take place in the Scottish TS and UK EEZ for the Aurora Project.

Based on ongoing discussion with asset owners, the Aurora Project is submitting a separate MLA under Part 4 of the Marine and Coastal Access Act (MaCAA) 2009 and Part 4 the Marine (Scotland) Act 2010 for rock placement activities for additional protection at existing pipeline and cable crossing locations within the Scottish TS and UK EEZ. As such, prior to the new MLA, this document details the proposed approach to undertaking a proportionate EA to assess the

potential impacts of the rock placement component of the Aurora Project. The Technical Note outlines the topics scoped in and out of the EA Report, alongside the proposed methodology for the assessment.

1.3.1 DOCUMENT STRUCTURE

The remainder of this report is structured as follows:

- **Section 2:** Legislative Context and Regulatory Requirements
- **Section 3:** Stakeholder Engagement
- **Section 4:** Project Description
- **Section 5:** Approach to Assessment and Scoping
- **Section 6:** Summary

FIGURE 1-1 PROPOSED UNITED KINGDOM AURORA SUBSEA CABLE ROUTE

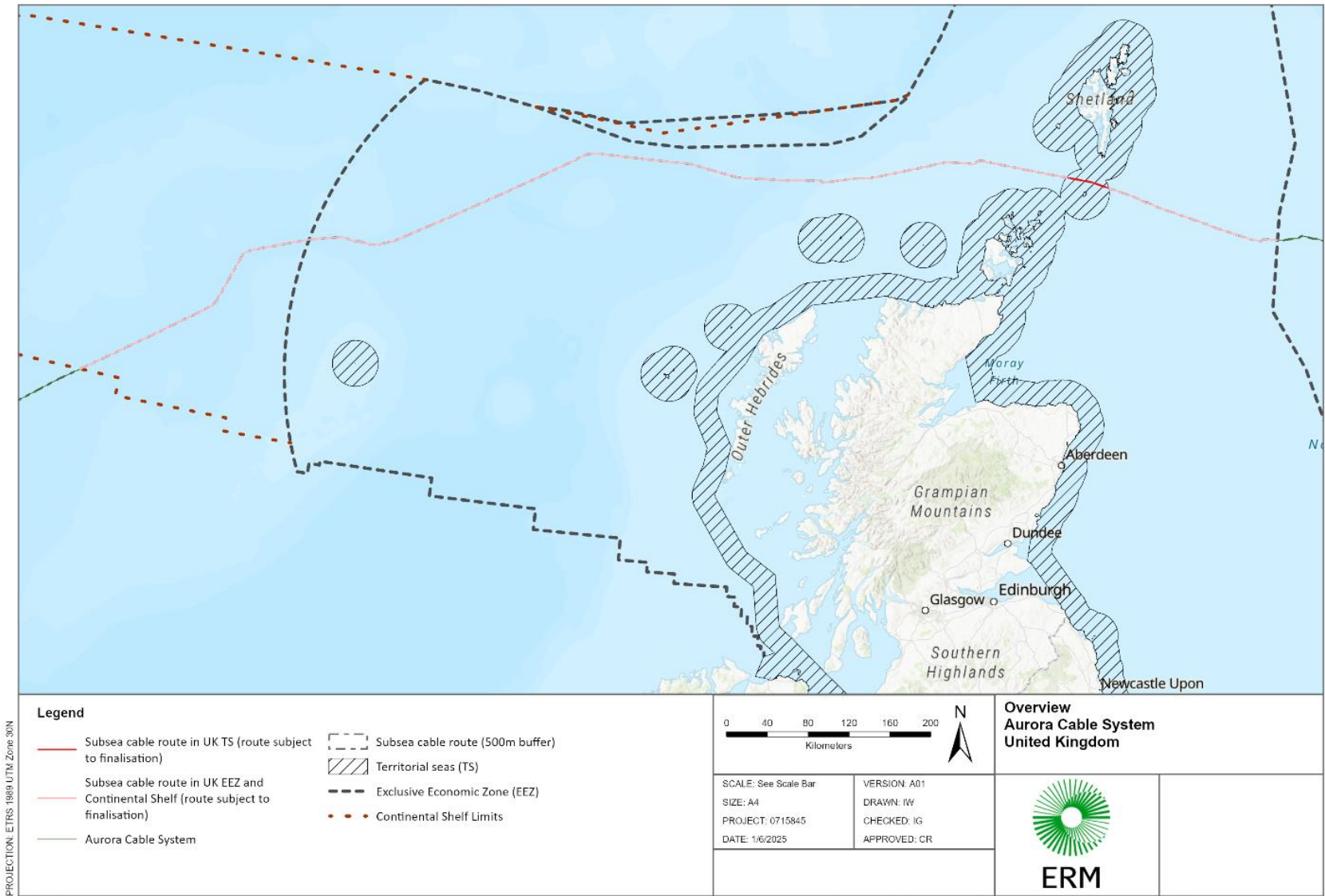
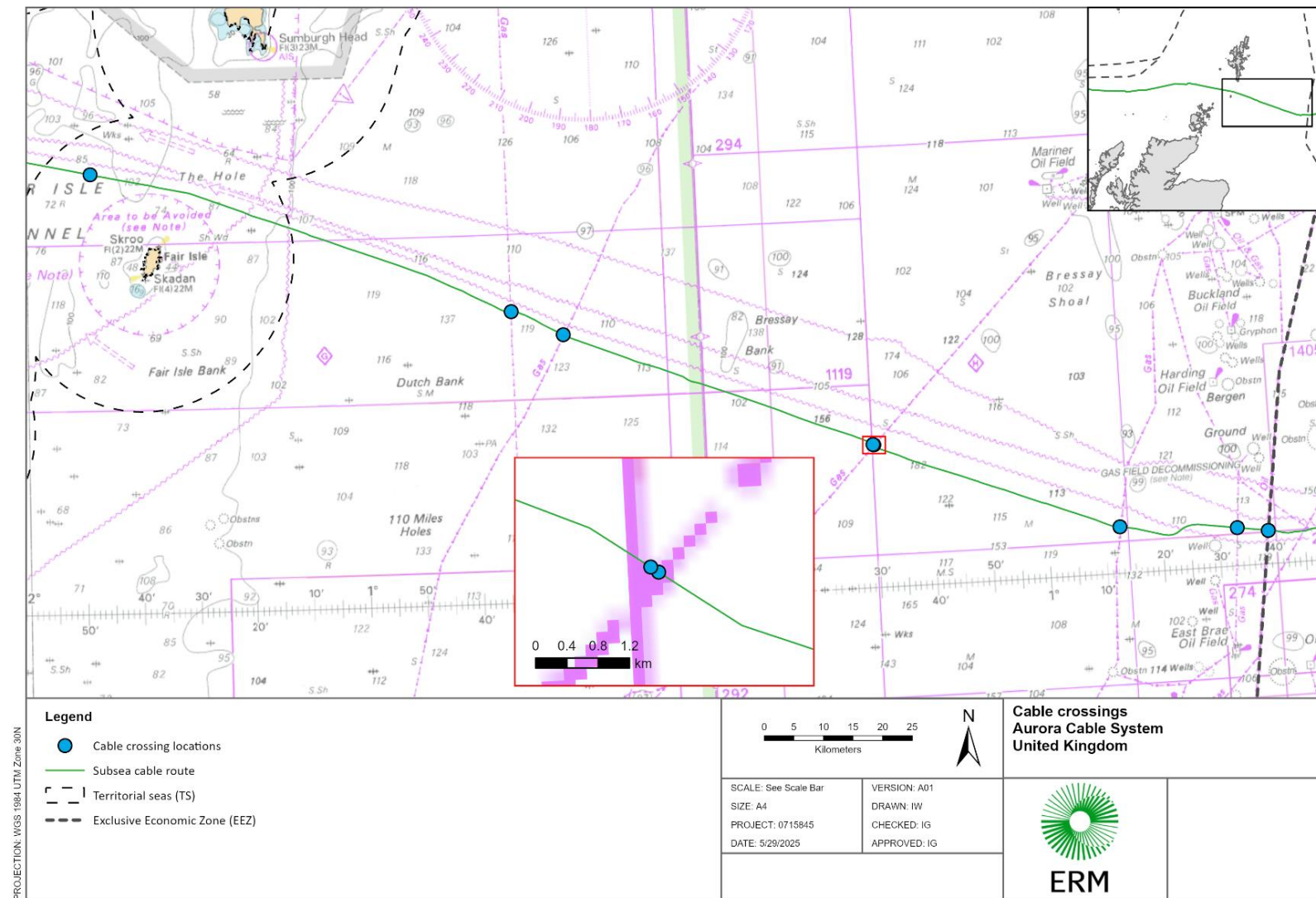


FIGURE 1-2 LOCATION OF ASSET CROSSINGS AND ROCK PLACEMENT IN THE UNITED KINGDOM EXCLUSIVE ECONOMIC ZONE AND TERRITORIAL SEAS



SOURCE: © Crown Copyright and/or database rights. Reproduced by permission of The Keeper of Public Records and the UK Hydrographic Office (www.GOV.UK/UKHO).

Path: G:\7_Cables\0715845_Aurora_Rock_Placement\workspace\working\0715845_Aurora_RP.aprx / UK cable crossing

2. LEGISLATIVE CONTEXT AND REGULATORY REQUIREMENTS

2.1 MARINE LICENCE

2.1.1 THE MARINE AND COASTAL ACCESS ACT 2009

Part 4 of the MaCAA 2009 details licensable marine activities and sets out the requirements for marine licences in the area between the 12 nautical miles (nm) limit and the UK's EEZ (200 nm).

Part 4, Section 66 defines the licensable marine activities which require a marine licence to be authorised by the relevant authority. Licensable activities are defined under Part 4, Chapter 1, Section 66, Paragraph 1: To deposit any substance or object within the UK marine licensing area, either in the sea or on or under the seabed, from (a) any vehicle, vessel, aircraft or marine structure'. For the EEZ offshore Scotland, MLAs are submitted to MD-LOT and are also considered by Scottish Ministers.

2.1.2 MARINE (SCOTLAND) ACT 2010

Under Part 4 of the Marine (Scotland) Act 2010, an MLA is required for the permanent deposit of substances below Mean High Water Springs (MHWS) in the Scottish TS (i.e. within 12 nm).

Section 21 describes the licensable marine activities, which require a Marine Licence submission to MD-LOT and consideration by Scottish Ministers. In line with Section 21, a Marine Licence is required for the Project as an activity *"to construct, alter or improve any works within the Scottish marine area either in or over the sea, or on or under the seabed"*.

2.2 SCOTTISH NATIONAL MARINE PLAN

The Scottish National Marine Plan (NMP) (Marine Scotland, 2015) establishes policies and objectives to enable the sustainable development and management of Scotland's marine resources, in both Scottish TS (out to 12 nm) and UK EEZ (12 to 200 nm). The NMP details 21 general policies that are applicable to all future developments and uses within Scottish waters. These general policies are supplemented by sector-specific policies, enabling policies, and objectives to be targeted at particular industries. The Submarine Cables chapter of the NMP details four marine planning policies that should be considered when considering cable developments. Two (2) of these four (4) policies, as detailed below, are relevant to the rock placement activities associated with the Aurora Project.

- Protect submarine cables whilst achieving successful seabed user co-existence; and
- Safeguard and promote the global communications network

Currently, the Scottish Marine Plan 2 is in consultation and, consequently, has not been considered further in this report.

2.3 EUROPEAN PROTECTED SPECIES LICENCE

In the EEZ beyond 12 nm, the Habitats Directive is transposed into law by the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended). The protection of wild animals listed in Annex IV(a) is addressed under Regulation 45, which details the activities that constitute an offence against the regulations.

In Scottish waters, the European Habitats Directive (European Union Council Directive 92/43/EEC) is implemented by the Habitats Regulations 1994 (The Conservation (Natural Habitats &c.) Regulations 1994). These are strengthened by the Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007, which contain a revision of the disturbance offence for European protected species (EPS) specifically through Regulation 39, which details the activities that constitute an offence under the regulations.

Any activity that has the potential to disturb these species must therefore obtain a European Protected Species (EPS) Licence prior to commencement. The potential for the rock placement activities associated with the Aurora Project to result in injury or disturbance to EPS will be assessed in the EA Report. However it is anticipated that there will be negligible risk of deliberate injury or non-trivial disturbance.

3. STAKEHOLDER ENGAGEMENT

3.1 ENGAGEMENT STRATEGY OVERVIEW

The Aurora Project intends share this technical note with the consultees listed in **Table 3-1** to introduce the proposed rock placement activities for the Aurora Project. Any feedback received from the stakeholders will be responded to as appropriate and / or required, and requests for information to be incorporated into the EA Report will be taken into consideration. The Aurora Project intends on issuing a single follow up notification to any stakeholders from which a response is not received, in order to reiterate the opportunity to respond.

TABLE 3-1 PROPOSED STATUTORY AND NON-STATUTORY CONSULTÉES

Consultees	
Statutory Consultees: - Northern Lighthouse Board (NLB); - Maritime and Coastguard Agency (MCA); - Scottish Environment Protection Agency (SEPA); and - NatureScot.	Non-Statutory Consultees: - Crown Estate Scotland (CES); - MD-LOT; - Marine Directorate Science; - Joint Nature Conservation Committee (JNCC); - Orkney Islands Council; - Shetland Islands Council; - Chamber of Shipping; - Ministry of Defence (MOD); - National Trust for Scotland; - Historic Environment Scotland; - HM Coastguard (Orkney and Shetland); - Royal National Lifeboat Institution (RNLI); - Scottish Fishermen's Federation (SFF); - Fisheries Management Scotland; - Northeast Fishermen's Training Association (NFTA); - Seafood Scotland; - Scottish White Fish Producers Association (SWFPA); - Shetland Fishermen's Association (SFA); - Scottish Fishermen's Organisation (SFO); - Scottish Creel Fishermen's Federation (SCFF); - Scottish Pelagic Fishermen's Association (SPFA); - North Atlantic Fishing Company; - Western Isles Fishermen's Association; - Mallaig and Northwest Fishermen's Association; - Royal Society for the Protection of Birds (RSPB); - Whale and Dolphin Conservation; - Orkney Islands Council Port Harbour Authority; - Shetland Islands Council Harbour Authority; - NorthLink Ferries; - Streamline Shipping Group; - Orkney Ferries; - Royal Yachting Association (RYA); - Shetland Inter-Club Yachting Association; - Orkney Sailing Club; - Sullom Voe Terminal; - The North Sea Transition Authority (NSTA);

Consultees

- Cruising Association;
- Shetland Shellfish Management Organisation (SSMO);
- Dunrossness Community Council;
- Shetland Islands Council Ferry Operations Team;
- Fair Isle Marine Environment and Tourism Initiative; and
- Shetland Amenity Trust.

4. PROJECT DESCRIPTION

4.1 COMPONENTS FOR ROCK PLACEMENT ACTIVITIES

Per standard industry practice in the North Sea, freshly crushed Norwegian granite will be utilised for the rock placements to minimise contamination risks for environmentally sensitive areas of the seabed. For pre-installation rock placement, it is expected that 1"-5" or 1"-3" rock mix will be used. Rock material produced for offshore installation generally follows the EN-13383-1 'Armourstone – Part1: Specification' regarding material quality requirements. This standard specifies that the material "*shall not contain any foreign matter in a quantity that will cause damage to the structure or the environment in which it is used*". The proposed rock type is 1-5" size filter rock layer, used in areas where 100-year storm conditions would be applied to wave break forces.

The subsea cable will be protected by a recognised high-density synthetic material approximately 25 mm thick, to provide further separation at the crossing locations between the Aurora Project and top of the existing assets. This additional separation will prevent direct metallic contact between the subsea cable armour and steel pipelines.

The proposed parameters of the rock placement activities for the Aurora Project are shown below in **Table 4-1**, as well as the area footprint and quantities. **Figure 4-1** to **Figure 4-4** provide an indicative cross-section profile and plan view of the pre-installation rock placement and post-installation rock placement on a flat seabed.

TABLE 4-1 COMPONENTS FOR ROCK PLACEMENT ACTIVITIES

Parameter	Units	Value	
		TS	EEZ
Rock Placements and Protection			
Number of Pre-Installation Rock Placement	No.	0	6
Number of Post-Installation Rock Placement	No.	1	7
Rock Berm Profile at Pre-Installation Rock Placement*	m	-	Length: 85 to 100 Height: 0.2 to 2 Width: 8 to 10
Rock Berm Profile at Post-Installation Rock Placement*	m	Length: 44 to 52 Height: 0.6 to 0.8 Width: 3.6 to 5.2	Length: 44 to 52 Height: 0.6 to 0.8 Width: 4.8 to 6.8
Height*	m	Pre-installation: Not required Post-installation: 0.6 to 0.8 Total: 0.6 to 0.8	Pre-installation: 0.2 to 2 Post-installation: 0.6 to 0.8 Total: 0.8 to 2.8
Slope	-	1:3	1:3
Type of Deposit Material	-	Norwegian granite	Norwegian granite
Size of Deposit Material	mm	Pre-installation: Not required Post-installation: 50 to 200	Pre-installation: 25 to 125 Post-installation: 50 to 200

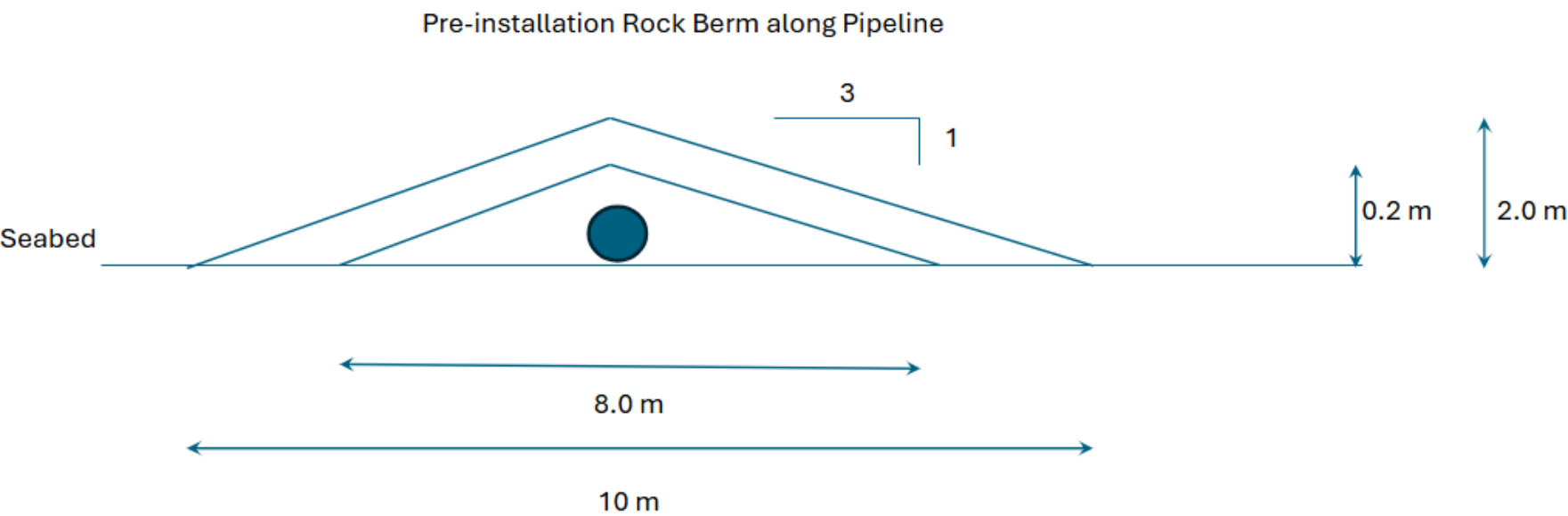
Parameter	Units	Value	
		TS	EEZ
Volume of Rock (per crossing location)*	m ³	Pre-installation: Not required Post-installation: 95 to 216.3	Pre-installation: 136 to 2,000 Post-installation: 126.7 to 282.9
Volume of Rock (total)*	m ³	Pre-installation: Not required Post-installation: 95 to 216.3	Pre-installation: 816 to 12,000 Post-installation: 887 to 1,980.2
Length of Separation Product (Uraduct)	m	100	100
Seabed			
Number of Vessels	No.	1	1
Affected Seabed Footprint Area (per crossing location)*	m ²	Pre-installation: Not required Post-installation: 158.4 to 270.4	Pre-installation: 680 to 1000 Post-installation: 211.2 to 353.6
Affected Seabed Footprint Area (total)*	m ²	Pre-installation: Not required Post-installation: 158.4 to 270.4	Pre-installation: 4,080 to 6,000 Post-installation: 1,478.4 to 2,475.2
Timings and Duration			
Proposed Pre-Installation Rock Placement Start Date	-	-	Q1 2027
Proposed Post-Installation Rock Placement Start Date	-	Q3 2027	Q3 2027
Pre-Installation Rock Placement Duration	Days	-	6
Post-Installation Rock Placement Duration	Days	1	7

Notes:

* The dimensions of the post-installation and pre-installation rock berm profiles have not been finalised and are subject to the crossing agreements which were under negotiation with asset owners at the time of writing this document. Post-installation rock berm profile dimensions will be determined following post lay inspection and burials (PLIBs) that are performed after the subsea cable is installed.

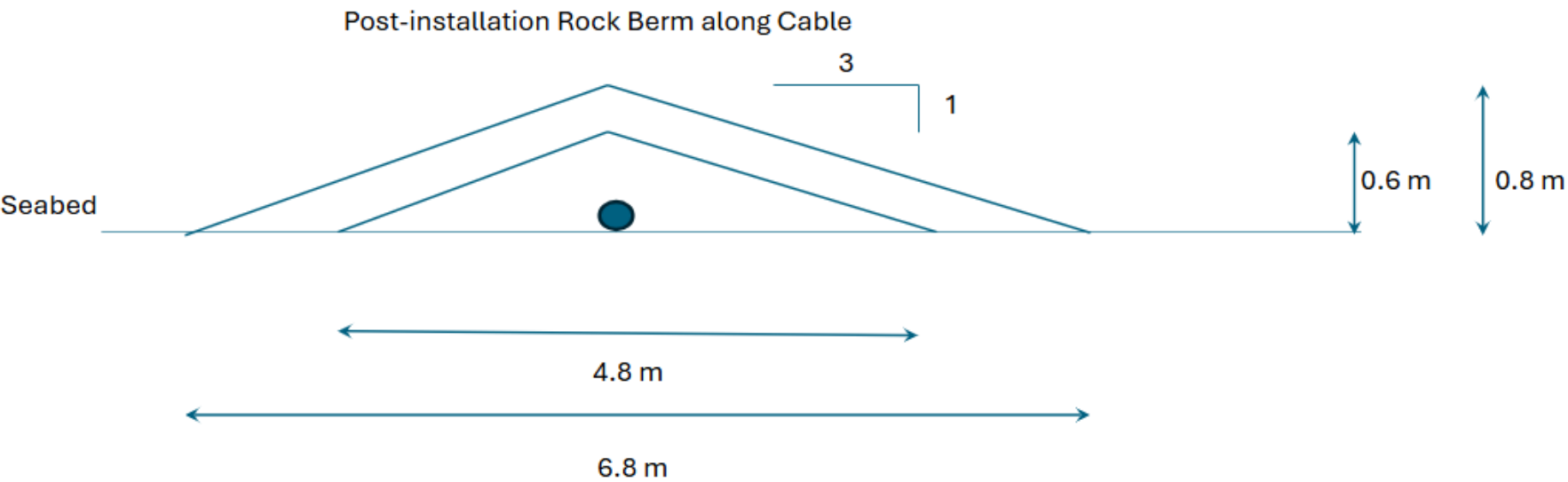
Source: ASN, 2025

FIGURE 4-1 CROSS-SECTION PROFILE OF PRE-INSTALLATION ROCK BERM ALONG PIPELINE IN UNITED KINGDOM EXCLUSIVE ECONOMIC ZONE



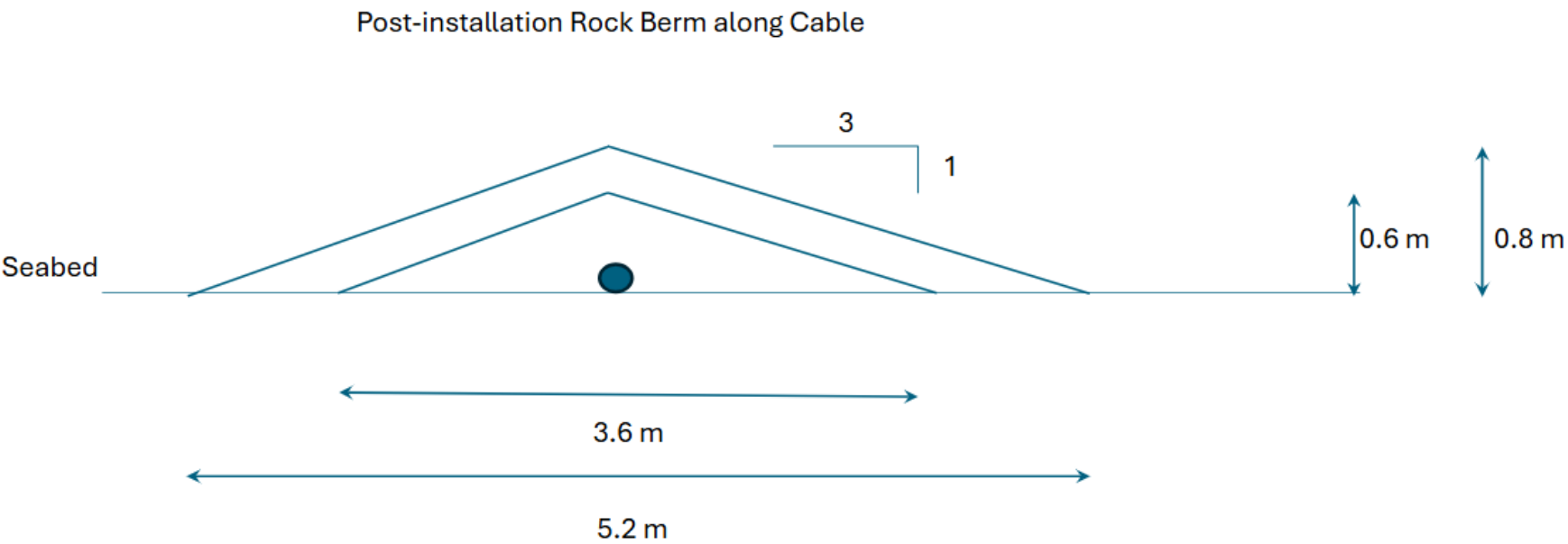
Source: ASN, 2025

FIGURE 4-2 CROSS-SECTION PROFILE OF POST-INSTALLATION ROCK BERM IN UNITED KINGDOM EXCLUSIVE ECONOMIC ZONE



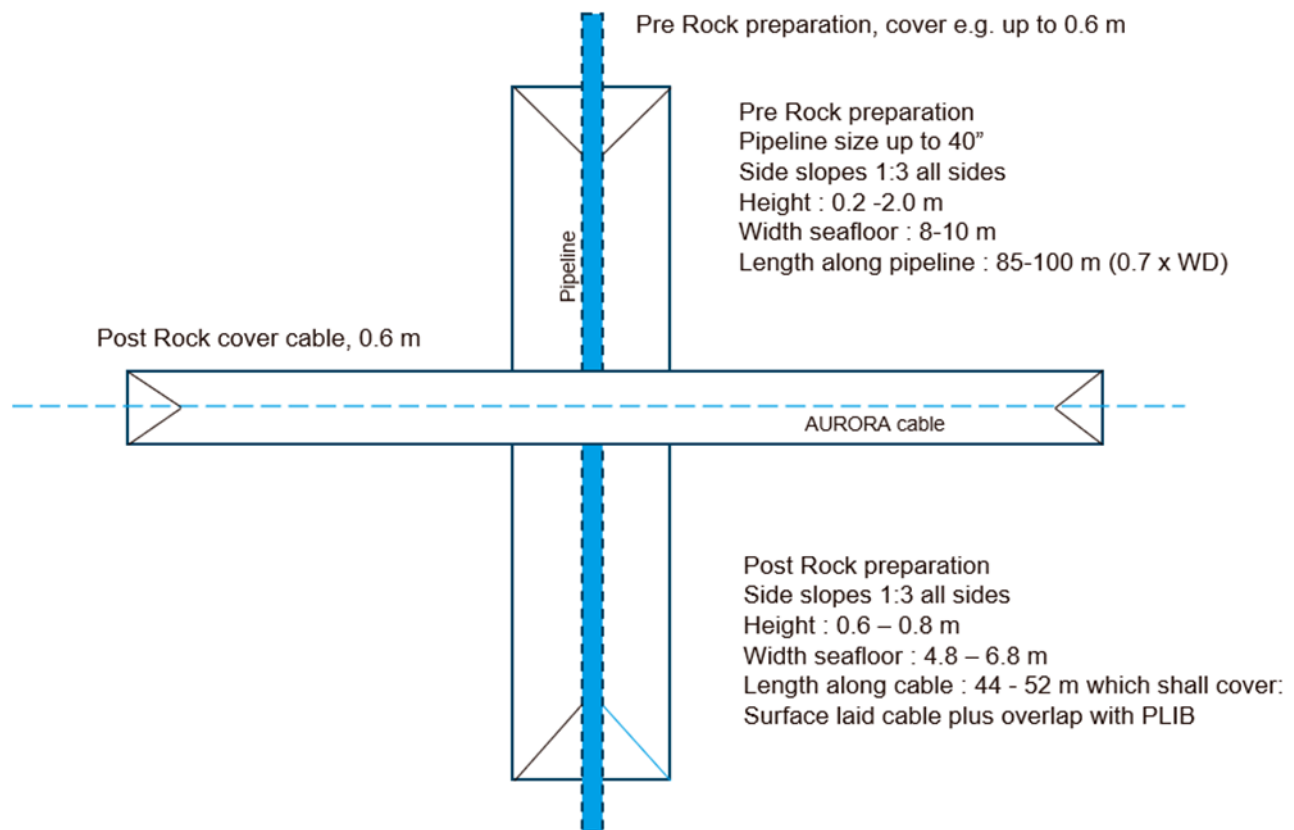
Source: ASN, 2025

FIGURE 4-3 CROSS-SECTION PROFILE OF POST-INSTALLATION ROCK BERM IN SCOTTISH TERRITORIAL SEAS



Source: ASN, 2025

FIGURE 4-4 PLAN VIEW OF PRE-INSTALLATION ROCK AND POST-INSTALLATION ROCK BERMS



Source: ASN, 2025

4.2 ROCK PLACEMENT ACTIVITIES

The rock placement activities will involve the following:

- Pre-installation rock placement; and
- Post-installation rock placement.

As mentioned in **Section 1.1**, a separate MLA was submitted to MD-LOT in January 2025 to obtain a Marine Licence for the installation and operation of the Aurora Project within the Scottish TS. Therefore the installation and operation activities will not be discussed in this document.

4.2.1 PRE-INSTALLATION ROCK PLACEMENT

Prior to rock placement, a video inspection will be undertaken to document the condition of the existing pipeline which the Aurora Project will cross, and record the horizontal and vertical positioning of the asset.

The pre-installation rock placement at the pipeline crossings will be undertaken to a minimum 0.6 m separation between top of pipelines in the UK EEZ and the Aurora Project, in advance of the installation of the subsea cable at the designated pipeline crossings, by a Flexible Fall Pipe Vessel (FFPV) (**Figure 4-5**) equipped with FPROV.

The FFPV is dynamically positioned by Differential Global Positioning Systems (DGPS). The vessel will deliver graded, crushed, rock material in a controlled manner from deck to the seabed, via a flexible fall-pipe.

Subject to availability, a rock placement vessel with up to 25,000 tonnes capacity may be utilised. At time of writing this document, the crossing agreements are under negotiation with the asset owners and as such the quantity of rocks that will be utilised for the Aurora Project is yet to be defined.

The extent of the pre-installation rock placement will be approximately 85-100 m along each of the pipeline crossings, to allow a wide target for the FFPV to lay the subsea cable on this pre-installation rock placement at the crossing locations.

The general side slope for all rock berms at each crossing location will be a minimum of 1:3.

FIGURE 4-5 A TYPICAL FLEXIBLE FALL PIPE VESSEL



Source: ASN, 2025

The FPROV located at the end of the flexible fall pipe is fitted with survey and positioning equipment that maneuvers the pipe to deliver rock accurately and precisely on the seabed. **Figure 4-6** shows a typical FPROV.

Following completion of the pre-installation rock placement, the FPROV will perform a video inspection to document the installation.

FIGURE 4-6 A REMOTELY OPERATED VEHICLE AT END OF FALL PIPE



Source: ASN, 2025

4.2.2 POST-INSTALLATION ROCK PLACEMENT

To protect the subsea cable after installation from external damage due to activities such as fishing, post-lay inspection and burial (PLIB) will be performed on either side of the crossing locations where the subsea cable will be jetted into the seabed (activity assessed under previous MLA). This burial will be performed as close as practically possible to the assets from either side.

If any of the assets are visible on the seabed surface, the post lay burial (PLB) will stop at a short distance before the assets.

The installation method for post-installation rock placement will be the same as that described for the pre-installation rock placement in **Section 4.2.1**.

As post-installation rock placement is designed to protect the subsea cable passing over a feature, such as a pipeline, it will generally be thinner and longer than the pre-installation rock placement berms. All post-installation rock placement activities on the Aurora Project at each of the crossing locations will have a minimum 5 m overlap with the end of PLIB. PLIB may stop a few meters from the foot of pre-installation rock placement berm.

4.3 INDICATIVE PROJECT SCHEDULE

The pre-installation rock placements within UK EEZ are expected to commence in Q1 2027 before the subsea cable is installed. Estimated total duration is 6 days.

The post-installation rock placements within the Scottish TS and UK EEZ are expected to commence in Q3 2027 after the PLIBs. Estimated total duration is 8 days.

5. APPROACH TO ASSESSMENT AND SCOPING

5.1 INTRODUCTION

In order to determine the type and nature of impacts of a proposed development on environmental, social and economic receptors, an environmental assessment is often undertaken. The initial scoping phase identifies the relevant environmental, social and economic topics and determines which will be scoped in to the environmental assessment.

The potential impacts that may arise from the rock placement activities and their effects on receptors have been considered when determining whether or not a topic is scoped into the environmental assessment. **Table 5-1** outlines the scoping decision for each topic, providing justification for whether it has been scoped in or out of the assessment.

TABLE 5-1 TOPICS SCOPED IN AND OUT OF THE ASSESSMENT

Topic	Scoping Decision	Justification For Scoping Decision
Marine Physical Processes	Scoped In	There is potential that the rock placement activities involved with the Aurora Project asset crossings will cause disturbance to marine physical processes. Potential impacts of rock placement activities on marine physical processes include: • Increased suspended sediment concentrations (SSC); • Changes to the sediment transport system; • Changes to the morphology of the seabed; • Changes to the wave climate or oceanic currents. Therefore, marine physical processes has been scoped in to the assessment.
Water and Sediment Quality	Scoped In	There is potential that the rock placement activities involved with the Aurora Project asset crossings will have an effect on water and sediment quality. Potential impacts of rock placement activities on water and sediment quality include: • Deterioration of water and sediment quality due to resuspension of sediment; • Deterioration of water and sediment quality due to resuspension of contaminants; • Deterioration of water and sediment quality due to vessel discharges; • Deterioration of sediment quality due to permanent deposits; and • Deterioration of water and sediment quality due to accidental events from unplanned fuel spills due to collisions or equipment. Therefore, water and sediment quality has been scoped in to the assessment.
Benthic Ecology	Scoped In	There is potential that the rock placement activities involved with the Aurora Project asset crossings will cause disturbance to benthic ecology. Potential impacts of rock placement activities on benthic ecology include: • Permanent habitat change/loss;

Topic	Scoping Decision	Justification For Scoping Decision
		• Temporary increases in SSC and siltation; and • Localised scour effects from rock placement on the seabed. Therefore, benthic ecology has been scoped in to the assessment.
Fish and Shellfish Ecology	Scoped In	There is potential that the rock placement activities involved with the Aurora Project asset crossings will cause disturbance to fish and shellfish ecology. Potential impacts of rock placement activities on fish and shellfish ecology include: • Direct damage; • Permanent habitat change/loss; and • Temporary increases in SSC and siltation. Therefore, fish and shellfish ecology has been scoped in to the assessment.
Marine Mammals	Scoped In	There is potential that the rock placement activities involved with the Aurora Project asset crossings will impact marine mammals. Potential impacts of rock placement activities on marine mammals include: • Risk of collision with project vessel; • Temporary changes in SSC and siltation; • Indirect effects resulting from impacts on prey species; and • Direct effects from underwater noise (e.g., disturbance). Therefore, marine mammals have been scoped in to the assessment.
Ornithology	Scoped In	There is potential that the rock placement activities involved with the Aurora Project asset crossings will cause disturbance to ornithology. Potential impacts of rock placement activities on ornithology include: • Vessel related disturbance; • Indirect effects resulting from impacts on prey species; and • Temporary changes to SSC. Therefore, ornithology has been scoped in to the assessment.

Topic	Scoping Decision	Justification For Scoping Decision
Commercial Fisheries	Scoped In	There is potential that the rock placement activities involved with the Aurora Project asset crossings will impact commercial fisheries. Potential impacts of rock placement activities on commercial fisheries include: • Disruption or displacement of fishing activity into other areas; • Loss of access to fishing grounds; and • Impacts to commercially important species. Commercial fisheries have been scoped in to the assessment and will be considered under the overarching topic of 'Other Users' alongside shipping and navigation and offshore infrastructure as shown below in this table.
Shipping and Navigation	Scoped In	There is potential that the rock placement activities involved with the Aurora Project asset crossings will impact shipping and navigation. Potential impacts of rock placement on shipping and navigation include: • Impacts on commercial vessel and/or small craft routing; • Increased vessel-to-vessel collision risk; • Impacts on emergency response/search and rescue operations; • Snagging of anchors and fishing gear; and • Navigational impacts on recognised sea lanes. Shipping and navigation has been scoped in to the assessment and will be considered under the overarching topic of 'Other Users' alongside commercial fisheries and offshore infrastructure as shown below in this table.
Aviation and Radar	Scoped Out	As there will be no infrastructure above sea level, aviation and radar has been scoped out of the assessment.
Noise and Vibration	Scoped Out	Due to noise levels associated with rock placement activities falling within background levels¹ (Nedwell and Howell, 2004) and the Aurora Project rock placement activities having a limited spatial extent and short term exposure, impacts of injury and disturbance will be unlikely, therefore, noise and vibration has been scoped out of the assessment.

¹ Nedwell, J. R. and D. Howell (2004). *A review of offshore windfarm related underwater noise sources*. COWRI report No. 544 R 0308, 57 pp.

Topic	Scoping Decision	Justification For Scoping Decision
Seascape, Landscape and Visual Amenity (SLVIA)	Scoped Out	There will be no infrastructure above sea level and any impacts to SLVIA receptors will be associated with the presence of additional vessels. Impacts to SLVIA receptors will be temporary and restricted to only the very short duration of the work, therefore SLVIA has been scoped out of the assessment.
Marine Archaeology	Scoped In	There is potential that the rock placement activities involved with the Aurora Project asset crossings will cause disturbance to marine archaeology (including aviation wreckage) that was both undisturbed during the construction of existing assets and has since been exposed to the water column since an asset's construction. Potential impacts of rock placement activities on marine archaeology include: • Direct physical impact to currently unknown maritime archaeology resulting in the physical loss of assets in previously undisturbed areas to be buried by the rock placement. Therefore, marine archaeology (including aviation wreckage) has been scoped in to the assessment. Significant effects to palaeolandscape features are unlikely as the construction of an existing asset would have already impacted any features present in the location, this removal would have been once off and irreversible. Moreover, the capping effect of the rock placement would be unlikely to remove remaining elements of surviving palaeolandscape features. Therefore, palaeolandscape assessment for maritime cultural heritage and archaeology is scoped out.
Offshore Infrastructure	Scoped In	There is potential that the rock placement activities involved with the Aurora Project asset crossings will impact offshore infrastructure. Potential impacts of rock placement activities on offshore infrastructure include: • Temporary loss of access; • Collision risk between vessels and other sea users; and • Direct damage to assets of other users.

Topic	Scoping Decision	Justification For Scoping Decision
		Offshore infrastructure has been scoped in to the assessment and will be considered under the overarching topic of 'Other Users' alongside shipping and navigation and commercial fisheries as shown above on this table.
Habitats Regulations Appraisal (HRA) and Nature Conservation Marine Protected Area (NCMPA) Assessment	Scoped In	Due to the Aurora Project rock placement activities being situated within/in the vicinity of protected sites (Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar Sites), a Stage 1: Screening of a HRA will determine if there are any Likely Significant Effects (LSE) to protected sites. Therefore, a HRA and NCMPA Assessment have been scoped in to the assessment.
Water Framework Directive (WFD) Assessment	Scoped Out	Due to the location of the Aurora Project rock placements, there will be no activities undertaken within the marine environment out to 1 nautical mile (nm). Additionally, the potential area of influence of the sediment plume is not expected to overlap with any water bodies. As such, it is unlikely that the works will have any effect on water bodies, and as such, no WFD Assessment is required for the Aurora Project rock placement activities. Therefore, WFD Assessment has been scoped out of the assessment.
Cumulative Impact Assessment (CIA)	Scoped In	Due to the small scale of the proposed works, it is unlikely that the Aurora Project rock placement activities will have any significant disturbance to other identified projects within the vicinity of the rock placement sites. However, the rock placement may result in effects to receptors identified for each topic chapter that have the potential to be subject to cumulative impacts. Therefore, a cumulative impact assessment has been scoped in to the assessment.

5.2 ASSESSMENT METHODOLOGY

The EA Report will assess whether the Aurora Project rock placement activities are likely to result in any significant effects on the environment. The assessment will use a standardised methodology which aligns with the underpinning principles for an Environmental Impact Assessment (EIA) in order to assess the environmental risk of the Aurora Project rock placement activities across all topics scoped into the assessment:

- 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; and
- Assessment of the level of significance of residual effects: significant effects will be assessed taking account of committed mitigation measures.

In order to implement a systematic assessment of impacts between the different receptors, an overall approach to the assessment of potential impacts to determine their significance has been implemented and is consistent with the EA Report for the Aurora Project submitted to MD-LOT in January 2025 (Reference Number: 00011067). The process considers:

- Sensitivity and value of the receptor;
- Magnitude of effect; and
- Determination and qualification of the significance of impact using a risk matrix (as shown in **Table 5-2**).

TABLE 5-2 OVERALL IMPACT ASSESSMENT MATRIX USED TO INFORM THE ASSESSMENT

		Sensitivity			
		Negligible	Low	Medium	High
Magnitude	Negligible	Negligible	Negligible	Negligible	Minor
	Low	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	High	Minor	Minor	Moderate	Major

6. SUMMARY

The Aurora Project will be carrying out rock placement activities at one (1) power cable crossing in the Scottish TS and seven (7) pipeline crossing locations in the UK EEZ. Pre-installation rock placement activities will include a video inspection and rock placement installation at the pipeline crossings between top of pipelines in the UK EEZ and the Aurora Project, as required by asset owners. The subsea cable will be further protected at the crossing locations to provide further separation between the existing assets and the subsea cable. Upon completion of installation activities for the Aurora Project in UK waters, post-installation rock placement activities will be carried out in the Scottish TS and UK EEZ after the PLIBs of the Aurora Project.

Due to impacts being localised and short term, it is anticipated that potentially affected receptors will recover quickly and not be impacted at a population level, therefore, the effects of the pre- and post-installation rock placement activities from the Aurora Project are expected to be negligible. The following topics have been scoped in for assessment of effects of the Aurora Project rock placement activities:

- Marine Physical Processes;
- Water and Sediment Quality;
- Benthic Ecology;
- Fish and Shellfish Ecology;
- Marine Mammals;
- Ornithology;
- Other Marine Sea Users (Commercial Fisheries, Shipping and Navigation and Offshore Infrastructure);
- Marine Archaeology;
- HRA and NCMPS; and
- Cumulative Impact Assessment.

APPENDIX B HABITATS REGULATIONS APPRAISAL REGULATORY CONTEXT AND METHODOLOGY

B1 HABITATS REGULATIONS APPRAISAL

B1.1 SCREENING OF STATUTORY DESIGNATED SITES AND FEATURES

B1.1.1 APPROACH TO SCREENING FOR LIKELY SIGNIFICANT EFFECT

In order to adopt an approach that appropriately accounts for the potential footprint of potential effects associated with the rock placement activities for the Aurora Project, while providing a proportionate screening and assessment to the scale of the rock placement activities, defined screening buffers have been applied to the HRA process. Sites which are situated beyond these screening buffers are deemed to be at a sufficient distance from the rock placement locations such that it is reasonable to conclude No Likely Significant Effect (LSE). A summary of the approach used for each receptor group is provided in **Table B-1**.

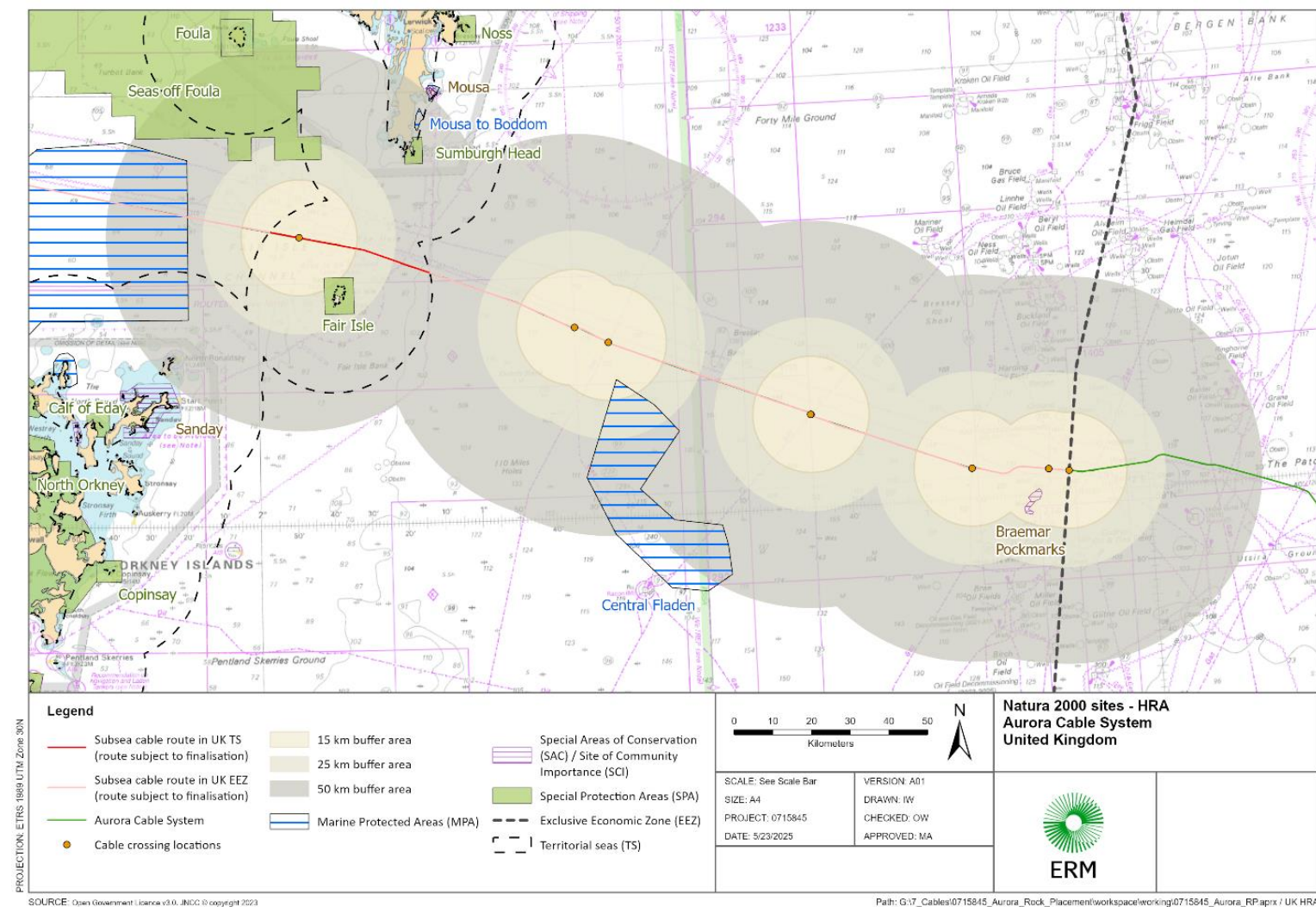
TABLE B-1 BUFFERS ADOPTED FOR LIKELY SIGNIFICANT EFFECT SCREENING

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 so that the Aurora Project activities do not create any barrier to species movement.
Annex II Marine Mammals (SACs)	50 km screening buffer. This buffer is applied to encompass foraging distances, and movement of mobile marine mammal features outside of the boundaries of the SACs of which they are a qualifying feature.
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 <i>et al.</i> (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. 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 Aurora 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 B-1**, feature-specific sensitivity to pressures associated with the proposed activity is considered. NatureScot's 'FeAST' (Feature Activity Sensitivity Tool) has been used where possible (**Section B1.1**). However, it should be noted that sensitivity assessments were not available for all qualifying features. The JNCC Advice on Operations (AoO) has been used to supplement information to provide a thorough review of the potential effects has been carried out.

Figure B-1 presents the location of SACs, SPAs, and Ramsar Sites considered within the assessment in relation to the rock placement activities within the Aurora Project Study Areas. One (1) SAC and four (4) SPAs are situated within the screening distances.

FIGURE B-1 HABITATS REGULATIONS APPRAISAL SCREENING BUFFER ZONES (15 KM, 25 KM AND 50 KM), AND THE SPECIAL AREAS OF CONSERVATION, SPECIAL PROTECTION AREAS, AND RAMSAR SITES WITHIN SCREENING DISTANCE



B1.2 PRESSURES CONSIDERED IN ASSESSMENT

FeAST (NatureScot, 2023), and JNCC's AoO, have been used to identify pressures that:

- Are under the activity 'infrastructure – cables and pipelines (operation and installation)'; and
- Have the potential to interact with features as a result of the rock placement activities to be carried out associated with the Aurora Project.

Pressures which have the potential to interact with qualifying features of the sites listed in **Table B-2** are presented below.

As a result of the above identification process, pressures which are considered to have the potential to interact with European (Natura 2000) site(s) features as a result of the rock placement activities associated with the Aurora Project have been grouped into broad topics:

- **Increases in SSC and associated deposition** (Heavy and Light siltation):
 - Water clarity changes;
 - Siltation rate changes (heavy); and
 - Siltation rate changes (light).
- Accidental **release of pollutants** from vessel activity and subsea equipment:
 - Hydrocarbon and Polyaromatic hydrocarbon (PAH) contamination; and
 - Synthetic compound contamination (including pesticides, antifoulants, pharmaceuticals).
- Accidental **release of contaminated sediments** from seabed disturbance during installation, operation and maintenance, and decommissioning:
 - Hydrocarbon and PAH contamination; and
 - Transition elements and organic metal (e.g. chromium, copper, Tributyl tin [TBT]).
- Accidental introduction and spread of INNS:
 - Genetic modification and translocation of indigenous species.
- **Disturbance and/or displacement** of species from habitats previously available to them:
 - Underwater noise; and
 - Visual disturbance (behaviour).

B1.3 SCREENING OUTCOMES

B1.3.1 PROJECT ALONE ASSESSMENT

Screening has been undertaken on a two (2)-stage basis, where screening distances (**Table B-1**) have been used to identify sites within the rock placement activities vicinity of the Aurora Project, followed by sites within screening distance being assessed to a higher level of detail.

The screening distances laid out in **Table B-1** identified the following European sites to be taken forward for further consideration within the screening process:

SACs Designated for Annex I Benthic Habitats:

- No sites are located within the screening threshold distance.

SACs Designated for Annex II Migratory Fish Species:

- No sites are located within the screening threshold distance.

SACs Designated for Annex II Species:

- Mousa SAC (UK0012711).

SPAs with Classified Bird Populations:

- Fair Isle SPA (UK9002091);
- Seas off Foula SPA (UK9020331);
- Sumburgh Head SPA (UK9002511); and
- Foula SPA (UK9002061).

Table B-2 presents the results of the screening exercise for the sites listed above. The qualifying features of each site are presented alongside the assessment and justification for determination of LSE.

TABLE B-2 SCREENING FOR LIKELY SIGNIFICANT EFFECT

Site Name and Code	Qualifying Features	Distance from Study Area (km)	Screening for Likely Significant Effect
Special Areas of Conservation (SACs)			
Mousa UK0012711	<u>Annex I Benthic Habitats:</u> Reefs Submerged or partially submerged sea caves <u>Annex II Marine Mammals:</u> Harbour seal <i>Phoca vitulina</i>	49.79	The Mousa SAC is beyond the noted screening buffer for the Aurora Project works regarding Annex I habitats. Therefore, the designated Annex I habitats are screened out of assessment with No LSE. The Mousa SAC is located within the foraging range of harbour seal (100 km) (SCOS, 2024), and therefore there is potential for works to indirectly impact harbour seal populations. Of the potential pressures from rock placement activities associated with the Aurora Project (Section B1.1), harbour seal may be directly impacted by: • Disturbance and / or displacement. Only a single vessel will be operating at any one time during rock placement activities. The proposed activities are expected to produce low levels of acoustic disturbance, and any noise created will be expected to attenuate within a small distance from the noise source. Therefore, the area of potential effect is considered to be highly localised. Further, once the works are complete, no further disturbance will occur as a result of the rock placement activities undertaken by the Aurora Project. Due to the distance between the Mousa SAC and the highly spatial and temporal localisation of activities, there is no potential impact pathway for disturbance or displacement. Therefore, No LSE is concluded for direct impacts to harbour seal. Indirect impacts which have the potential to effect harbour seals relate to foraging efficiency: • Localised changes in water flow; • Increases in SSC and associated deposition; • Accidental release of contaminated sediments; and

Site Name and Code	Qualifying Features	Distance from Study Area (km)	Screening for Likely Significant Effect
			Accidental introduction and spread of invasive non-native species. Due to the distance between the rock placement activity works and the small, localised nature of the works, it is considered that the area of potential effect will represent a negligible portion of the potential foraging area for harbour seal. Accounting for the scale of the rock placement activities and the localised nature of the activities which will be undertaken, harbour seal are unlikely to be potentially effected rock placement activities. Therefore, No LSE is concluded.
Special Protection Areas (SPAs) and Ramsar Sites			
Fair Isle UK9002091	<u>Breeding Populations:</u> Arctic skua <i>Stercorarius parasiticus</i> Arctic tern <i>Sterna paradisaea</i> Atlantic puffin <i>Fratercula arctica</i> Black-legged kittiwake <i>Rissa tridactyla</i> Common guillemot <i>Uria aalge</i> European shag <i>Gulosus (Phalacrocorax) aristotelis</i> Fair Isle wren <i>Troglodytes troglodytes fridariensis</i> Great skua <i>Stercorarius skua</i> Northern fulmar <i>Fulmarus glacialis</i> Northern gannet <i>Morus bassanus</i> Razorbill <i>Alca torda</i> Seabird assemblage	12.26	The Fair Isle SPA is within the foraging ranges for all qualifying features, wherein figures for foraging ranges are provided by Woodward <i>et al.</i> (2019). Potential grouped pressure pathways which have may affect the qualifying features, both directly and indirectly, include: - Increases in SSC and associated deposition; - Accidental release of pollutants from vessel activity and subsea equipment; - Accidental release of contaminated sediments from seabed disturbance; - Accidental introduction and spread of invasive non-native species; and - Disturbance and / or displacement. Of these pressures, accidental release of pollutants from vessel activity and subsea equipment, and disturbance and / or displacement, may be considered as potential direct impacts on species. Pollutants released from vessels and equipment into the surrounding environment may be ingested by foraging seabirds. Movement of vessels and equipment whilst undertaking works may cause visual disturbance.

Site Name and Code	Qualifying Features	Distance from Study Area (km)	Screening for Likely Significant Effect
			The Project Proponent will be following appropriate pollution prevention guidelines, which will significantly lower the risk of accidental release of pollutants. Visual disturbance is unlikely to potentially impact qualifying features due to the highly localised spatial extent and temporary nature of works. The other potential pressures may be considered as indirect risks to qualifying features, as they have the potential to affect seabirds by directly impacting species they may feed on, thereby affecting foraging ability / efficiency. However, as the works will be occurring on a highly localised spatial and temporal scale, and will only potentially effect a fraction of the available space for qualifying features, it is highly unlikely that secondary impacts will affect qualifying features. Due to the localised nature of works and distance from the Fair Isle SPA, it is concluded that there is No LSE to qualifying features.
Seas off Foula UK9020331	<u>Breeding Populations:</u> Arctic skua <i>Stercorarius parasiticus</i> Atlantic puffin <i>Fratercula arctica</i> Common guillemot <i>Uria aalge</i> Great skua <i>Stercorarius skua</i> Northern fulmar <i>Fulmarus glacialis</i> Seabird assemblage <u>Non-breeding Populations:</u> Great skua <i>Stercorarius skua</i> Common guillemot <i>Uria aalge</i> Northern fulmar <i>Fulmarus glacialis</i> Seabird assemblage	20.14	All qualifying features designated for non-breeding purposes are also designated for breeding purposes. Therefore the Seas off Foula SPA is considered here for the highest potential impact, relating to breeding ability and efficiency. Following assessment of the Fair Isle SPA (above), which is within closer proximity of the rock placement activities locations associated with the Aurora Project, the potential for detrimental impacts on the Seas off Foula SPA is low. Potential pressure pathways are deemed to be highly unlikely to affect qualifying features due to the distance between the rock placement activities locations and the Seas off Foula SPA, and the highly localised temporal and spatial nature of the proposed rock placement activities. Therefore, No LSE is concluded for qualifying features within the Seas off Foula SPA.

Site Name and Code	Qualifying Features	Distance from Study Area (km)	Screening for Likely Significant Effect
Sumburgh Head UK9002511	<u>Breeding Populations:</u> Arctic tern <i>Sterna paradisaea</i> Black-legged kittiwake <i>Rissa tridactyla</i> Common guillemot <i>Uria aalge</i> Northern fulmar <i>Fulmarus glacialis</i> Seabird assemblage	33.35	Following assessment of other SPAs within closer proximity of the rock placement activities locations associated with the Aurora Project, the potential for detrimental impacts on the Sumburgh Head SPA is low. Potential pressure pathways are deemed to be highly unlikely to affect qualifying features due to the distance between the rock placement activities locations and the Sumburgh Head SPA, and the highly localised temporal and spatial nature of the proposed rock placement activities. Therefore, No LSE is concluded for qualifying features within the Sumburgh Head SPA.
Foula UK9002061	<u>Breeding Populations:</u> Arctic skua <i>Stercorarius parasiticus</i> Arctic tern <i>Sterna paradisaea</i> Atlantic puffin <i>Fratercula arctica</i> Black-legged kittiwake <i>Rissa tridactyla</i> Common guillemot <i>Uria aalge</i> European shag <i>Gulosus (Phalacrocorax) aristotelis</i> Great skua <i>Stercorarius skua</i> Leach's petrel <i>Oceanodroma leucorhoa</i> Northern fulmar <i>Fulmarus glacialis</i> Razorbill <i>Alca torda</i> Red-throated diver <i>Gavia stellata</i> Seabird assemblage	48.50	Following assessment of other SPAs within closer proximity of the rock placement activities locations associated with the Aurora Project, the potential for detrimental impacts on the Foula SPA is low. Potential pressure pathways are deemed to be highly unlikely to affect qualifying features due to the distance between the rock placement activities locations and the Foula SPA, and the highly localised temporal and spatial nature of the proposed rock placement activities. Therefore, No LSE is concluded for qualifying features within the Foula SPA.

B1.4 IN COMBINATION ASSESSMENT

Each of the features of the sites assessed is screened out as having no LSE for any pressure pathways considered. In view of this, and of the small scale of the proposed works and the highly localised extent of potential effects predicted in the rock placement activities associated with the Aurora Project alone assessment, an in combination assessment has not been undertaken.

B1.5 APPROPRIATE ASSESSMENT

Stage 2 of the HRA requires an appropriate assessment of features which are determined to potentially be affected by the rock placement activities associated with the Aurora Project. As all features are deemed to be no LSE, an Appropriate Appraisal (AA) is determined to not be applicable, and no further assessment has been undertaken.

B1.6 CONCLUSION OF HABITATS REGULATIONS APPRAISAL

As detailed in **Table B-2**, **No LSE** is concluded for all sites and qualifying features. This is due to the very small magnitude and localised extent of potential effects from the rock placement activities, both in terms of geographic extent but also extent of potential effects within the water column, such as through increase in SSC and potential for pollutant input. In addition, it is noted that where potential effects do occur, there will be rapid recovery following cessation of activities.

A total of five (5) sites (one [1] SAC and four [4] SPAs) were situated within the stated screening distances and were screened for further consideration within **Table B-2**.

The SPAs screened into assessment are classified for a range of breeding and non-breeding features including terns, skuas, fulmar, shags and seabird assemblages. Seabird foraging ranges (Woodward *et al.*, 2019) were considered when screening for LSE, giving indication of the proportion of available habitat which may be affected. As the rock placement activities associated with the Aurora Project is of small magnitude, potential effects will be highly localised and restricted to the immediate vicinity of any ongoing works. In addition, benthic habitats (**Section 6.2**), and fish and shellfish receptors (**Section 6.3**) are beyond the screening distance for assessment. As a result, it is determined that potential effects are not significant to them and, therefore, potential impacts to seabird prey and supporting habitat are also considered to be minimal.

In view of these factors, **No LSE** was concluded for all SPAs considered within assessment:

- Fair Isle SPA;
- Seas off Foula SPA;
- Sumburgh Head SPA; and
- Foula SPA.

The SAC screened into assessment is designated for a marine mammal feature, harbour seal. Potentially direct impacts from rock placement activities associated with the Aurora Project do not interact with the SAC, though potentially indirect impacts may. However, given the pressure pathways and the Statutory Nature Conservation Body (SNCB) advice, **No LSE** was concluded for the SAC under assessment:

- Mousa SAC.

Given that no LSE was concluded for all SACs and SPAs, no site and feature will be taken forward for AA.

APPENDIX C NATURE CONSERVATION MARINE PROTECTED AREA ASSESSMENT REGULATORY CONTEXT AND METHODOLOGY

C1 NATURE CONSERVATION MARINE PROTECTED AREA ASSESSMENT

C1.1 INTRODUCTION

MPAs in Scotland are designated under two (2) key legislative frameworks, depending on their location. Within Scottish TS, MPAs are established under Section 67 of the Marine (Scotland) Act 2010. For offshore waters, the designation falls under Section 116 of the MaCAA. Notably, under the MaCAA, any Marine Conservation Zone (MCZ) designated by Scottish Ministers is referred to as an MPA.

C1.1.1 AIMS AND OBJECTIVES

This appendix has been produced to provide evidence on whether the potential impacts of the rock placement activities associated with the Aurora Project will:

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

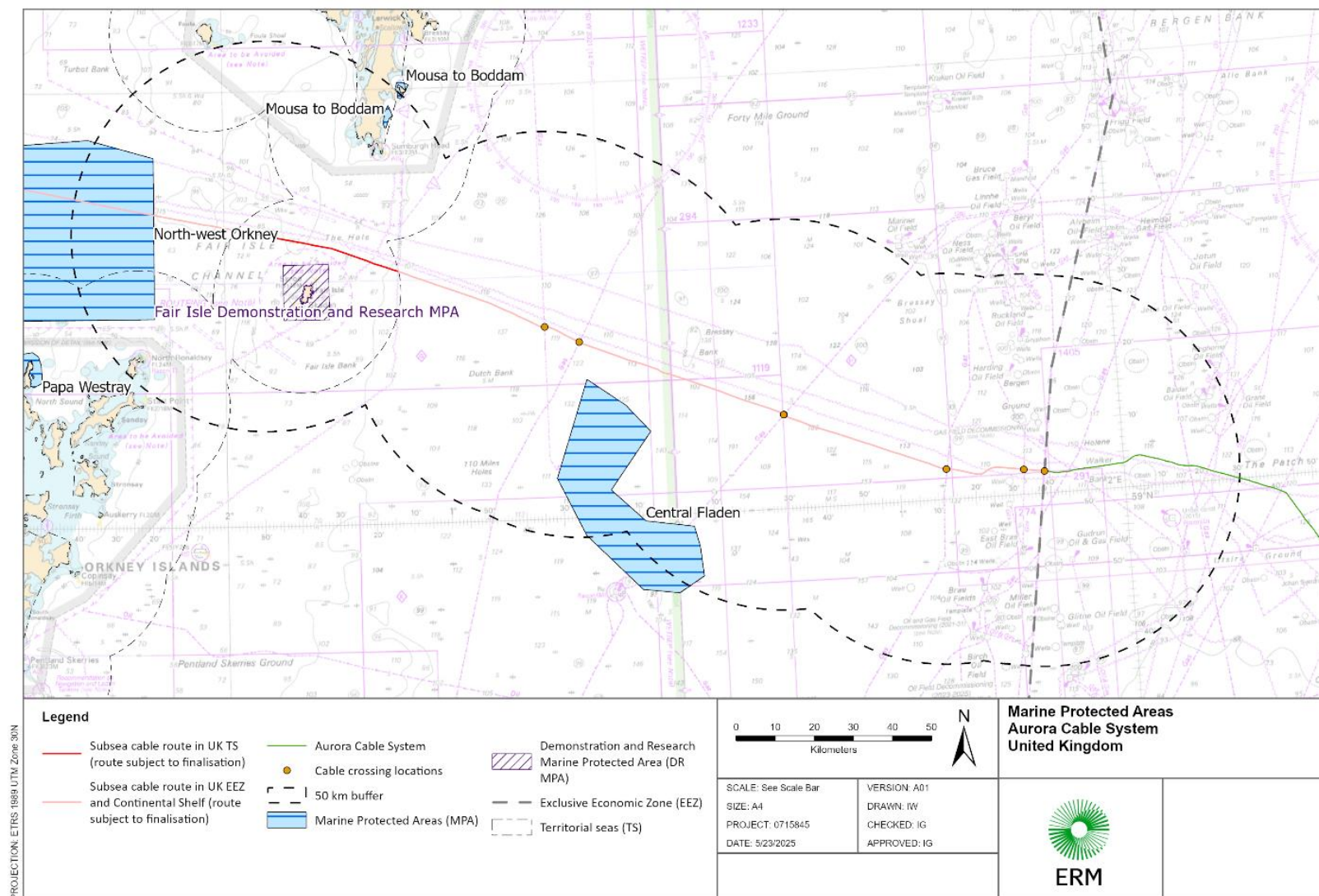
The following sections describe the approach to the initial screening and main assessment stages of the process. Given that Marine Scotland's NCMPS: Draft Management Handbook (Marine Scotland, 2013) remains unavailable, the following sections are based on guidance provided on MCZs.

C1.1.2 THE PROJECT-SPECIFIC SURVEYS AND ASSESSMENTS

To further inform the NCMPS assessment, where available, project-specific data sources and assessments have been consulted regarding rock placement activities for the Aurora Project.

Figure C-1 shows the NCMPSs within 50 km of the screening Study Areas.

FIGURE C-1 THE AURORA PROJECT STUDY AREA FOR ROCK PLACEMENT ACTIVITIES AND NATURE CONSERVATION MARINE PROTECTED AREAS WITHIN THE PROJECT VICINITY



C1.2 SCREENING – ALONE

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

There are four (4) NCMPAs within 50 km of either one of the Study Areas. These are:

- Central Fladen NCMPA;
- Mousa to Boddam NCMPA;
- North-West Orkney NCMPA; and
- Fair Isle D&R MPA.

The Fair Isle Demonstration and Research (D&R) MPA has been excluded from this assessment. This MPA was established in 2016 to research the relationship between healthy seas and the maintenance of a local island community, through trialling sustainable management measures. The objectives focus on identifying the main factors affecting seabird populations on Fair Isle, with particular focus on climate change impacts and direct human influence. The Fair Isle D&R MPA also aims to demonstrate the socio-economic benefits of the MPA and wider general benefits to Scotland. This differs from NCMPAs which are designated for biodiversity and geodiversity features.

Screening Question 2: 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 considered for assessment.

- Central Fladen NCMPA (**Section C1.3**);
- Mousa to Boddam NCMPA (**Section C1.4**); and
- North-West Orkney NCMPA (**Section C1.5**).

Key information used for the screening assessment is sourced from:

- Protected Nature Sites Application;
- Statements on conservation benefits, condition and conservation measures for Central Fladen Nature Conservation Marine Protected Area (JNCC, 2020a);
- Conservation and Management Advice Note Mousa to Boddam MPA (NatureScot, 2025);
- Statements on conservation benefits, condition and conservation measures for North-West Orkney Nature Conservation Marine Protected Area (JNCC, 2020b);
- Scotland's National Marine Plan Interactive (NMPi) (Scottish Government, 2023);
- Feature Activity Sensitivity Tool (FeAST, 2023);
- Scottish Natural Heritage (SNH) Descriptions of Scottish PMFs (Tyler-Walters *et al.*, 2016);
- The Marine Life Information Network (MarLIN) (MarLIN, 2024); and
- Relevant published reports and peer-review scientific literature.

C1.3 CENTRAL FLADEN NATURE CONSERVATION MARINE PROTECTED AREA

C1.3.1 SITE FEATURES

The Central Fladen NCMPA (925 km²) was designated to protect one biodiversity feature and one geodiversity feature:

- Burrowed mud – Offshore sublittoral sediment (Marine); and
- Quaternary of Scotland – Quaternary geology and geomorphology.

C1.3.2 FEATURES TO BE SCREENED

For the features listed above for the Central Fladen NCMPA, it is acknowledged that there is no likely potential impact pathway between the rock placement activities locations associated with the Aurora Project and the features. The rock placement activities will involve temporary, highly localised impacts to the marine environment. As the nearest Study Area is 9.8 km from the Central Fladen NCMPA, it is determined that there are no potential pathways to impact on either of the qualifying features. Therefore, under Screening Question 2, these features are being screened out.

C1.4 MOUSA TO BODDAM NATURE CONSERVATION MARINE PROTECTED AREA

C1.4.1 SITE FEATURES

The Mousa to Boddam NCMPA is 41.1 km from the nearest Study Area. The Mousa to Boddam NCMPA (13 km²) was designated to protect one biodiversity feature and one geodiversity feature:

- Sandeels (*Ammodytes marinus*/*Ammodytes tobianus*); and
- Marine Geomorphology of the Scottish Shelf Seabed.

C1.4.2 FEATURES TO BE SCREENED

Sandeels are highly sensitive to physical change and extraction of their habitat, surface abrasion, and heavy siltation. These are all potential pressures associated with the rock placement activities for the Aurora Project. However, rock placement activities will be highly localised and have fast recovery rates due to the nature of the activities.

For the features listed above for Mousa to Boddam NCMPA, it is acknowledged that there is no likely impact pathway between the rock placement activities locations associated with the Aurora Project and the features. The Study Area is greater than 10 km from the seabed biodiversity and geodiversity features of the Mousa to Boddam NCMPA. Therefore, under Screening Question 2, these features are being screened out.

C1.5 NORTH-WEST ORKNEY NATURE CONSERVATION MARINE PROTECTED AREA

C1.5.1 SITE FEATURES

The North-West Orkney NCMPA (4,365 km²) was designated to protect one biodiversity feature and one geodiversity feature:

- Sandeels (*Ammodytes marinus*/*Ammodytes tobianus*); and
- Marine Geomorphology of the Scottish Shelf Seabed.

C1.5.2 FEATURES TO BE SCREENED

As noted above, sandeels are highly sensitive to potential effects which may be caused during the rock placement activities. However, activities will be highly localised and have fast recovery rates due to the nature of the activities. The North-West Orkney NCPMA is 28.85 km from the nearest Study Area.

For the features listed above for North-West Orkney NCPMA, it is acknowledged that there is no likely impact pathway between the rock placement activities for the Aurora Project and the features. The Study Area is greater than 10 km from the seabed biodiversity and geodiversity features of the North-West Orkney NCPMA. Therefore, under Screening Question 2, these features are being screened out.

C1.6 SCREENING SUMMARY

Following screening of the rock placement activities alone for Central Fladen NCPMA, Mousa to Boddam NCPMA, and North-West Orkney NCPMA, all of the site features have been screened out for further assessment.

Considering the highly localised spatial and temporal footprint of the proposed activities, and considering 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.

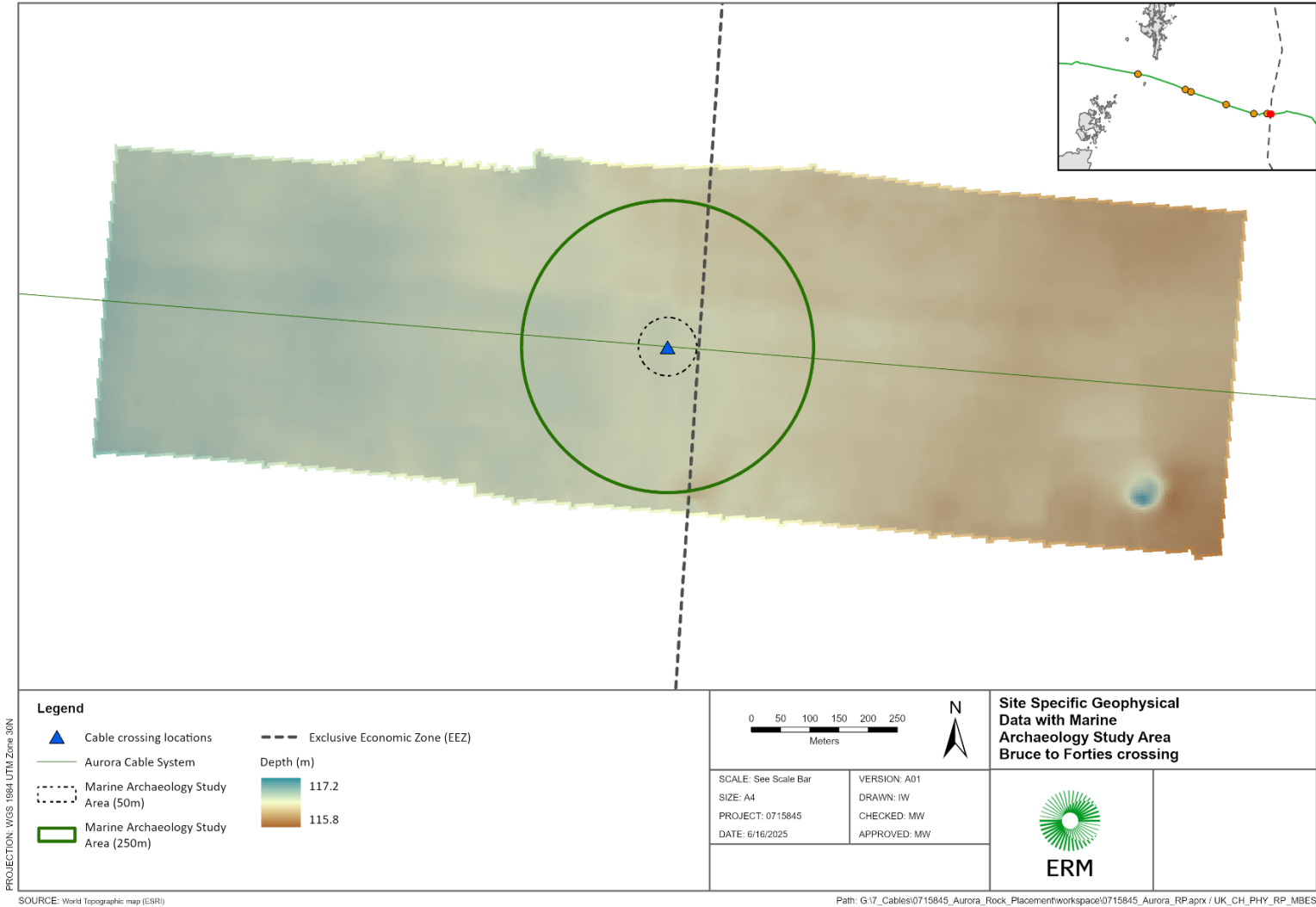
As all features are determined to have no potential pressure pathways, a Stage 1 assessment is not necessary.

APPENDIX D EMBEDDED / INBUILT MITIGATION MEASURES FOR ROCK PLACEMENT ACTIVITIES ASSOCIATED WITH THE AURORA PROJECT IN UNITED KINGDOM WATERS

Aspect	Inbuilt Control / Mitigation Measures
Promulgation of information and advance notice	- Advance notice and information will be provided via NtM so that the appropriate authorities are informed of offshore installation, operation and maintenance, and decommissioning activities. Advance notice will be given to His Majesty's Coastguard (HMCG) prior to commencement of rock placement activities. - In line with standard industry best practice, NtMs will be issued and updated on Kingfisher bulletins. These NtMs (especially to ferry operators and regular sea users) will be promulgated in advance of any proposed works and will include the time and location of works, and emergency events procedures.
Marking and charting	The United Kingdom Hydrographic Office (UKHO) will be notified of both the commencement, progress and completion of the rock placement activities to allow marking of all installed infrastructure on nautical charts.
Aid to Navigation (AtoN)	AtoNs (marking and lighting) will be deployed in accordance with international maritime regulations and the latest relevant available standard industry guidance, as advised by the NLB or MCA.
Safe passing distance	Advisory safe passing distances for vessels transiting near the subsea cable. These will be broadcast appropriately to nearby vessels, for example, via Automatic Identification System (AIS) or very high frequency.
Compliance with maritime law	- Compliance of the Aurora Project vessel with international maritime law and safe practice guidelines, including those by the United Nations Convention on the Law of the Sea (UNCLOS), International Regulations for Preventing Collisions at Sea (COLREGS Rule) and International Convention for the Safety of Life at Sea (SOLAS). - Vessel Waste Management Plan (WMP) compliant with applicable legislation and MARPOL 73/78.
Marking and lighting of vessels	Marking and lighting of the Aurora Project vessel in accordance with maritime law, in particular for vessels restricted in manoeuvrability.
Emergency Response Co-operation Plan (ERCoP)	- An offshore ERCoP will be prepared to ensure relevant compliance with MGN654, where appropriate. - Onboard spill response equipment. - Shipboard Oil Pollution Emergency Plan (SOPEP).

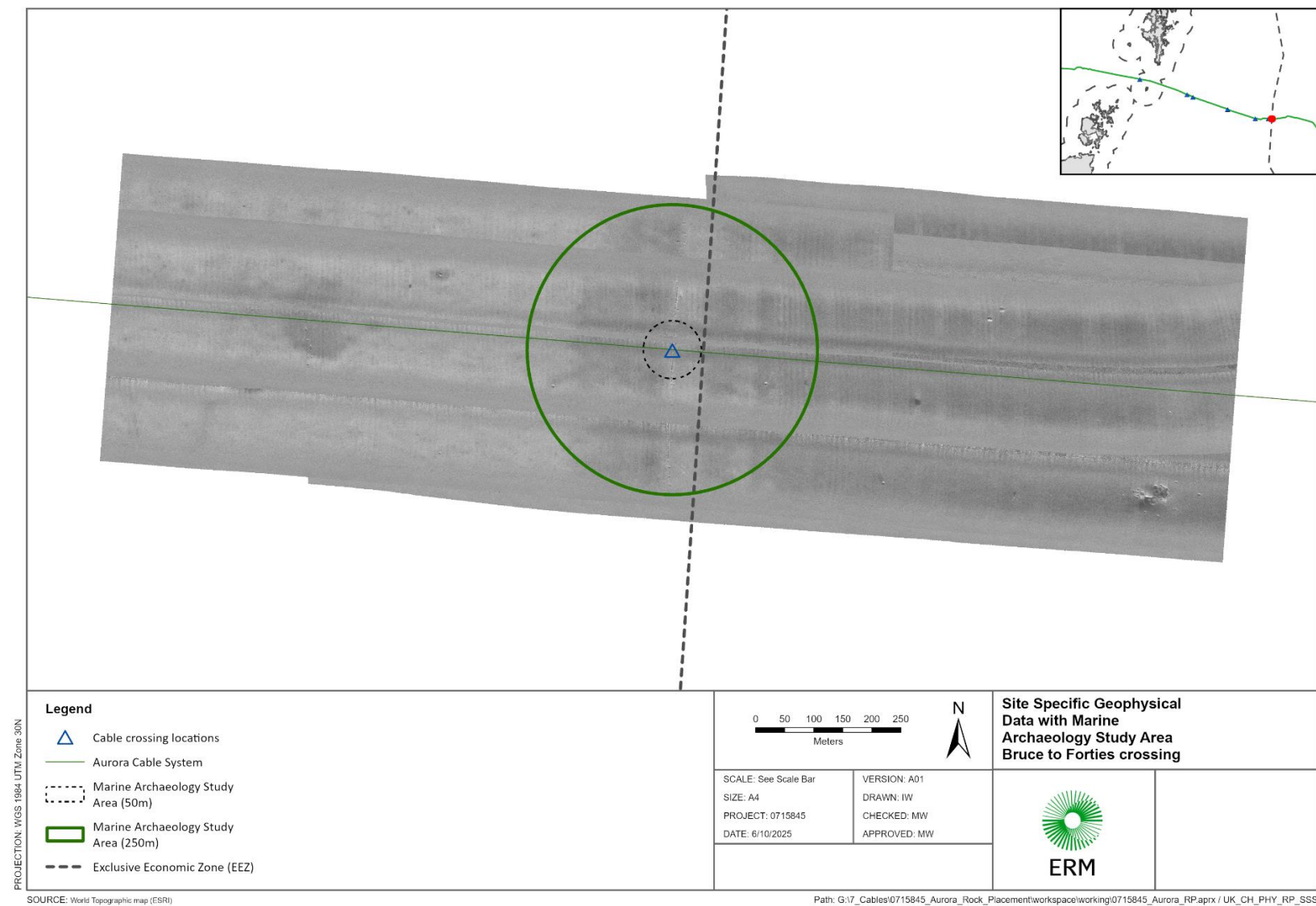
APPENDIX E SITE SPECIFIC GEOPHYSICAL DATA AT ROCK PLACEMENT ACTIVITIES LOCATIONS

FIGURE E-1 BATHYMETRY AND MULTIBEAM ECHOSOUNDER AT BRUCE TO FORTIES ROCK PLACEMENT LOCATION



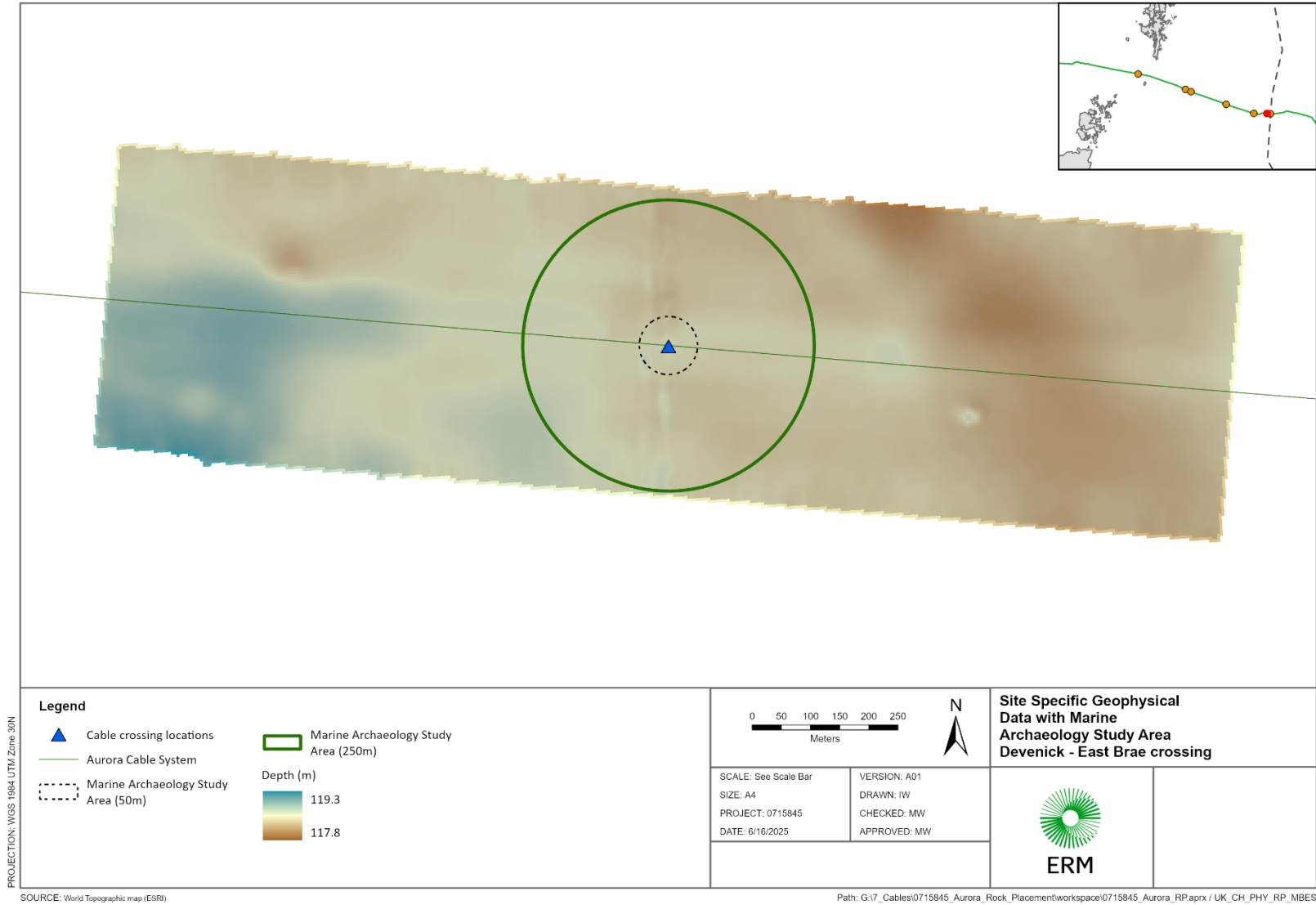
Source: EGS, 2024

FIGURE E-2 SIDESCAN SONAR AT BRUCE TO FORTIES ROCK PLACEMENT LOCATION



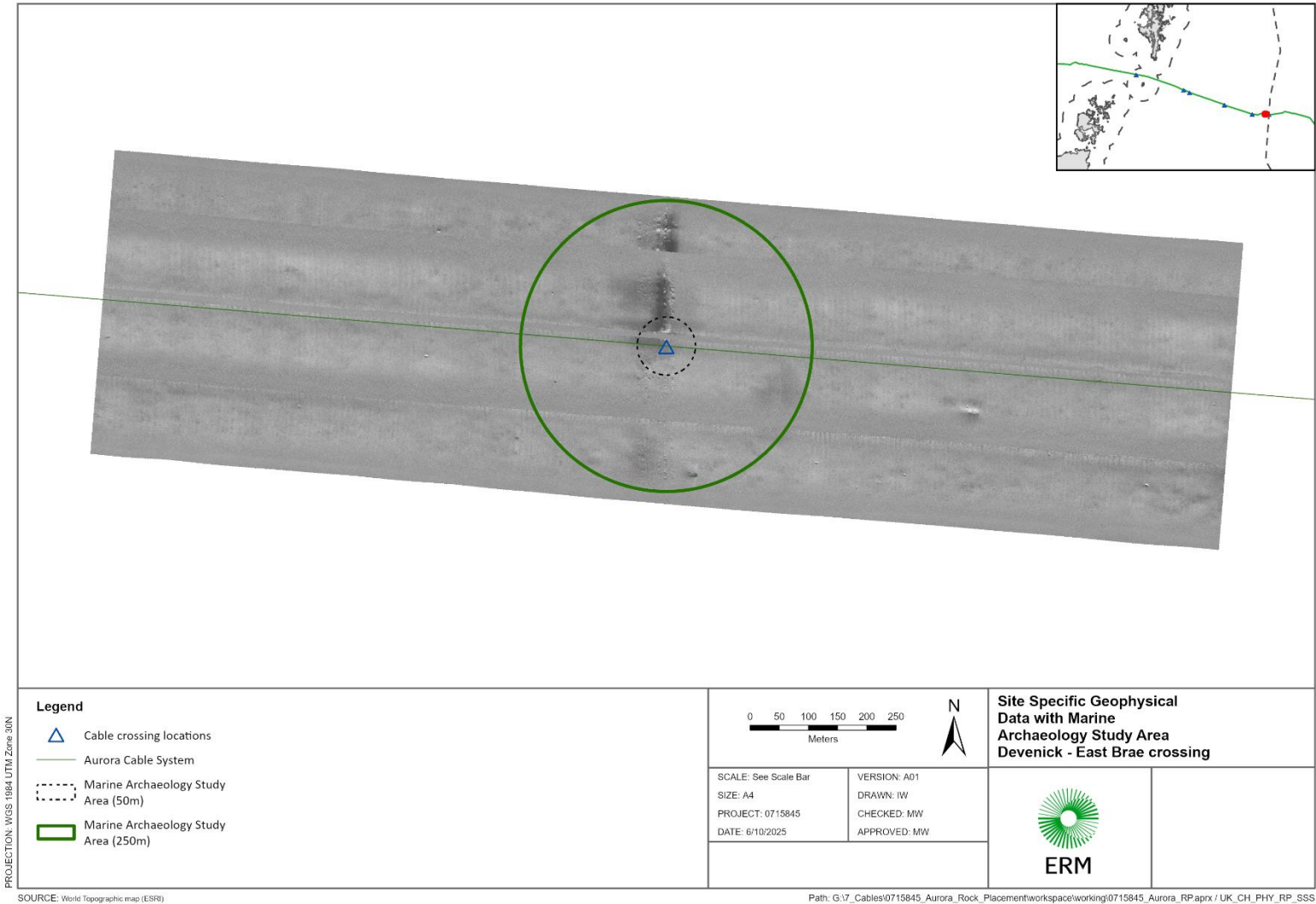
Source: EGS, 2024

FIGURE E-3 BATHYMETRY AND MULTIBEAM ECHOSOUNDER AT THE DEVENICK ROCK PLACEMENT LOCATION



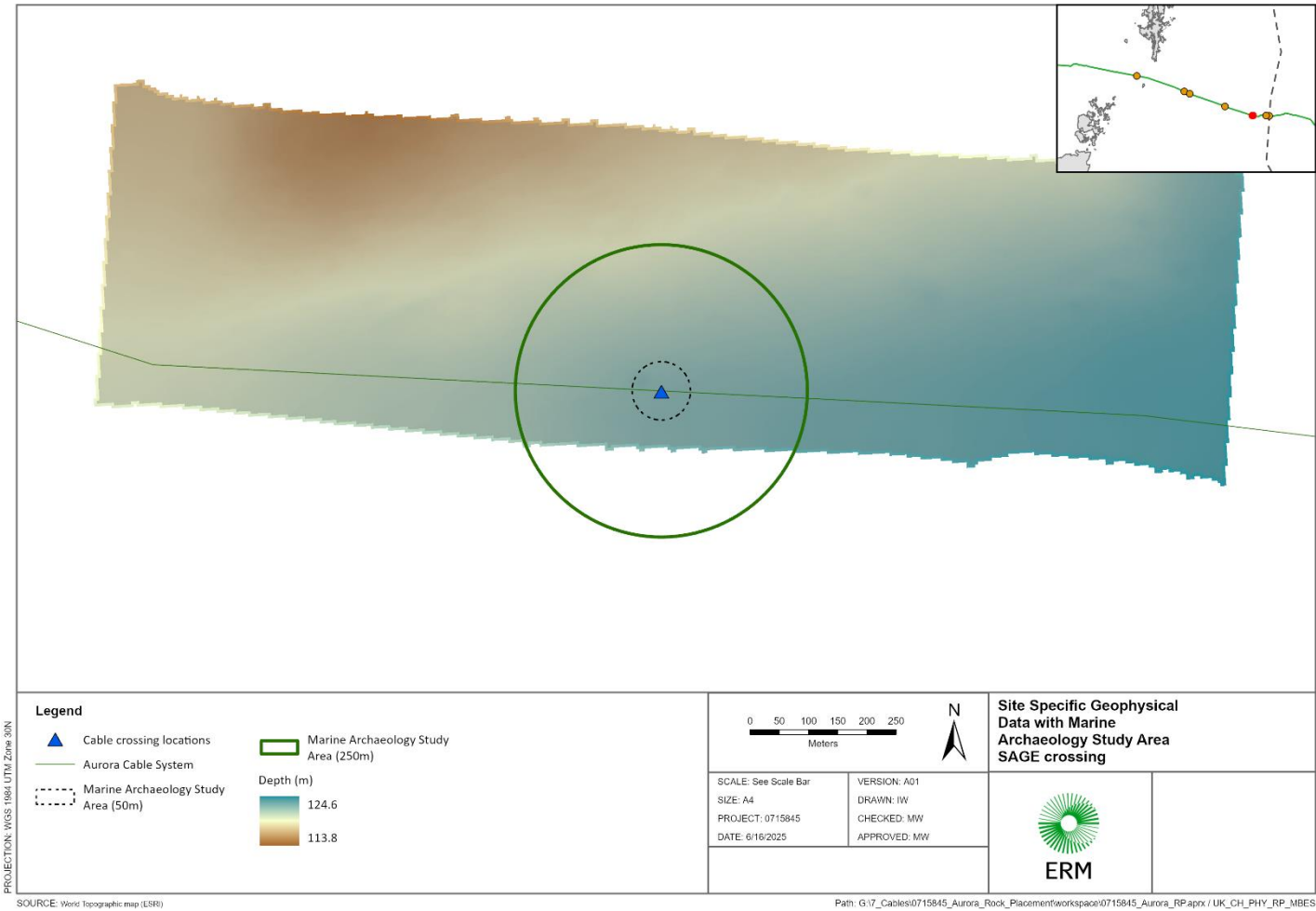
Source: EGS, 2024

FIGURE E-4 SIDESCAN SONAR AT THE DEVENICK ROCK PLACEMENT LOCATION



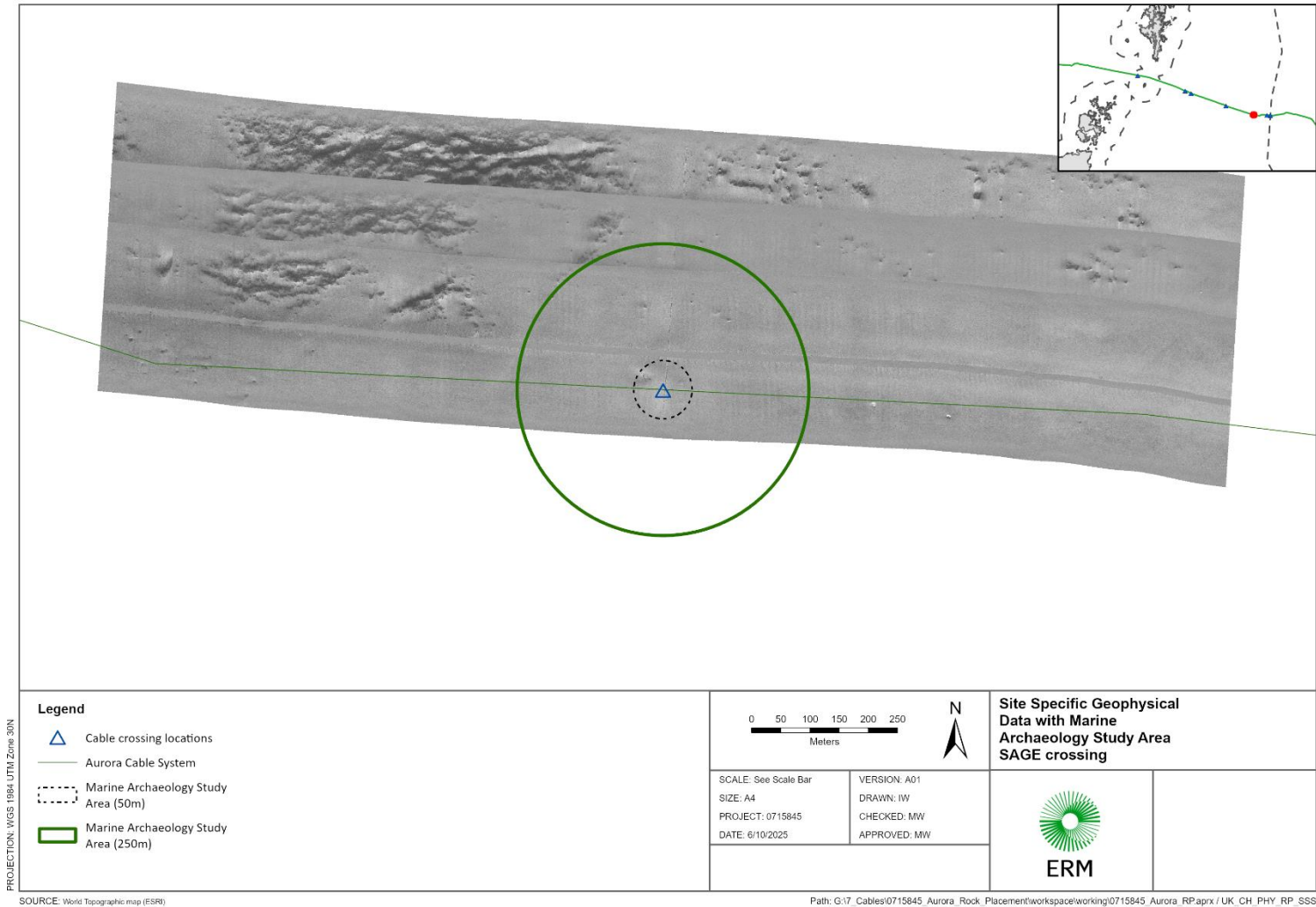
Source: EGS, 2024

FIGURE E-5 BATHYMETRY AND MULTIBEAM ECHOSOUNDER AT THE SCOTTISH AREA GAS EVACUATION ROCK PLACEMENT LOCATION



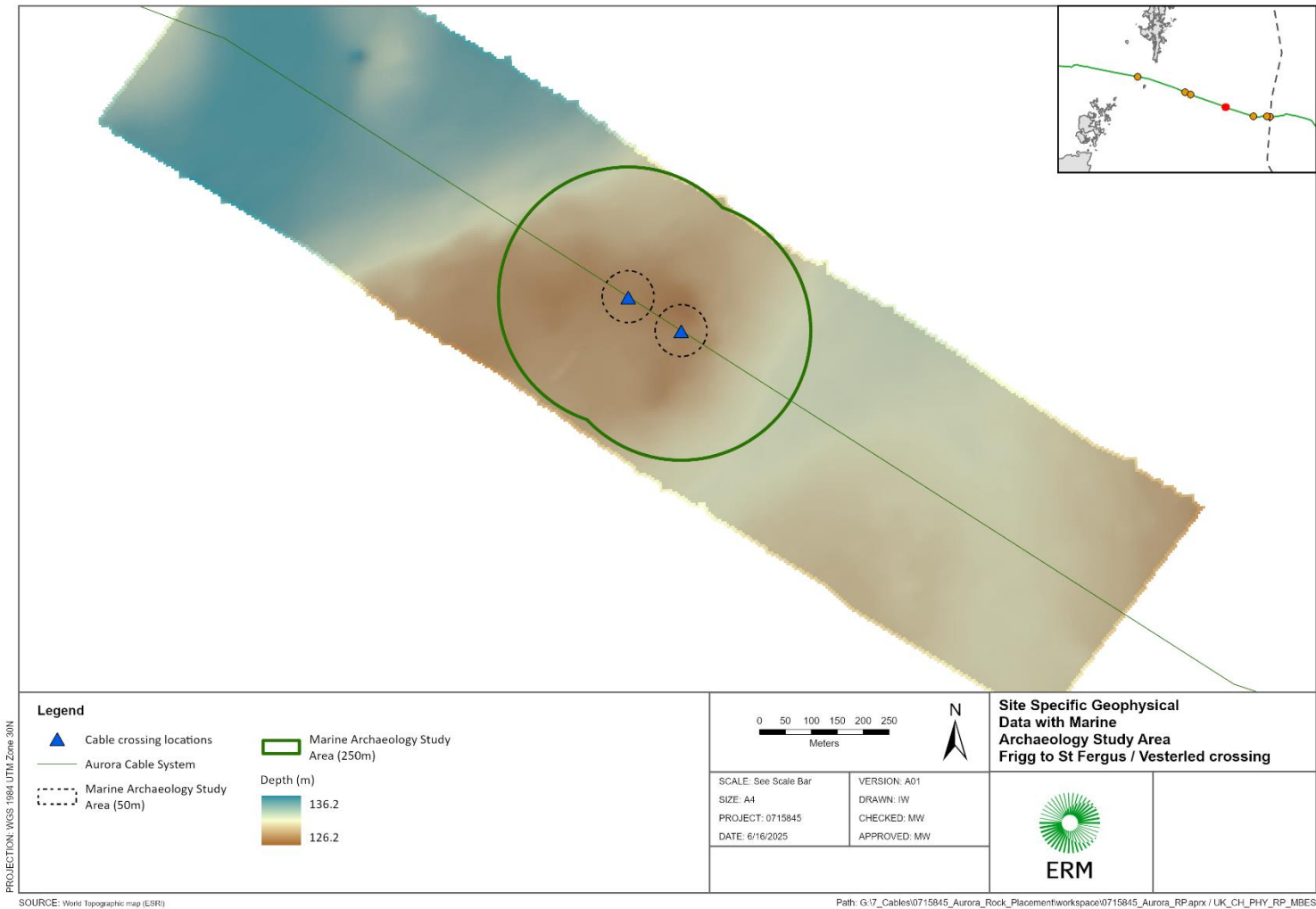
Source: EGS, 2024

FIGURE E-6 SIDESCAN SONAR AT THE SCOTTISH AREA GAS EVACUATION ROCK PLACEMENT LOCATION



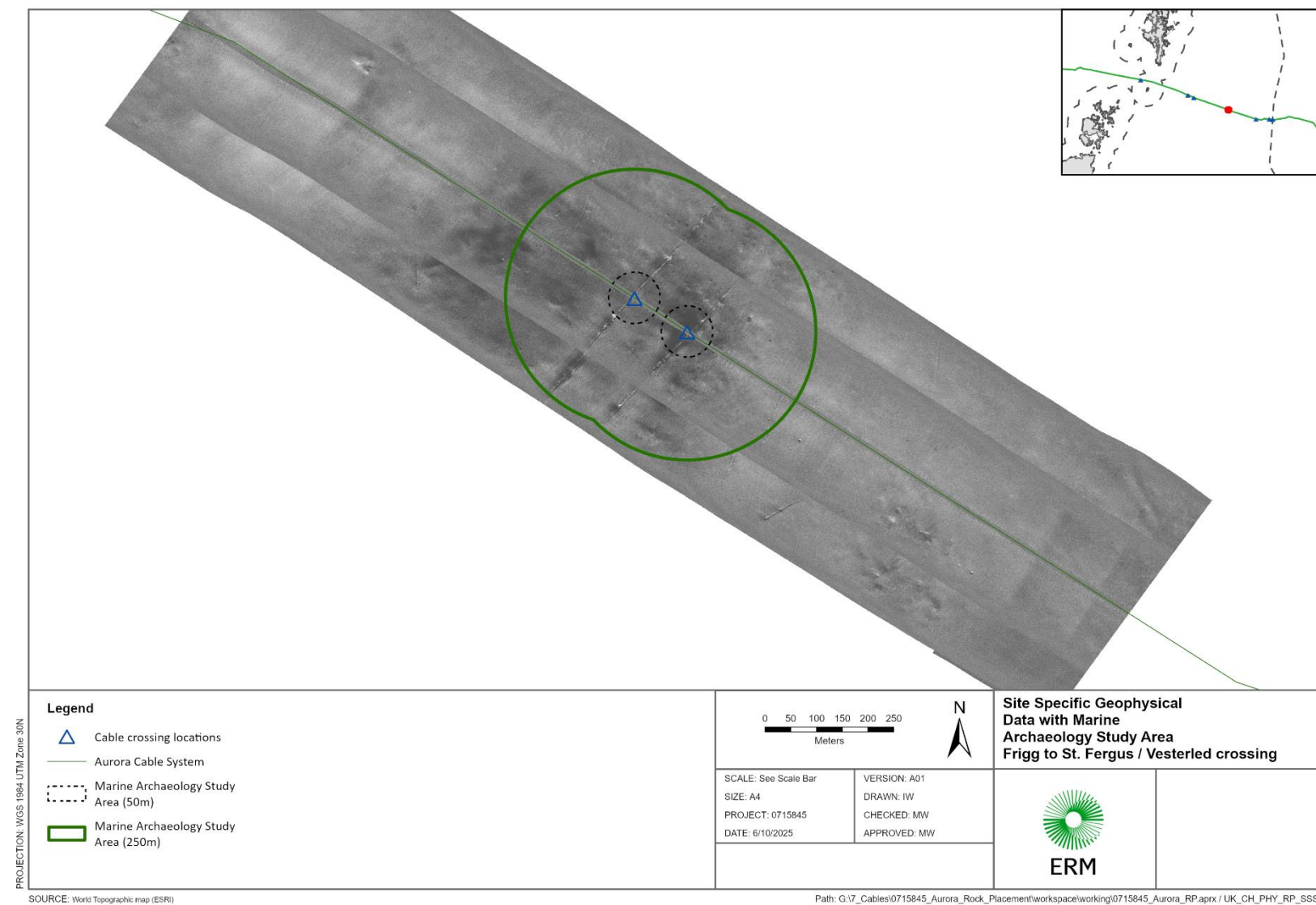
Source: EGS, 2024

FIGURE E-7 BATHYMETRY AND MULTIBEAM ECHOSOUNDER AT THE FRIGG TO ST FERGUS AND VESTERLAND ROCK PLACEMENT LOCATIONS



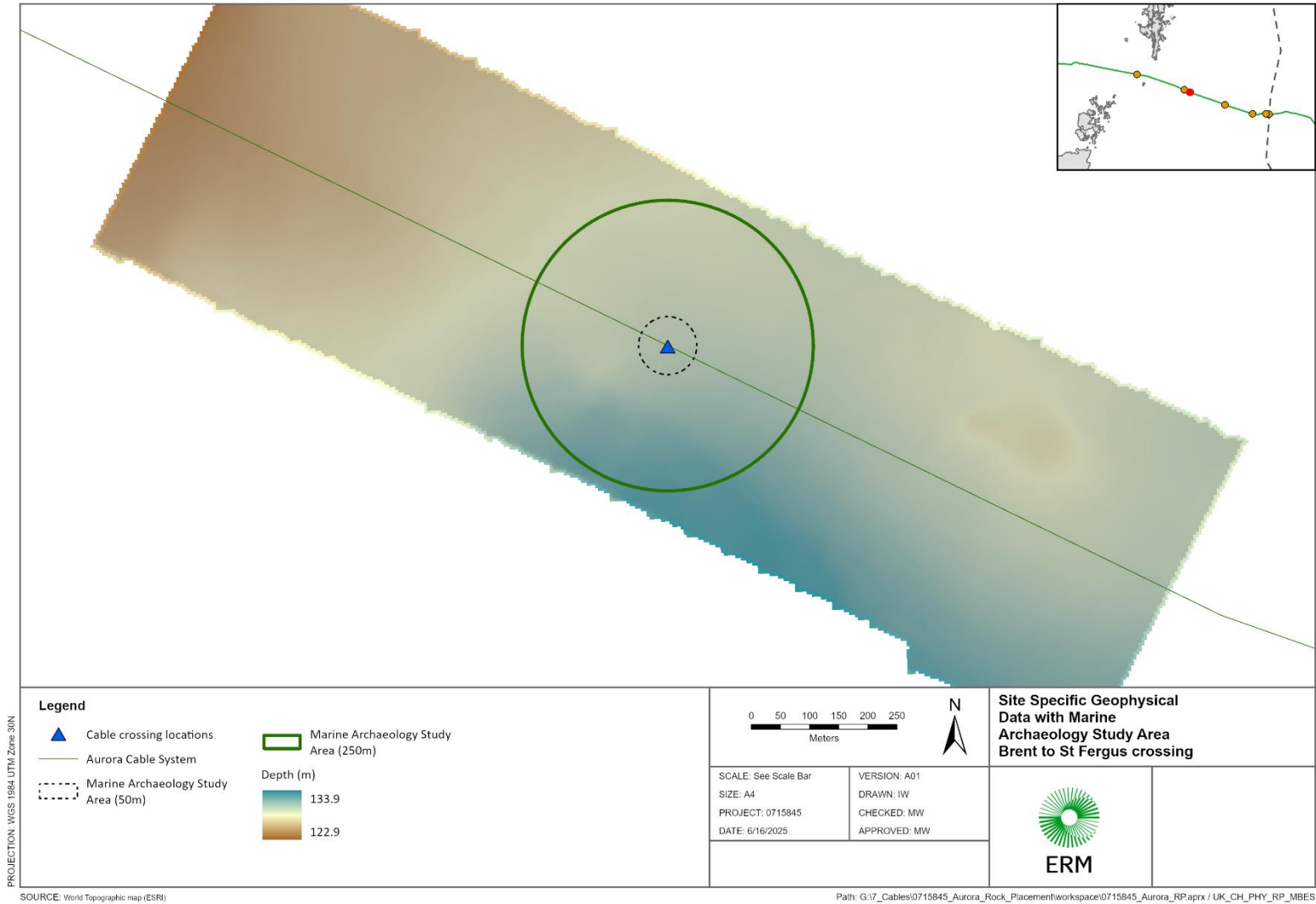
Source: EGS, 2024

FIGURE E-8 SIDESCAN SONAR AT THE FRIGG TO ST FERGUS AND VESTERLAND ROCK PLACEMENT LOCATIONS



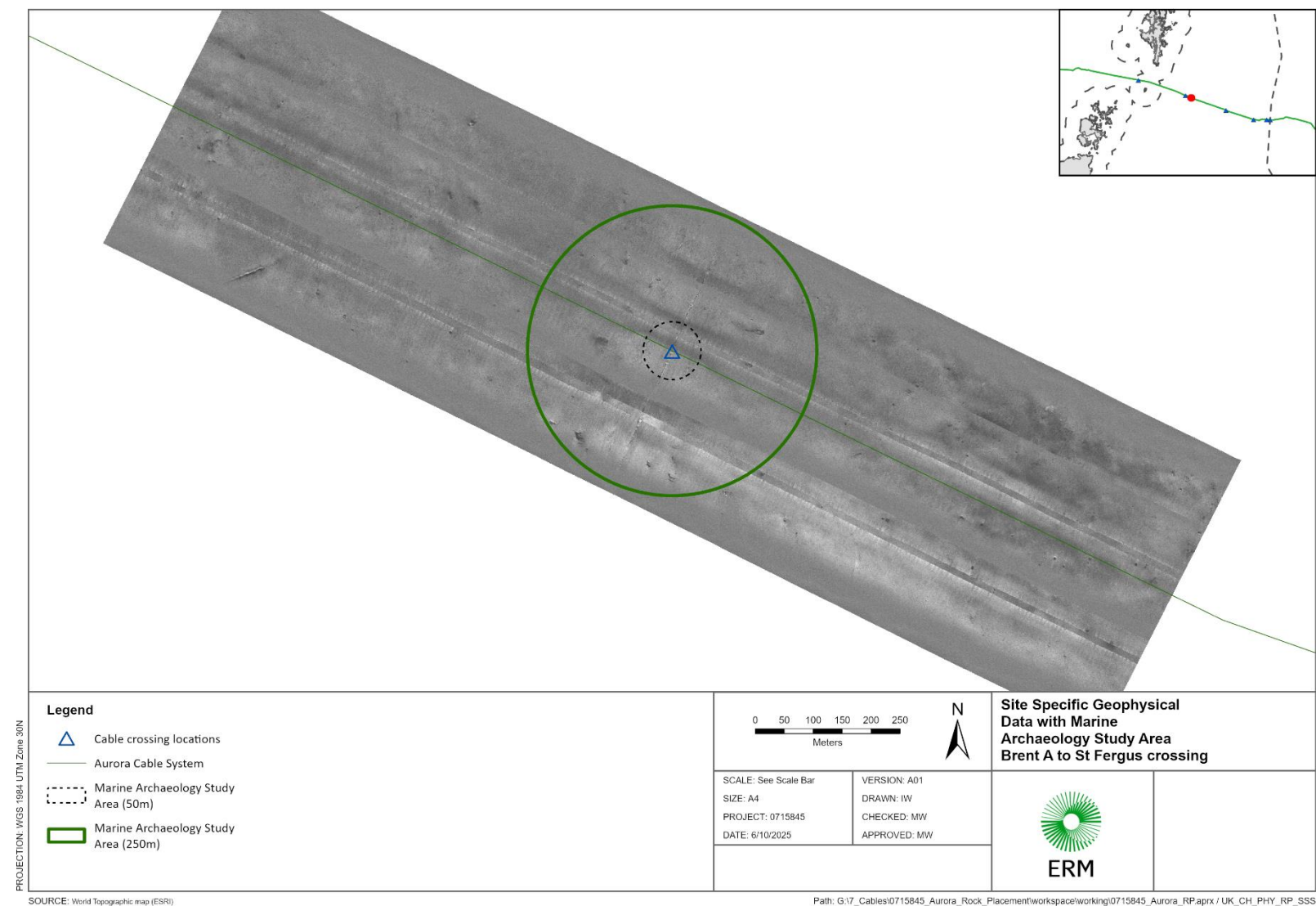
Source: EGS, 2024

FIGURE E-9 BATHYMETRY AND MULTIBEAM ECHOSOUNDER AT THE BRENT A TO ST FERGUS ROCK PLACEMENT LOCATION



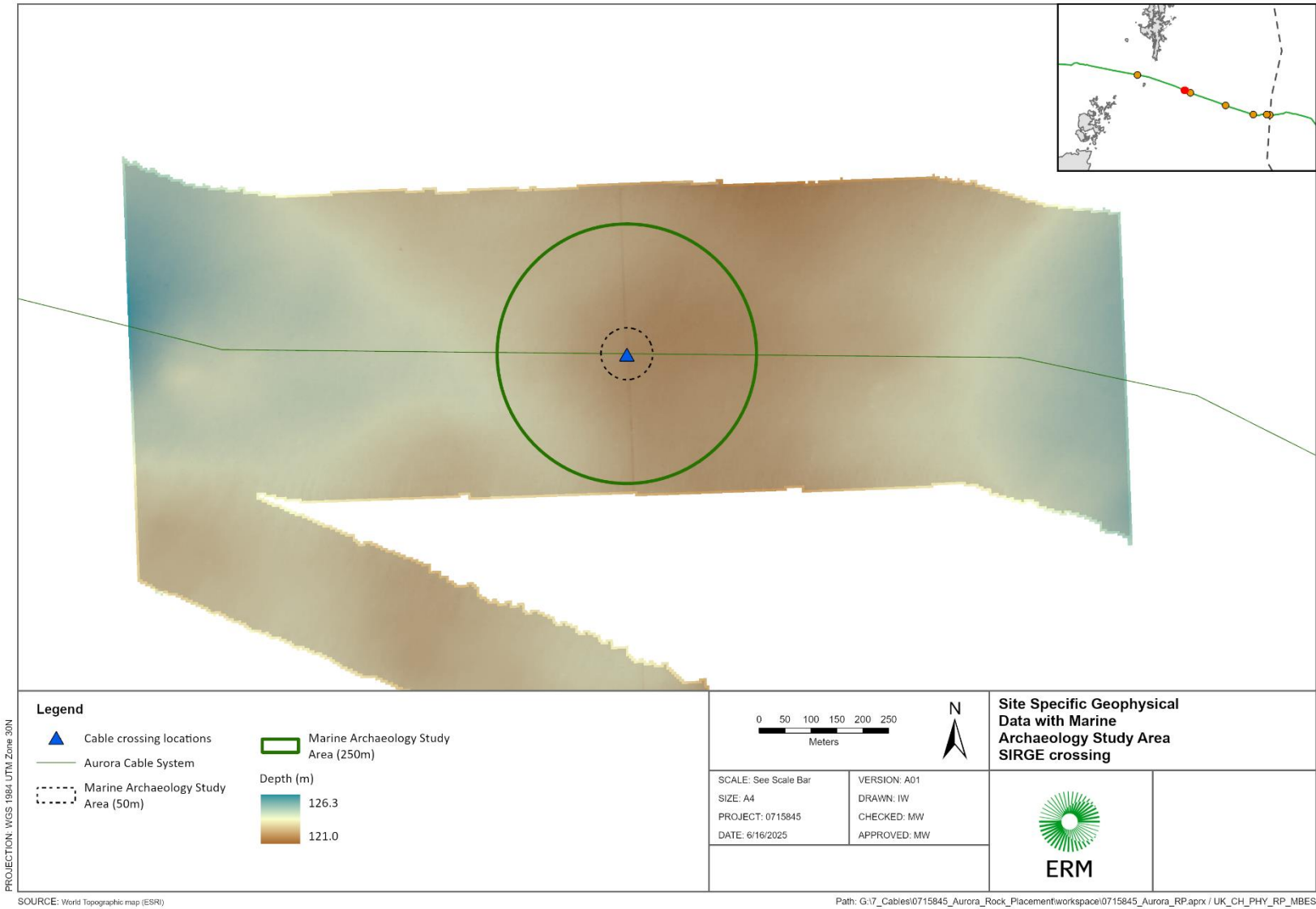
Source: EGS, 2024

FIGURE E-10 SIDESCAN SONAR AT THE BRENT A TO ST FERGUS ROCK PLACEMENT LOCATION



Source: EGS, 2024

FIGURE E-11 BATHYMETRY AND MULTIBEAM ECHOSOUNDER AT SHETLAND ISLAND GAS EXPORT SYSTEM ROCK PLACEMENT LOCATION



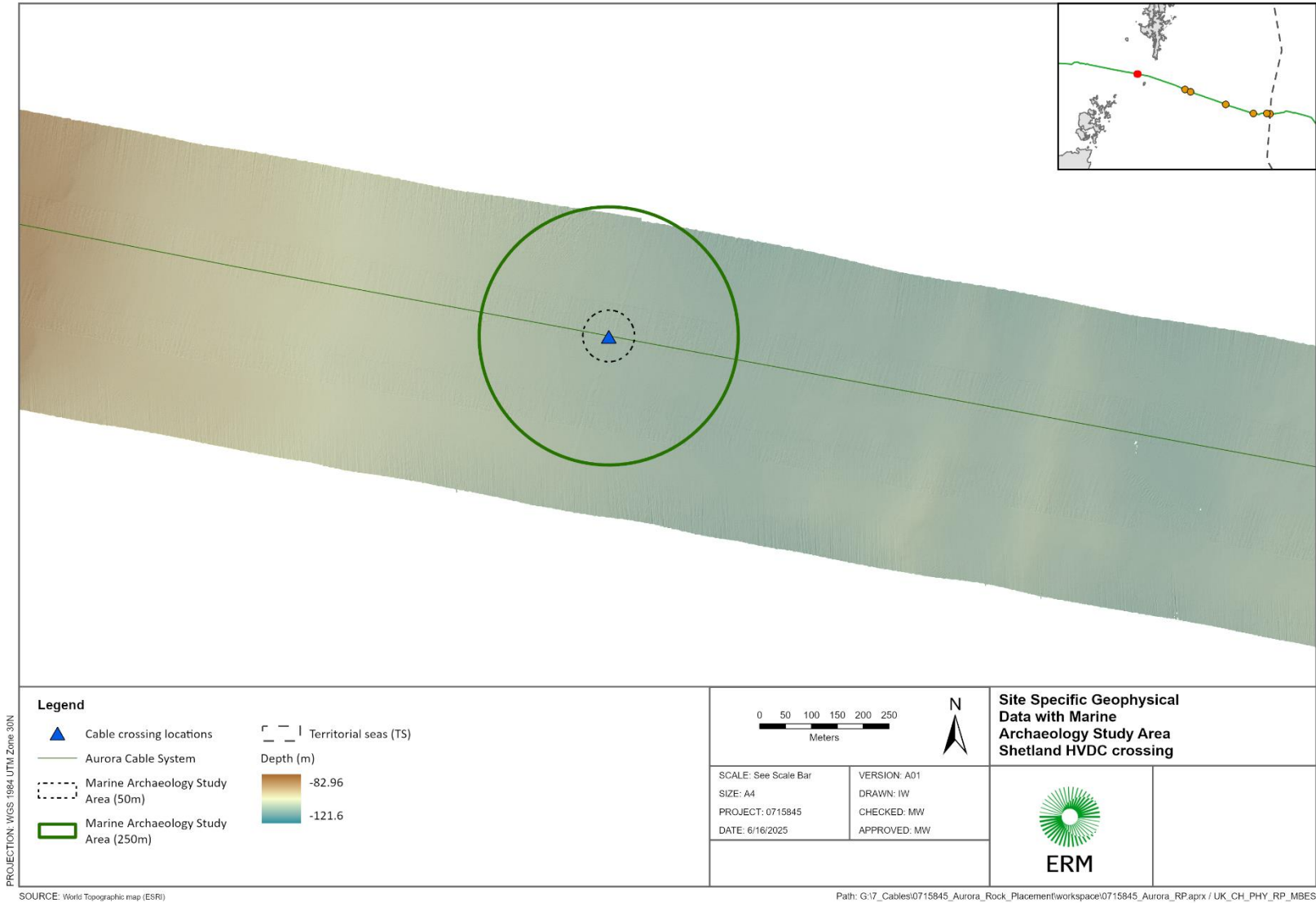
Source: EGS, 2024

FIGURE E-12 SIDESCAN SONAR AT SHETLAND ISLAND GAS EXPORT SYSTEM ROCK PLACEMENT LOCATION



Source: EGS, 2024

FIGURE E-13 BATHYMETRY AND MULTIBEAM ECHOSOUNDER AT SHETLAND HVDC ROCK PLACEMENT LOCATION



Source: EGS, 2024



FIGURE E-14 SIDESCAN SONAR AT SHETLAND HVDC ROCK PLACEMENT LOCATION



Source: EGS, 2024

APPENDIX F NAVIGATIONAL RISK ASSESSMENT



NASH
MARITIME

AURORA PROJECT

Cable and Pipeline Crossings Navigation Risk Assessment

ERM

Document No: 25-NASH-0523 | R03-00

03-Jul-25

PROJECT INFORMATION

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

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



EXECUTIVE SUMMARY

A Navigation Risk Assessment (NRA) has been undertaken in line with International Maritime Organisation's (IMO) Formal Safety Assessment (FSA) methodology for eight cable and pipeline crossings of the Aurora Project fibre optic cable which may require additional protection through rock dumping. One crossing is located within UK Territorial Seas (TS) and seven are located within the UK Exclusive Economic Zone (EEZ). The objectives of the NRA were to:

- Provide an overview of the existing marine activities in proximity to each proposed cable and pipeline crossing;
- Identify key impacts/hazards associated with the installation of the protection at the crossings and the presence of the protection;
- Assess the levels of risk associated with each hazard; and
- Where necessary, identify potential additional risk controls to reduce the severity or frequency of any hazards deemed unacceptable occurring.

Vessel traffic analysis showed that a number of ferry, cargo and passenger routes operate in proximity to the Study Areas (as shown in Figure 2). One of these routes is a ferry route operated by NorthLink Ferries running between Orkney and Shetland. Cargo vessel routes were observed in proximity to all of the Study Areas, whilst medium-high tanker density was only observed in proximity to Study Areas 1 and 4.

Fishing activity within the Study Areas included vessels using demersal gears. Most of the activity was observed in proximity to Study Areas 1, 2 and 3. Lower fishing activity was observed in proximity to Study Area 4. Recreational activity was generally low across the Study Areas, with the exception of Study Area 1. A route was observed east of Study Area 1 between Shetland and Fair Isle.

Based on the existing activities in proximity to the cable route, nine impacts on shipping and navigation were included in the assessment. The majority of these impacts were associated with the installation of the rock placement, including interactions and risks associated with the project vessels. The primary impact during the operational phase of the project was snagging of fishing gear and ship anchors.

Based on a review of hazard types, vessel categories and areas, a total of 14 hazards were identified and assessed for each of the four Study Areas. These included various snagging, grounding and collision incidents. With embedded risk control measures, none of the scenarios were assessed as High Risk – Unacceptable, and none were assessed as Medium Risk. All hazards were ranked as Low Risk. Therefore, all hazards are considered to be acceptable and adequately mitigated without the need for additional risk controls.

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APPENDICES

Appendix A Hazard Log

ABBREVIATIONS

Abbreviation	Detail
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
AtoN	Aid to Navigation
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
DfT	Department for Transport
DGPS	Differential Global Positioning System
EEZ	Exclusive Economic Zone
EMODNet	European Marine Observation and Data Network
ERCoP	Emergency Response Co-operation Plan
FFPV	Flexible Fall Pipe Vessel
FLAGS	Brent A to St. Fergus
FSA	Formal Safety Assessment
GT	Gross Tonnes
HMCG	His Majesty's Coastguard
HVDC	High-Voltage Direct Current
IALA	International Association of Lighthouse Authorities
IMO	International Maritime Organization
km	Kilometres
m	Metre
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MGN	Marine Guidance Note
MMO	Marine Management Organisation
MSC	Maritime Safety Committee
NLB	Northern Lighthouse Board
nm	Nautical Mile
NRA	Navigation Risk Assessment
NSTA	North Sea Transition Authority
NtM	Notice to Mariners
OREI	Offshore Renewable Energy Installation
OWF	Offshore Wind Farm
PIANC	World Association for Waterborne Transport Infrastructure
PLIB	Post-Lay Inspection and Burial
RNLI	Royal National Lifeboat Institute
RoRo	Roll-on Roll-off

Abbreviation	Detail
ROV	Remotely Operated Vehicle
RYA	Royal Yachting Association
SAGE	Scottish Area Gas Evacuation
SAR	Search and Rescue
SIRA	Simplified IALA Risk Assessment method
SIRGE	Shetland Island Gas Export System
SOLAS	Safety of Life at Sea
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
TS	Territorial Seas
UK	United Kingdom
UKC	Under Keel Clearance
UNCLOS	United Nations Convention on the Law of the Sea
VHF	Very High Frequency
VMS	Vessel Monitoring System

1. INTRODUCTION

1.1 PROJECT OVERVIEW

NASH Maritime Ltd (NASH) have been contracted by ERM to undertake a Navigation Risk Assessment (NRA) for eight cable and pipeline crossings along the Aurora fibre optic telecommunication cable (the Aurora Project) where protection may be required.

The total estimated length of Aurora Project is approximately 7,230 kilometres (km), connecting landings at Manasquan in the United States and Blaabyerg in Denmark, traversing through both the United Kingdom (UK) and Norwegian waters. The subsea cable route will pass through the UK Exclusive Economic Zone (EEZ) and Territorial Seas (TS) between Orkney and the Shetland Isles.

This NRA focuses solely on the identified cable and pipeline crossing locations requiring rock placement protection within the UK TS and EEZ (see **Section 4.2**). It is noted that an NRA was previously undertaken by NASH for the section of Aurora Project within UK TS, however this did not cover the potential impacts arising from the cable and pipeline crossing protection (Document 24-NASH-0523 R03-00).

1.2 OBJECTIVES

The NRA has been undertaken for the Aurora Project cable and pipeline crossings within UK TS and EEZ that may require protection based on the following objectives:

- Provide a description of the baseline environment including key navigational features;
- Describe the baseline vessel traffic and risk profile;
- Determine the likely future traffic profile;
- Identify and assess potential impacts of the cable and pipeline crossing protection on shipping and navigation;
- Identify and assess potential cumulative and in-combination effects;
- Undertake an NRA that identifies and assesses hazards during installation, operation and decommissioning phases of the development;
- Identification of risk controls in relation to the Project hazards to reduce the risk to As Low As Reasonably Practicable (ALARP); and
- Provide recommendations in relation to the safety of the development and co-existence of users with regards to shipping and navigation.

2. POLICY, LEGISLATION AND GUIDANCE

2.1 UK LEGISLATION AND NATIONAL POLICY

The United Nations Convention on the Law of the Sea (UNCLOS) (UN, 1982) is an international agreement that establishes a legal framework for all marine and maritime activities. Article 60 concerns artificial islands, installations and structures in the exclusive economic zone. Article 60(7) states that “Artificial islands, installations and structures and the safety zones around them may not be established where interference may be caused to the use of recognised sea lanes essential to international navigation.” As per Article 22(4), “The coastal state shall clearly indicate such sea lanes and traffic separation schemes on charts to which due publicity shall be given”.

Vessels navigating must also adhere to requirements under the International Convention for the Safety of Life at Sea (SOLAS), the International Convention for the Prevention of Pollution from Ships and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). Furthermore, vessels will navigate in accordance with the Convention on the International Regulations for Preventing Collisions at Sea, 1972 as amended (COLREGs).

Scotland’s National Marine Plan has been considered, which covers both Scottish inshore waters (out to 12 nautical miles (nm)) and offshore waters (12 nm to 200 nm). Chapter 13 of the plan related to shipping, ports, harbours and ferries, whilst chapter 14 of the plan details marine planning policies for subsea cables. The key relevant policies stated within chapter 13 are presented in **Table 1**. These include the levels of marine traffic in Scottish waters relating to shipping, freight and trade, safeguarding the viability of main shipping routes, protecting dredging activity, oil and gas and renewable energy needs.

Table 1: Policies from Chapter 13 of Scotland’s National Marine Plan.

Policy ID	Description
TRANSPORT 1	Navigational safety in relevant areas used by shipping now and in the future will be protected, adhering to the rights of innocent passage and freedom of navigation contained in UNCLOS. The following factors will be taken into account when reaching decisions regarding development and use: • The extent to which the locational decision interferes with existing or planned routes used by shipping, access to ports and harbours and navigational safety. This includes commercial anchorages and defined approaches to ports. • Where interference is likely, whether reasonable alternatives can be identified. • Where there are no reasonable alternatives, whether mitigation through measures adopted in accordance with the principles and procedures established by the International Maritime Organization (IMO) can be achieved at no significant cost to the shipping or ports sector.
TRANSPORT 2	Marine development and use should not be permitted where it will restrict access to, or future expansion of, major commercial ports or existing or proposed ports and harbours which are identified as National Developments in the current National Planning Framework or as priorities in the National Renewables Infrastructure Plan.

Policy ID	Description
	Regional marine plans should identify regionally important ports and harbours, giving consideration to social and economic aspects of the port or harbour and the users of the facility subject to policies and objectives of this Plan. Regional plans should consider setting out criteria against which proposed activities and developments should be evaluated.
TRANSPORT 3	Ferry routes and maritime transport to island and remote mainland areas provide essential connections and should be safeguarded from inappropriate marine development and use that would significantly interfere with their operation. Developments will not be consented where they will unacceptably interfere with lifeline ferry services.
TRANSPORT 6	Marine planners and decision makers and developers should ensure displacement of shipping is avoided where possible to mitigate against potential increased journey lengths (and associated fuel costs, emissions and impact on journey frequency) and potential impacts on other users and ecologically sensitive areas.

2.2 PRIMARY GUIDANCE

The principal guidance document for NRAs is the Maritime and Coastguard Agency (MCA)'s Marine Guidance Note (MGN) 654 (2021). MGN 654 describes the potential shipping and navigation issues which should be considered by Applicants when proposing Offshore Renewable Energy Installations (OREIs). Whilst the Aurora Project is not an OREI, MGN 654 contains guidance specific to export cables, which is applicable for navigational safety around fibre optic telecommunication cables. MGN 654 provides a detailed methodology for assessing the marine navigational safety risks. In particular, by following the methodology, the NRAs:

- Are proportionate to the scale of the development and magnitude of risks;
- Are based on the risk assessment approach of the Formal Safety Assessment (FSA);
- Are capable of utilising techniques and methods which produce results which are acceptable to the Government;
- Compare the base case and future case risks in the study area before predicting the impacts of the Project on that risk through a hazard log; and
- Determine which risk controls should be put in place to minimise the risks to ALARP.

MGN 654 Annex 1 provides a standardised format of submission which is described in **Table 2**. Annex 3 provides guidance on Under Keel Clearance (UKC). Annex 4 provides hydrography guidelines, whilst Annex 5 contains guidance on requirements, guidance and operational considerations for search and rescue and emergency response.

Of particular relevance to cable protection, MGN 654 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 satisfactorily mitigated.”*

Additional guidance used to inform the NRA include the MCA's MGN 372 (MCA, 2022), International Association of Lighthouse Authorities (IALA) G1162 The Marking of Offshore Man-Made Structures (IALA, 2021), The World Association for Waterborne Transport Infrastructure (PIANC) WG161 Interaction Between Offshore Wind Farms and Maritime Navigation (PIANC, 2018) and The Shipping Industry and Marine Spatial Planning (Nautical Institute, 2013).

Table 2: MGN 654 Annex 1 Methodology for Assessing the Marine Navigational Safety and Emergency Response Risks of Offshore Renewable Energy Installations.

The following content is included:	Compliant Yes/No	Comments
A risk claim is included supported by a reasoned argument and evidence	Yes	The risk assessment conducted in Section 9 is supported by data analysis (Section 6.2), consultation (Section 3.4.1) and a review and discussion of impacts (Section 8). Therefore, a risk claim is made in Section 11 .
Description of the marine environment	Yes	A description of the marine environment has been provided within Section 5 and Section 6 .
Description of the Project and how it changes the marine environment	Yes	A description of the Project is provided in Section 4 . Potential impacts are described in Section 8 .
Analysis of the marine traffic	Yes	An analysis of the baseline vessel traffic is provided in Section 6.2 . Section 7 presents the future baseline traffic profile. The impacts of the Project on that traffic are contained within Section 8 .
Status of the hazard log	Yes	The navigational risk assessment is provided in Section 9 . The hazard log is provided in Appendix A .
Navigation Risk Assessment	Yes	The NRA is provided in Section 9.5 .
Search and Rescue overview and assessment	Yes	Existing search and rescue provision is described in Section 5.2 . An assessment of impacts of the Project to search and rescue is provided in Section 8.4 .
Emergency Response Overview and Assessment	Yes	
Status of Risk control log	Yes	Embedded mitigations are described in Section 4.6 . The results of the NRA deemed that no additional mitigation measures were necessary.
Major Hazards Summary	Yes	A summary of the principal impacts of the Project are contained within Section 8 and an NRA reported in Section 9 .
Statement of Limitation	Yes	Any limitations or assumptions of this assessment are reported in their relevant sections.
Through Life Safety Management	Yes	Embedded mitigations are described in Section 4.6 . The results of the NRA deemed that no additional mitigation measures were necessary.

The IMO FSA process has been applied within this NRA. The guidelines for FSAs were approved in 2002 and were most recently amended in 2018 by Maritime Safety Committee (MSC)-MEPC.2/Circ.12/Rev.2 (IMO, 2018). This NRA has been conducted utilising this methodology, as per recommendations from MGN 654. Further details of the FSA process are presented in **Section 9**.

3. NAVIGATION RISK ASSESSMENT METHODOLOGY

3.1 OVERVIEW

The NRA has been produced in accordance with the IMO's FSA methodology (see **Section 9**). This assessment considers identified impacts resulting from the cable and pipeline crossing protection on shipping and navigation receptors. The FSA defines a risk as “the combination of the frequency and the severity of the consequence” (IMO, 2018). Therefore, the likelihood and consequence of these impacts are assessed through the collection of high-quality datasets and consultation. Details on the risk criteria and matrix methodology are contained within **Section 9.3**.

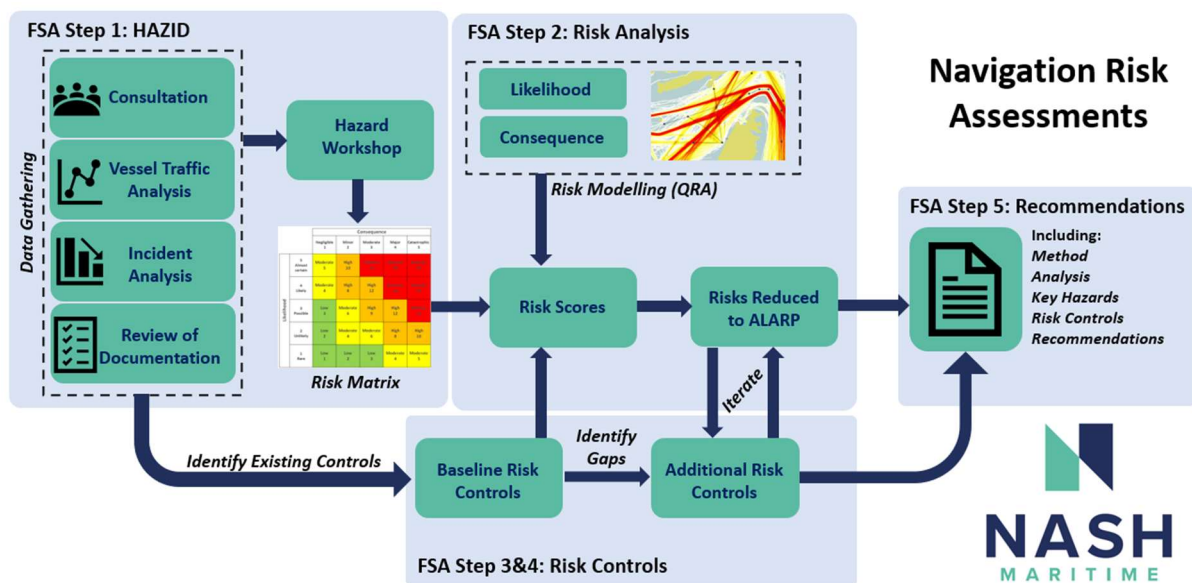


Figure 1: NRA Methodology.

3.2 SHIPPING AND NAVIGATION STUDY AREAS

The shipping and navigation study areas (hereafter referred to as the Study Areas) are shown in **Figure 2**. The Study Areas have been defined as areas covering a 5 nm area from each crossing. Where more than one crossing was close proximity, areas have been ‘merged’ for simplicity. These four Study Areas have been used within the NRA to assess shipping patterns in proximity to the Project. The study areas used are consistent with industry best practice for offshore NRAs.

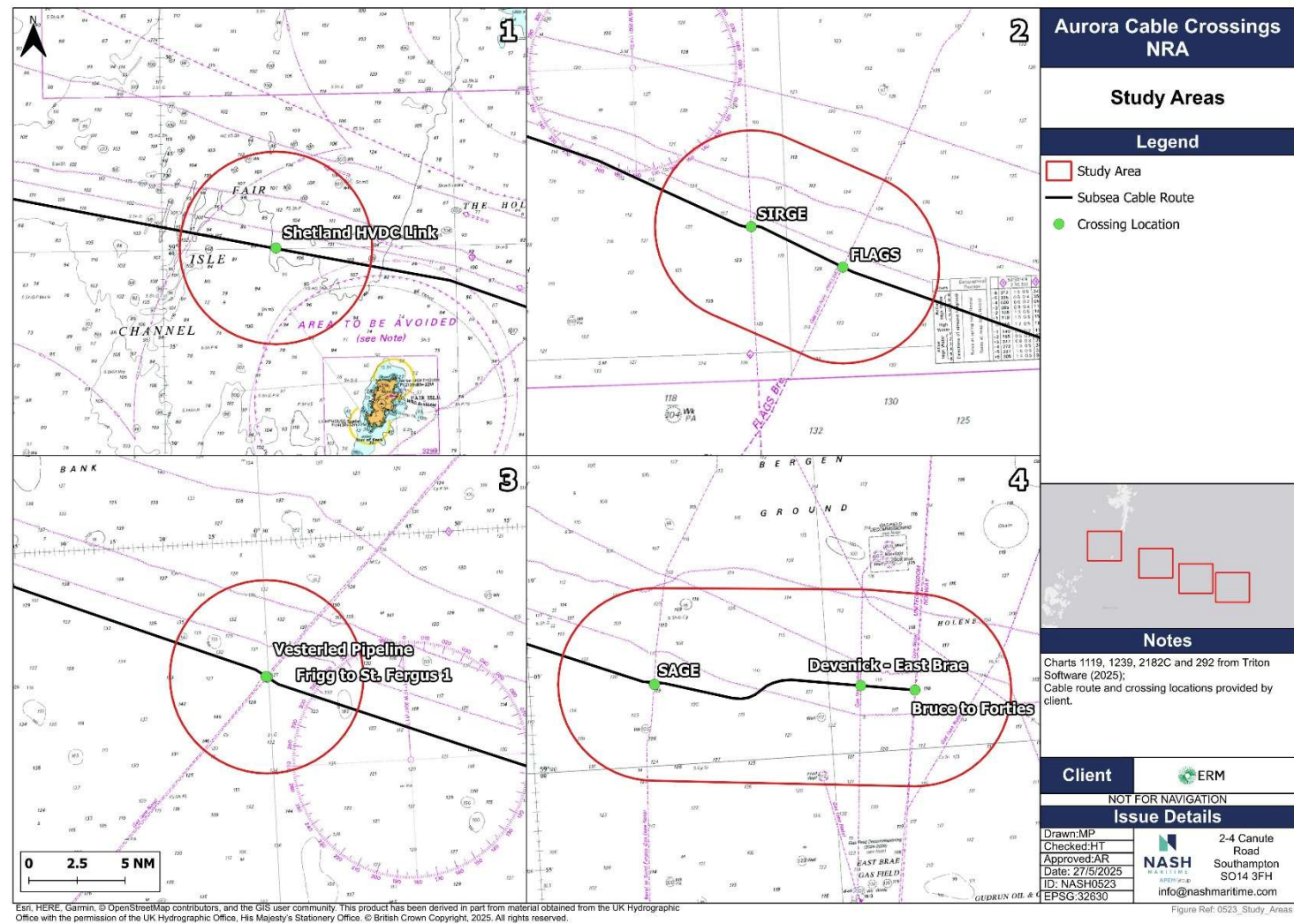


Figure 2: Study Areas.

3.3 IALA RISK MANAGEMENT TOOLS

IALA's Simplified IALA Risk Assessment method (SIRA) follows the FSA process and allows organisations to assess maritime and navigation risk in their waters so that they can meet their obligations for the management of navigation safety (e.g., obligations under international conventions such as SOLAS, national domestic legislation, etc.). The principles of the SIRA approach have been used to conduct the risk assessment.

Details of the overarching methodology are provided in the following IALA Guidance:

- IALA (2022) G1018— Risk Management; and
- IALA (2017) G1138— The Use of SIRA.

3.4 DATA SOURCES

3.4.1 Consultation and Engagement

Consultation has been undertaken with relevant shipping and navigation stakeholders as part of the MLA application. A Technical Note was issued to stakeholders on 2 June 2025 to a number of recipients, including the following stakeholders relevant to shipping and navigation:

- MCA;
- Northern Lighthouse Board (NLB);
- UK Chamber of Shipping;
- Royal Yachting Association (RYA);
- NorthLink Ferries;
- Cruising Association; and
- Fisheries organisations:
 - Scottish Fishermen's Federation (SFF);
 - Fisheries Management Scotland;
 - Scottish White Fish Producers Association; and
 - North Atlantic Fishing Company.

Responses to the Technical Note are presented in **Table 6**.

Table 3: Consultation Responses

Consultee	Date / Response Type	Response	Where addressed
SFF	6 June 2025 Email response	We hold regular meetings with subsea cable developers of which share information regarding proposed subsea cable routes with the purpose of gaining insight relating to fishing concerns, with the amount of anticipated subsea cabling on the horizon we at SFF Services Ltd have since developed the idea to create Horizon Watch. Horizon Watch is primarily to allow the fishing industry early insight into proposed cable routes until such time as they become as laid positioning within KIS-ORCA, our aim is to receive the raw data from asset owners , convert this data into fishing plotter files which can then be overlayed into fishing plotters. This will allow fishers the opportunity of early insight, in turn providing a platform for localised feedback in relation to any areas of concern that the developer should be made aware of. Our plan sees the issuing of the Horizon Watch NTM which will alert fishers of a proposed cable route to which any interested parties will be directed to the plotter files being held on a downloadable file via SFF webpage under our “Safe Seas” category. The benefits gained by allowing a plotter overlay file opposed to a series of coordinates on an NTM have been proven via previous projects to gain the most in-depth response as fishers can visualise this alongside their daily fishing operations. Issuing of such an NTM would be distributed via our eight constituent associations of which holds around 450 member vessels, also issuing via social media platforms will capture further audiences ensuring the maximum reach of notification.	Response provided is informational and no issues raised that require addressing.
SFF	25 June 2025 Letter response	The SFF note from TABLE 4-1 (p10) of the Technical Note that a total of 136 to 2,000 m³ of rock will be used per crossing location (pre-installation) within the UK Exclusive Economic Zone (EEZ). Given that this represents a substantial volume of rock deposit, we seek clarification on the rationale behind this specific volume selection. The SFF note from Figure 4-1 to 4-3 of the Technical Note that crossing profile slopes are designed with an apex, however the SFF prefers a design that features slopes on either side with a flat section instead. Considering the high levels of fishing activity at proposed crossing points, we believe that the presence of pre-lay rock and potentially unprotected cables pose snagging hazards to fishermen. To mitigate this risk, we propose deploying a guard vessel to provide active monitoring and alerts, as well as utilizing Horizon Watch (a cable	Noted. Preference noted. Guard vessels do not form part of the embedded mitigation, as discussed in Section 8.5, as the use of guard vessels is not considered proportionate. However appropriate

Consultee	Date / Response Type	Response	Where addressed
		charting service provided by the SFF Services Ltd) to ensure fishermen have early access to cable route information within the UK as the KIS-ORCA only updates once annually. The SFF welcome the Aurora Project decision in terms of in terms of using rock for cable protections. We would like to reiterate that the fishing industry is opposed to using concrete mattresses, grout bag, rock/sandbags in open water since they create significant snagging hazards for bottom trawl fishing vessels and static gears.	precautions will be taken for any periods where cable is exposed. Noted.
MCA	26 June 2025 Email response	We note that the works will take place in a high-density shipping area, close to an IMO adopted recommended route, and will cross routes used frequently by ferry operators, local pleasure craft, as well as fishing areas. We would therefore expect further consultation with fisheries interests and local operators. We would expect a proportionate NRA following a recognised risk assessment methodology such as the IMO FSA methodology, which is the internationally recognised approach for assessing the impact to shipping and navigation users. The NRA should establish how the phases of the project are managed to a point where risk is reduced and considered to be ALARP. The range of potential project impacts on shipping and navigation and other marine users should be identified which could occur during the construction, operation, and decommissioning phases of the project. In addition to those potential impacts listed on page 21 of the Technical Note, the NRA should consider the potential for reduction in navigable depth referenced to chart datum. The combined height of the cable and additional rock protection at cable crossings and the water depth at each location will need to be assessed. The MCA would accept a maximum of 5% reduction in surrounding depth referenced to Chart Datum. Where this is not achievable the MCA would welcome further discussion to consider the impact and any proposed risk mitigation measures. Under no circumstances should depth reductions compromise safe navigation. The MCA would expect the applicant to ensure that all maritime safety legislation is complied with and the use of up-to-date nautical charts and publications.	Consultation has been undertaken with fisheries, in addition to other stakeholders listed in Section 3.4.1. An NRA has been undertaken in accordance with the IMO's FSA (see Section 9), which concluded that all risks were "Low Risk" and require no additional mitigation. This NRA considered across the construction, operation and decommissioning phases of the project. Reduction in under keel clearance has been considered in Section 8.6. The worst case protection associated with cable crossings will not reduce any water depths by over 2.7% and is therefore well within the 5% tolerance as set out in MGN 654. Up to date nautical charts and publications have been used to inform this NRA.
NLB	17 June 2025	Northern Lighthouse Board will formally respond to the Marine Licence once consulted and will likely advise the following unless there is a substantive change to the project:	Noted, no substantive changes are anticipated. Promulgation of

Consultee	Date / Response Type	Response	Where addressed
	Email response	- The Project issue Notice to Mariners, Kingfisher Bulletins and Radio Navigation Warnings in advance and during the activities as needed, please copy any issued NtMs to navigation@nlb.org.uk - The Project submit final survey data to the UK Hydrographic Office advising the as-laid information for the cable and rock dump areas	information is an embedded mitigation per Section 4.6 .

3.4.2 Vessel Traffic Datasets

The vessel traffic data used within this NRA is listed below:

- Publicly available European Marine Observation and Data Network (EMODNet) Automatic Identification System (AIS) data: 12 months 2024;
- Marine Management Organisation (MMO) Vessel Monitoring System (VMS) fishing effort data 2020;
- MMO VMS data: first 14 days per month 2019;
- RYA Coastal Atlas: May to September 2014 and 2017; and
- Department for Transport (DfT) shipping statistics 2024.

3.4.3 Incident Data

The following accident datasets were utilised to support this assessment:

- Marine Accident Investigation Branch (MAIB) accidents database 1991-2023; and
- Royal National Lifeboat Institute (RNLI) incident data 2008-2023.

3.4.4 Other Data Sources

Other datasets utilised to support this assessment include:

- Admiralty charts 1119, 1239, 2182C and 292 (2025);
- United Kingdom Hydrographic Office (UKHO) IMO routeing measures and UK limits 2024;
- North Sea Transition Authority (NSTA) oil and gas pipelines 2023;
- RNLI Lifeboat Stations 2021;
- HM Coastguard (HMCG) helicopter bases and Maritime Rescue Coordination Centres (MRCCs) 2024; and
- Admiralty Sailing Directions: NP52 2022.

4. PROJECT OVERVIEW

4.1 ACTIVITIES

Only the pre-installation rock placement and post-installation rock placement activities associated with the Aurora Project cable and pipeline crossings within the UK TS and EEZ are considered within this document. The other activities (i.e. subsea cable installation, operation and maintenance/decommissioning) were covered in a separate NRA which accompanied the marine licence application submitted to Marine Directorate - Licensing Operations Team on 13 January 2025 for the section of cable within UK TS (reference number: 00011067), and are therefore outside the scope of this document.

4.2 CROSSINGS AND LOCATIONS

Rock placements will be installed at cable and pipeline crossings where this is required by the asset owners. **Table 4** provides the location co-ordinates for the proposed rock placements, which are presented visually in **Figure 2**.

It is understood that six crossings within the EEZ require pre-installation and post-installation rock placement while one crossing within the EEZ only requires post-installation rock placement. The crossing within the UK TS will require only post-installation rock placement.

Table 4: Cable and Pipeline Crossing Rock Placement Locations.

System Name	Latitude			Longitude			Water Depth (m)	Type of Rock Placement
Shetland HVDC Link	059°	40.0393'	N	001°	48.3978'	W	104	Post-installation
Shetland Island Gas Export System (SIRGE)	059°	26.5525'	N	000°	33.5692'	W	122	Pre-installation & post-installation
Frigg to St. Fergus 1	059°	12.9676'	N	000°	29.8679'	E	127	Pre-installation & post-installation
Scottish Area Gas Evacuation (SAGE)	059°	04.2250'	N	001°	12.5662'	E	123	Pre-installation & post-installation
Bruce to Forties	059°	03.0413'	N	001°	38.6740'	E	116	Post-installation
Brent A to St. Fergus (FLAGS)	059°	24.2760'	N	000°	24.4077'	W	130	Pre-installation & post-installation
Vesterled Pipeline	059°	13.0056'	N	000°	29.7644'	E	127	Pre-installation & post-installation
Devenick – East Brae	059°	03.4641'	N	001°	33.2681'	E	119	Pre-installation & post-installation

Note: WGS84 Datum in degrees decimal minutes.

4.3 ROCK PLACEMENT

Six pipeline crossings in the UK EEZ will require pre-installation rock placement (before the cable is laid over the existing pipeline). All eight cable and pipeline crossings in the UK TS and EEZ require post-installation rock placement (after cable is laid over the cable/pipeline). The

Shetland HVDC Link crossing and the Bruce to Forties crossing only require post installation rock placement.

The purpose of the post-installation rock placement is to protect cable from external damage due to activities such as fishing.

Figure 3 to Figure 7 provide an indicative cross-section profile and plan view of the pre-installation and post-installation rock placement on a flat seabed for the crossings within UK TS and EEZ.

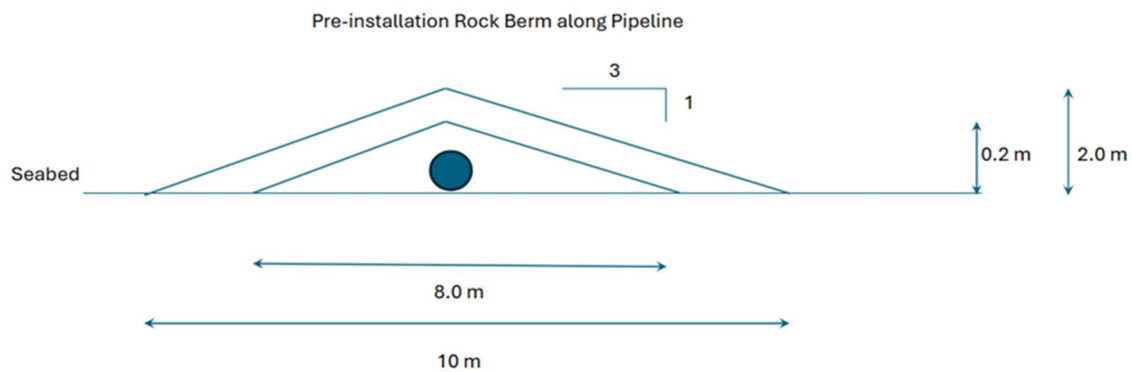


Figure 3: Cross-Section Profile of Pre-installation Rock Placement (EEZ).

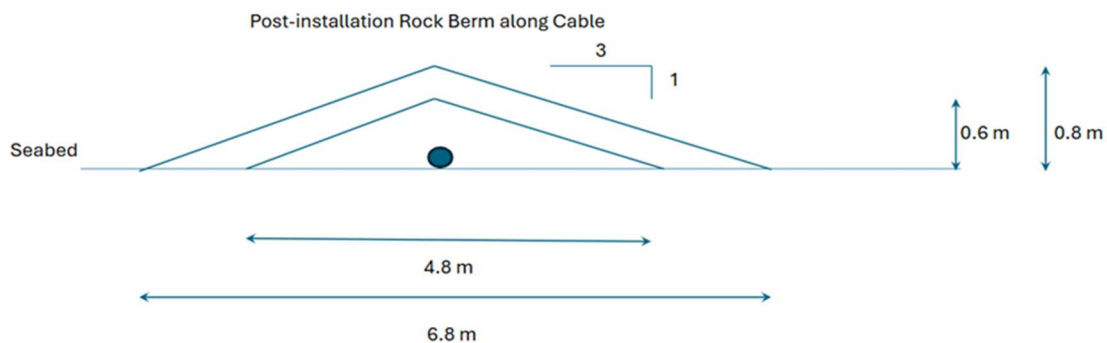


Figure 4: Cross-Section Profile of Post-Installation Rock Placement (EEZ).

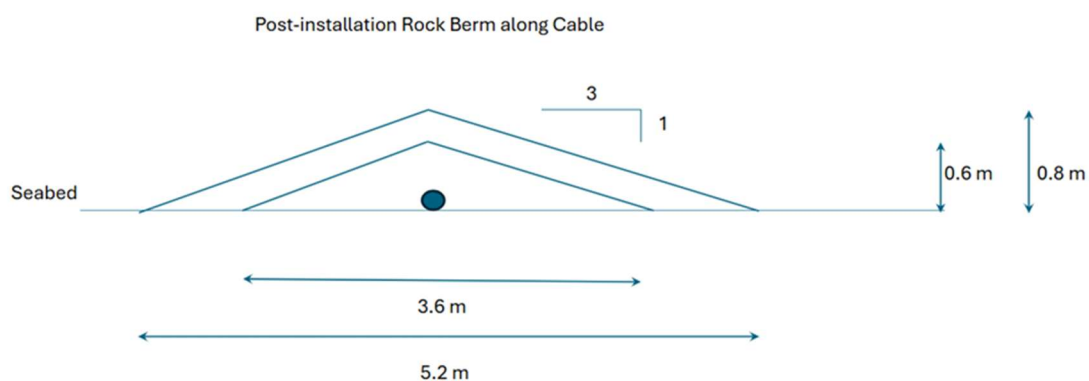


Figure 5: Cross-Section Profile of Post-installation Rock Placement (TS).

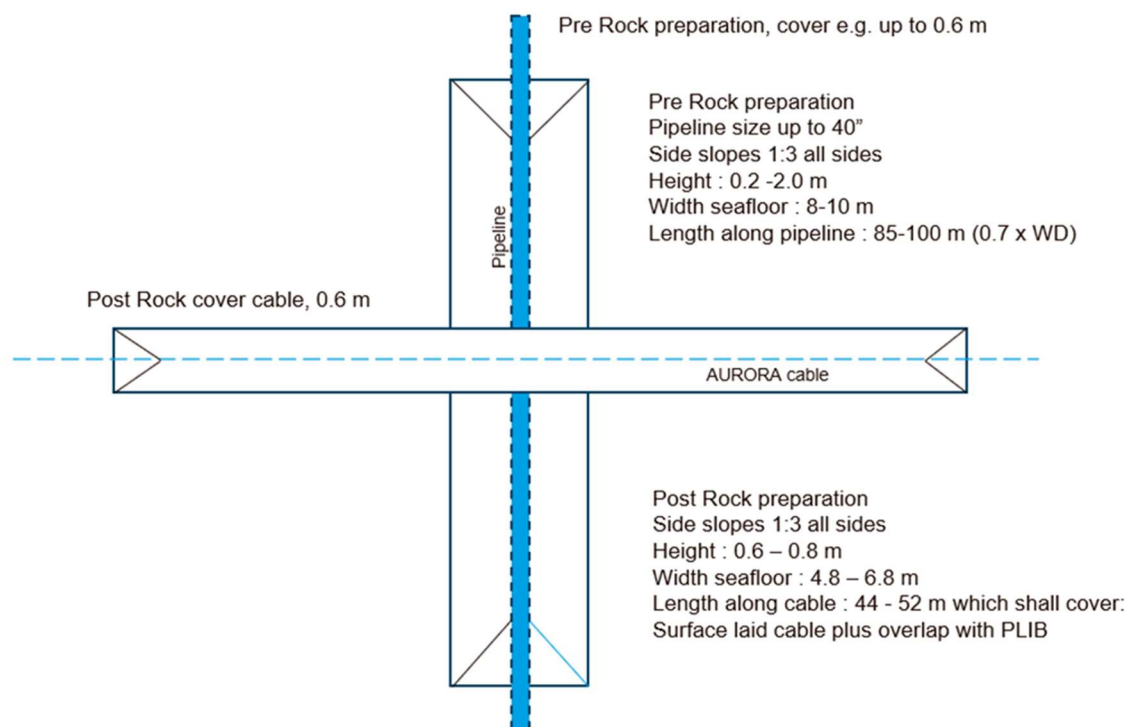


Figure 6: Top View Plan of Pre-Installation and Post-Installation Rock Placement (EEZ).

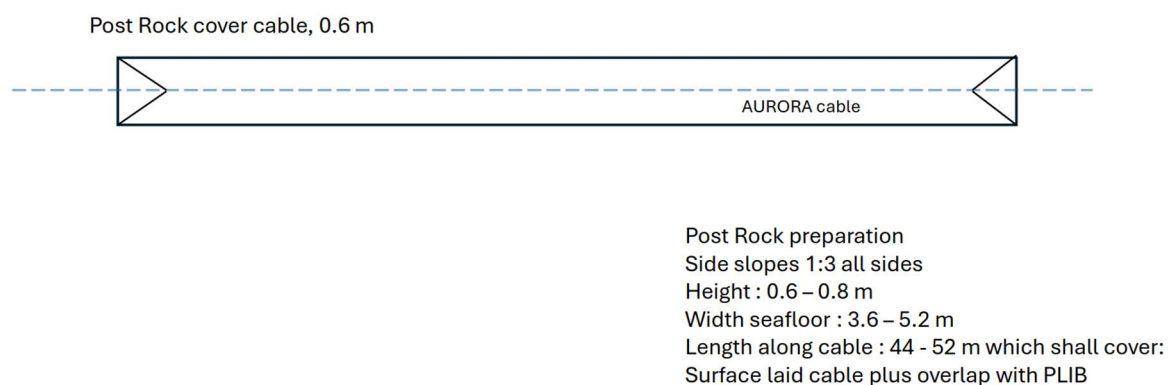


Figure 7: Top View Plan of Post-Installation Rock Placement (TS).

Estimated dimensions of the pre-installation and post-installation rock placement in the UK TS and EEZ are provided in **Table 5**. Please note that the dimensions of the rock placements have not been finalised and are subject to the crossing agreements which were under negotiation with pipeline owners at the time of writing this document.

Post-installation rock placement dimensions will be determined following post lay inspection and burials (PLIBs) that are performed after the subsea cable is installed.

Table 5: Rock Placement Dimensions.

Rock Placement	Length (m)	Height (m)	Width (m)	Slope
Pre-installation (EEZ)	85-100	0.2-2.0	8-10	1:3
Post-installation (EEZ)	44-52	0.6-0.8	4.8-6.8	1:3
Post-installation (TS)	44-52	0.6-0.8	3.6-5.2	1:3

Freshly crushed Norwegian granite will be utilized for the rock placements to minimize contamination risks for environmentally sensitive areas of the seabed. For pre-installation rock placements, it is expected that 1"-5" or 1"-3" rock mix will be used. For post-installation rock placements, it is expected that 2"-8" rock mix will be used.

4.4 INSTALLATION

4.4.1 Pre-Installation Rock Placement

Prior to the rock placements, a video inspection will be undertaken to document the condition of the pipeline which the Aurora Project will cross, and record the horizontal and vertical positioning of the asset.

The pre-installation rock placement at the pipeline crossings will be undertaken to a minimum 0.6 m separation between top of pipelines in the UK EEZ and the Aurora Project, in advance of the installation of the subsea cable at the designated pipeline crossings, by a Flexible Fall Pipe Vessel (FFPV).

The FFPV is dynamically positioned by Differential Global Positioning Systems (DGPS) and will deliver graded, crushed, rock material in a controlled manner from deck to the seabed, via a flexible fall-pipe. A typical FFPV is presented in **Figure 8**.

Subject to availability, a rock placement vessel with up to 25,000 tonnes capacity may be utilised. At time of writing this document, the crossing agreements are under negotiation with the asset owners and as such the quantity of rocks that will be utilised for the Aurora Project is yet to be defined



Figure 8: A Typical FFPV.

The Remotely Operated Vehicle (ROV) located at the end of the flexible fall pipe is fitted with survey and positioning equipment that manoeuvres the pipe to ensure accurate and precise rock delivery on seabed. **Figure 9** shows a typical fall pipe ROV. Following completion of the rock placement, the ROV will perform a video inspection to document the installation.



Figure 9: ROV at end of Fall Pipe.

4.4.2 Post-Installation Rock Placement

To protect the subsea cable after installation from external damage due to activities such as fishing, PLIB will be performed on either side of the crossing locations where the subsea cable will be jetted into the seabed (activity assessed under previous MLA). This burial will be performed as close as practically possible to the assets from either side.

Post-installation rock placement will take place after PLIBs. The installation method will be the same as that described for the pre-installation rock placement.

As post-installation rock placement is designed to protect the cable passing over a feature, such as a pipeline, it will generally be thinner and longer than the pre-installation rock placements.

4.5 PROJECT SCHEDULE

The pre-installation rock placements within UK EEZ are expected to commence in Q1 2027 before the subsea cable is installed, with the estimated total duration being 6 days.

The post-installation rock placements within the Scottish TS and UK EEZ are expected to commence in Q3 2027 after the PLIBs, with an estimated total duration of 8 days.

It is noted that these estimates are based on a daily 24-hour working schedule and are subject to weather conditions. These activities will operate on a daily 24-hour working schedule and will be subject to weather conditions.

4.6 EMBEDDED MITIGATION

Embedded mitigations during the Aurora Project pre-installation and post-installation rock placement activities are presented in **Table 6**.

Table 6: Embedded Mitigation.

Embedded Mitigation	Description
Promulgation of information and advance notice	Advance notice and information will be provided via Notice to Mariners (NtM) to ensure that the appropriate authorities are informed of offshore installation, operation and maintenance, and decommissioning activities. Advance notice will be given to HMCG prior to commencement of works.
Marking and charting	The UKHO will be notified of both the commencement, progress and completion of offshore installation works to allow marking of all installed infrastructure on nautical charts.
Aid to Navigation (AtoN)	AtoNs (marking and lighting) will be deployed in accordance with international maritime regulations and the latest relevant available standard industry guidance, as advised by the NLB or MCA.
Safe passing distance	Advisory safe passing distances for vessels transiting near cable layer. These will be broadcast appropriately to nearby vessels, for example, via AIS or very high frequency (VHF).
Compliance with maritime law	Compliance of project vessels with international maritime law and safe practice guidelines, including those by the UNCLOS, COLREGS Rule and International Convention for the SOLAS.

Embedded Mitigation	Description
Marking and lighting of vessels	Marking and lighting of project vessels in accordance with maritime law, in particular for vessels restricted in manoeuvrability.
Emergency Response Co-operation Plan (ERCoP)	An offshore ERCoP will be prepared to ensure relevant compliance with MGN654, where appropriate.
PLIB surveys	As part of the installation activities, a ROV will perform a video inspection

5. DESCRIPTION OF THE MARINE ENVIRONMENT

5.1 NAVIGATIONAL FEATURES AND EXISTING INFRASTRUCTURE

The key navigational features identified in the vicinity of the Study Areas are presented in **Figure 10**. These existing features form part of the baseline environment. Planned developments that may affect shipping and navigation in the area are considered within the cumulative assessment (see **Section 10**).

5.1.1 Nearby Ports and Harbours

North Haven, located 5 nm southeast of Study Area 1, is the primary harbour on Fair Isle and is used predominantly by fishing vessels and ferries.

North Haven has a quay, approximately 60 m long, with depths of 3 m to 9 m alongside. A pier, with a slip alongside the northeast side, extends northwest from the shore near the south end of the quay.

5.1.2 Anchorages

There are no anchorages within the Study Areas. The Admiralty Sailing Directions indicate that vessels may anchor at North Haven pier. This anchorage lies in a depth of 4 m with a seabed of rocks and stones and is suitable only for small vessels.

5.1.3 Subsea Infrastructure

Seven subsea pipelines intersect the Subsea Cable Route at the marked crossing locations. The Shetland HVDC Link was installed during 2023/2024 and became fully commissioned in August 2024, however nautical charts have not been updated to reflect this yet. The Shetland HVDC link crosses the Aurora Project within UK TS (Study Area 1).

Two other subsea cables intersect all Study Areas, passing at the closest point approximately 0.7 nm north of the SIRGE pipeline crossing location within Study Area 2. Intersecting Study Area 4, there are two additional pipelines at 2.2 nm from the Bruce to Forties (easternmost) crossing location and one cable at 1.1 nm north. These cables and pipelines are marked on nautical charts.

5.1.4 Practice and Exercise Areas

There is a firing practice area, area D809(N): Moray Firth (North), within UK TS 17 nm south of the closest crossing location, the Shetland HVDC Link.

5.1.5 IMO Features, Routeing Measures and Reporting Schemes

There are three Areas To Be Avoided within UK TS in proximity to the Aurora Project. One of these is around the Shetland Islands, whilst the others are located around Fair Isle and the Orkney Islands. The nearest is around Fair Isle, 0.3 nm south of the Aurora Project at the

closest point and 3.1 nm from the Shetland HVDC Link (Study Area 1) crossing location, intersecting Study Area 1 by approximately 1.9 nm.

- **Shetland Islands Area To Be Avoided:** To avoid the risk of pollution and severe damage to the environment and economy of Shetland, all vessels over 5,000 gross tonnes (GT) carrying, or capable of carrying, oil or other liquid hazardous cargoes in bulk should avoid the areas indicated.
- **Orkney Islands and Fair Isle Areas To Be Avoided:** To avoid the risk of pollution and severe damage to the environment, all vessels over 5,000 GT carrying oil or other liquid hazardous cargoes in bulk should avoid the areas indicated.

IMO adopted routes are present either side of Fair Isle. These are recommended for use by all vessels passing through the Fair Isle Channel. Vessels travelling east are recommended to pass south of Fair Isle, whilst vessels travelling west are recommended to pass either south or north. Within the south channel, vessels travelling west should use the north of the channel and those traveling east should use the south of the channel.

5.1.6 Aids to Navigation

There are two lighthouses located on Fair Isle; one on the north and one on the south of the island. There is also a lighthouse located at Sumburgh Head, the southern point of the Shetland Islands.

5.1.7 Oil and Gas

Study Area 4 is located between Harding Oil Field (approximately 8 nm north) and East Brae Gas Field (approximately 4 nm south). The crossings within Study Area 4 are all associated with oil or gas pipelines, and there are other subsea pipelines and wells in proximity. The nearest surface structure associated with oil and gas is a platform located 10.8 nm south of the closest crossing location.

It is noted that decommissioning is currently ongoing at East Brae Gas Field. According to nautical charts, during these works, aids to navigation may be unreliable and certain features may not be shown. Local NtM are issued by field operators for further details of the decommissioning process.

5.1.8 Other Navigational Features

There is an area of caution related to shipping movements located 6 nm north of the Aurora Project at the closest point. Ships navigating in the northern or south-eastern approaches to Yell Sound or Lerwick should do so with caution as large deep-draught vessels with limited manoeuvrability may be encountered. In the south-eastern approach to Yell Sound, large deep-draught vessels may also be encountered anchored close to the coast.

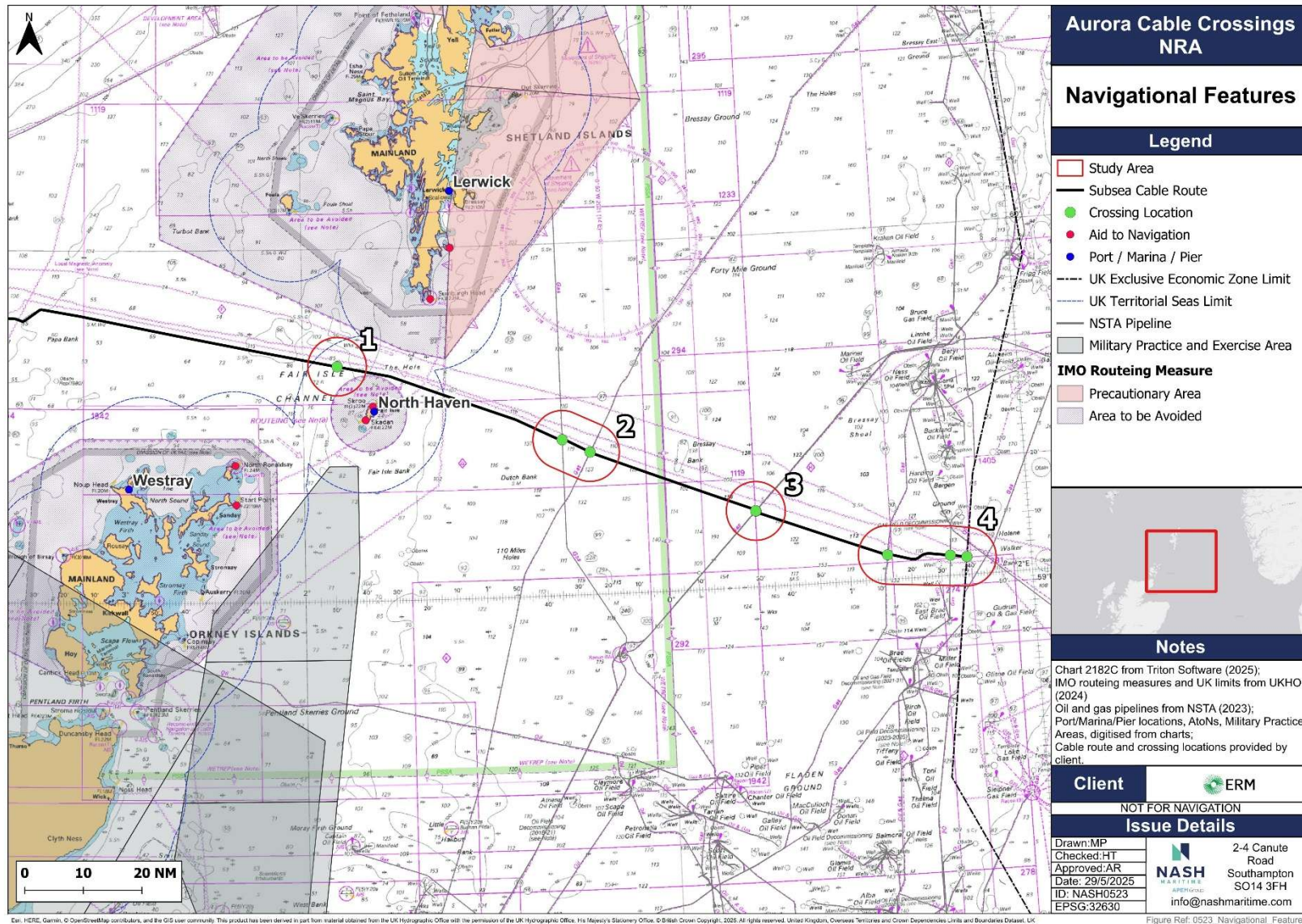


Figure 10: Navigational Features.

5.2 EMERGENCY RESPONSE RESOURCES

The closest search and rescue (SAR) helicopter base to the cable and pipeline crossings of the Aurora Project is located at Sumburgh, located 15.9 nm north. At 32 nm north is the Shetland Maritime Rescue Coordination Centre. The closest RNLI station is located 33 nm north of the cable at Lerwick where the capabilities include a Severn class all-weather lifeboat. Other nearby RNLI stations include Aith, Kirkwall, Stromness and Longhope.

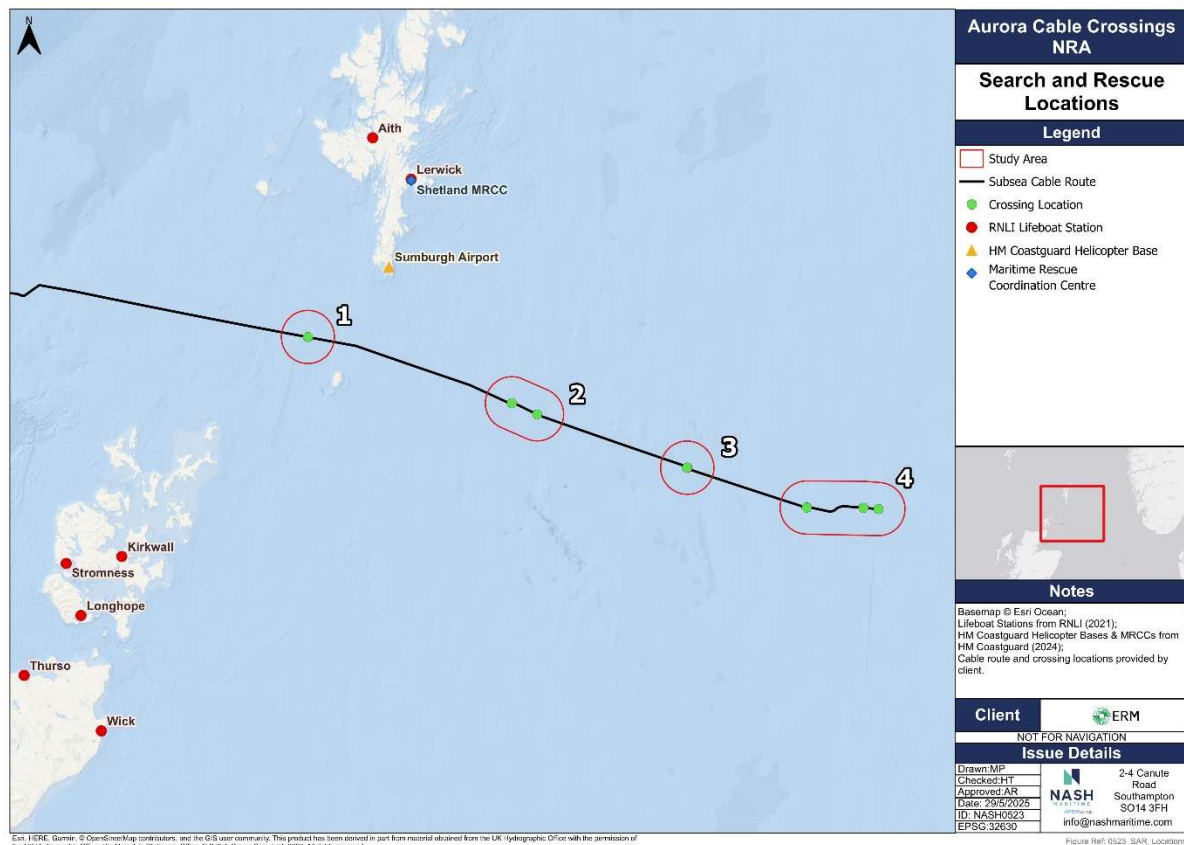


Figure 11: Local emergency response capabilities.

5.3 METOCEAN DATA

Metocean data was obtained from the Admiralty Sailing Directions NP52 (2022). In addition, tidal data was extracted from the nautical charts.

5.3.1 Wind

The area has a mild maritime climate due to the prevailing south westerly winds and the warming influence of the North Atlantic Current. Gale to hurricane force winds may occur from any direction, particularly during the period October to April.

In winter, the percentage frequency of gales (force 8 and above) over the open sea is between 13% and 18%. In the spring, the frequency reduces to about 5% but increased in the autumn to around 9%.

5.3.2 Tide

The tidal patterns in proximity to Fair Isle and eastwards generally move in an east/west direction at relatively low speeds. Further tidal information is displayed on nautical charts for each point marked with a tidal diamond.

5.3.3 Visibility

In proximity to Fair Isle, fog affects visibility approximately 51 days per year (~14%).

6. EXISTING MARITIME ACTIVITIES

6.1 INTRODUCTION

A description of existing marine activities in the Study Areas is presented based on 2024 AIS data as described in **Section 3.4.2**.

As noted in **Section 5.1.3**, the Shetland HVDC link was installed during 2023/2024. Therefore, a level of vessel activity will be associated with installation vessels and some routes may have been deviated temporarily for vessels to pass around the installation vessel. This activity is located in proximity to Study Area 1.

6.2 VESSEL TRAFFIC ANALYSIS

6.2.1 Overview

Annualised vessel traffic density presented in **Figure 12**, which shows the density of vessel transits during 2024, shows high density routes were observed crossing the Subsea Cable Route to and from the Shetland Islands or oil and gas fields. Vessel traffic density was generally moderate in all Study Areas, with moderate-high density routes intersecting Study Areas 1, 2 and 4.

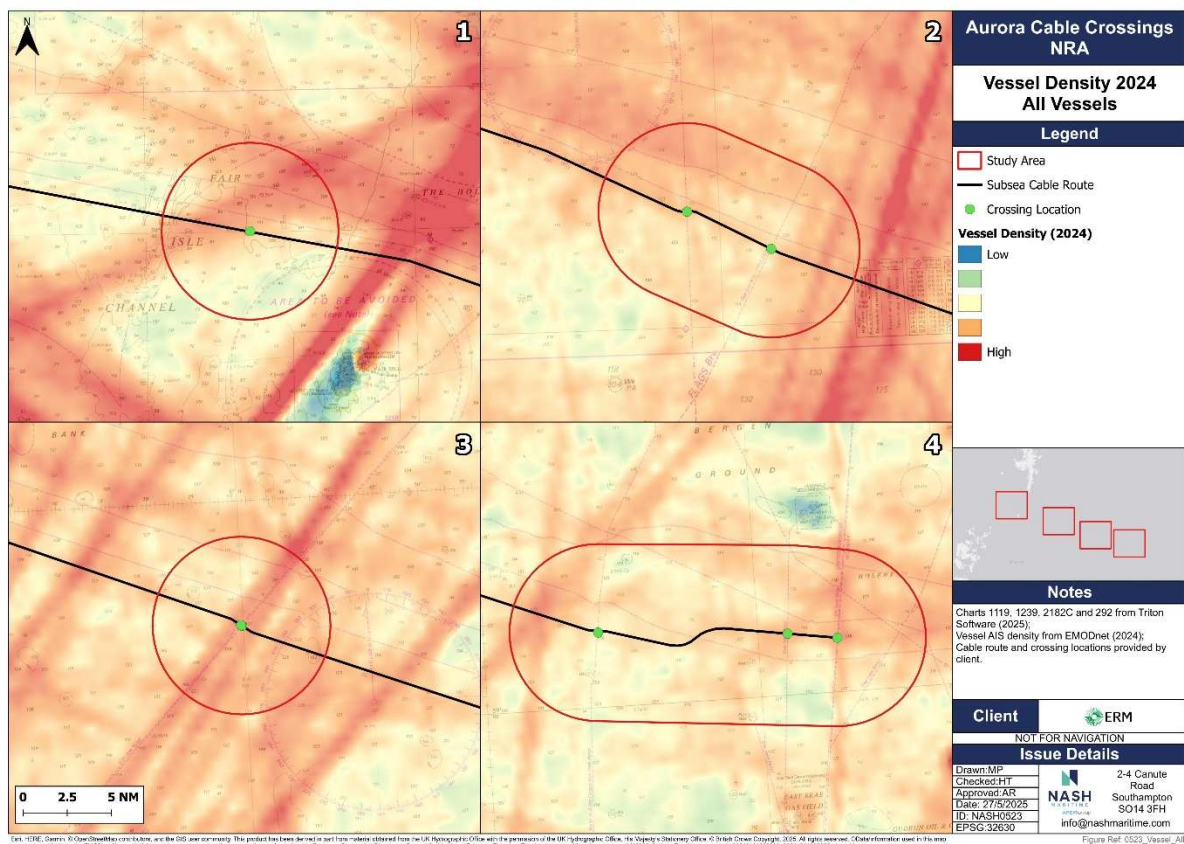


Figure 12: Vessels Density 2024 (All Vessel Types).

6.2.2 Cargo Vessels

The vessel density heat map for cargo vessels in 2024 is presented in **Figure 13**. Distinct medium to high density routes were observed passing through all four Study Areas. Study Area 1 is intersected by a moderate density route passing through the Fair Isle Channel, while Study Area 3 is intersected by a higher density route between Peterhead or Aberdeen and oil and gas fields to the northeast.

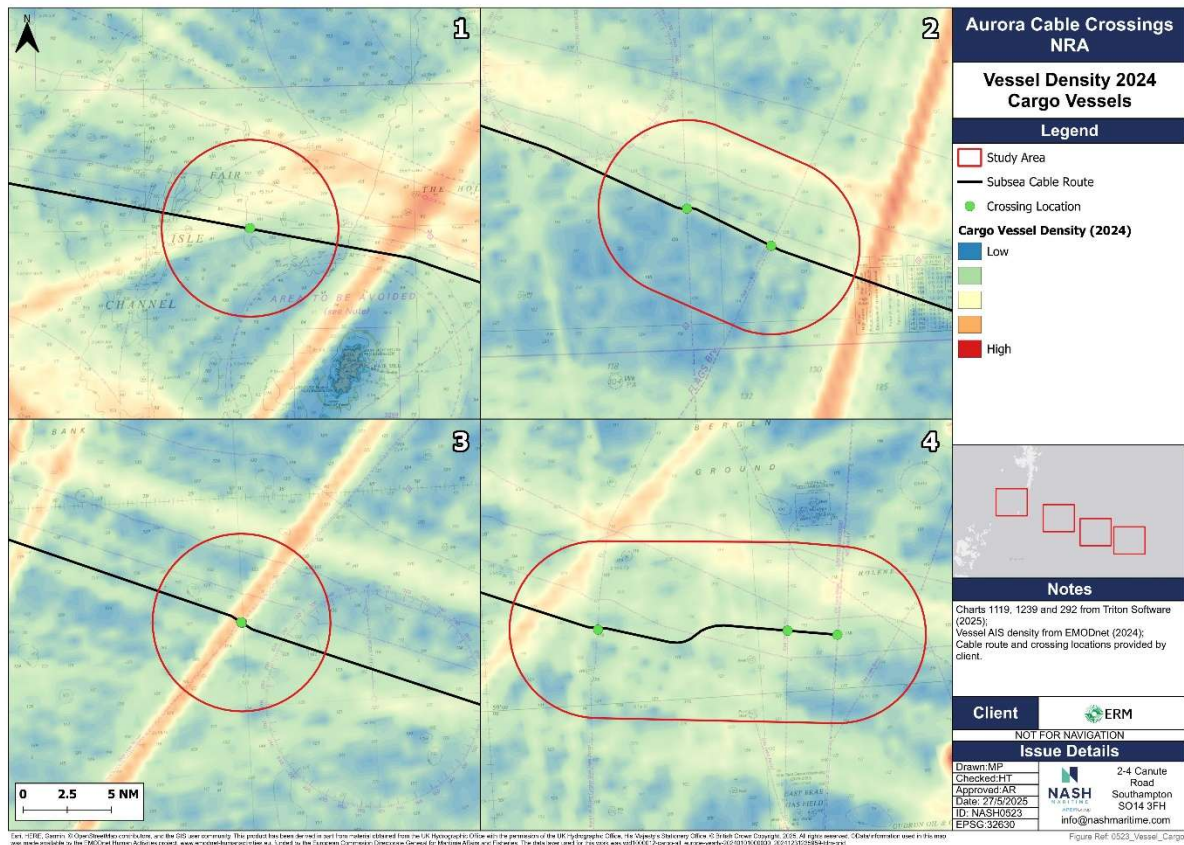


Figure 13: Vessel Density 2024 (Cargo Vessels).

6.2.3 Tankers

The vessel density heat map for tankers in 2024 is presented in **Figure 14**. The density of tankers in each study area is generally low, with medium density only observed at Study Areas 1 and 4. The route crossing Study Area 1 is a medium to high density route which becomes less dense in the west.

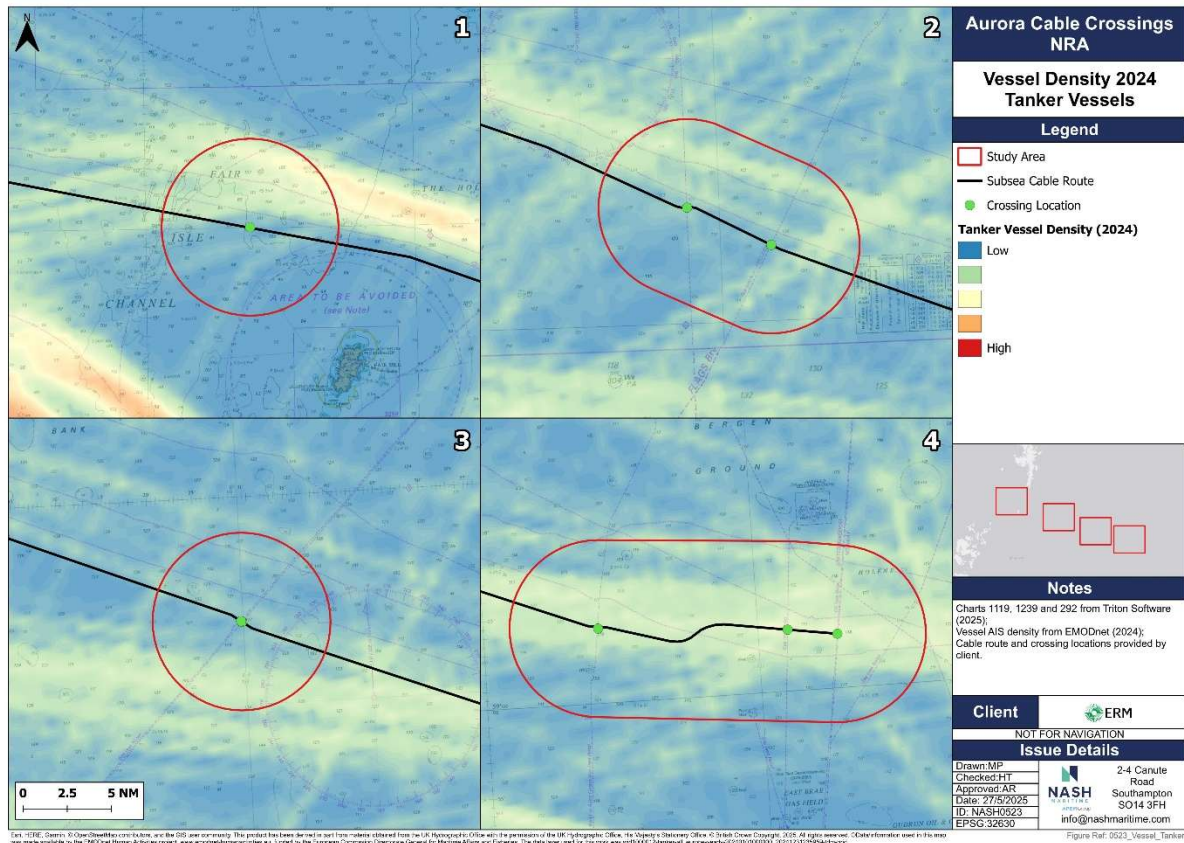


Figure 14: Vessel Density 2024 (Tankers).

6.2.4 Passenger Vessels

The vessel density heat map for passenger vessels in 2024 is presented in **Figure 15**. Two high density routes were observed crossing the Subsea Cable Route approximately 6.5 nm and 8.8 nm from the Shetland HVDC Link crossing location. One route is a ferry route operated between Fair Isle and the Shetland Islands. The other is a ferry route between Shetland and Orkney, operated by NorthLink Ferries.

The vessels operated by NorthLink are 125 m in length. Information on vessel crossing frequency has been summarised based on the timetables on the NorthLink website in **Table 7**.

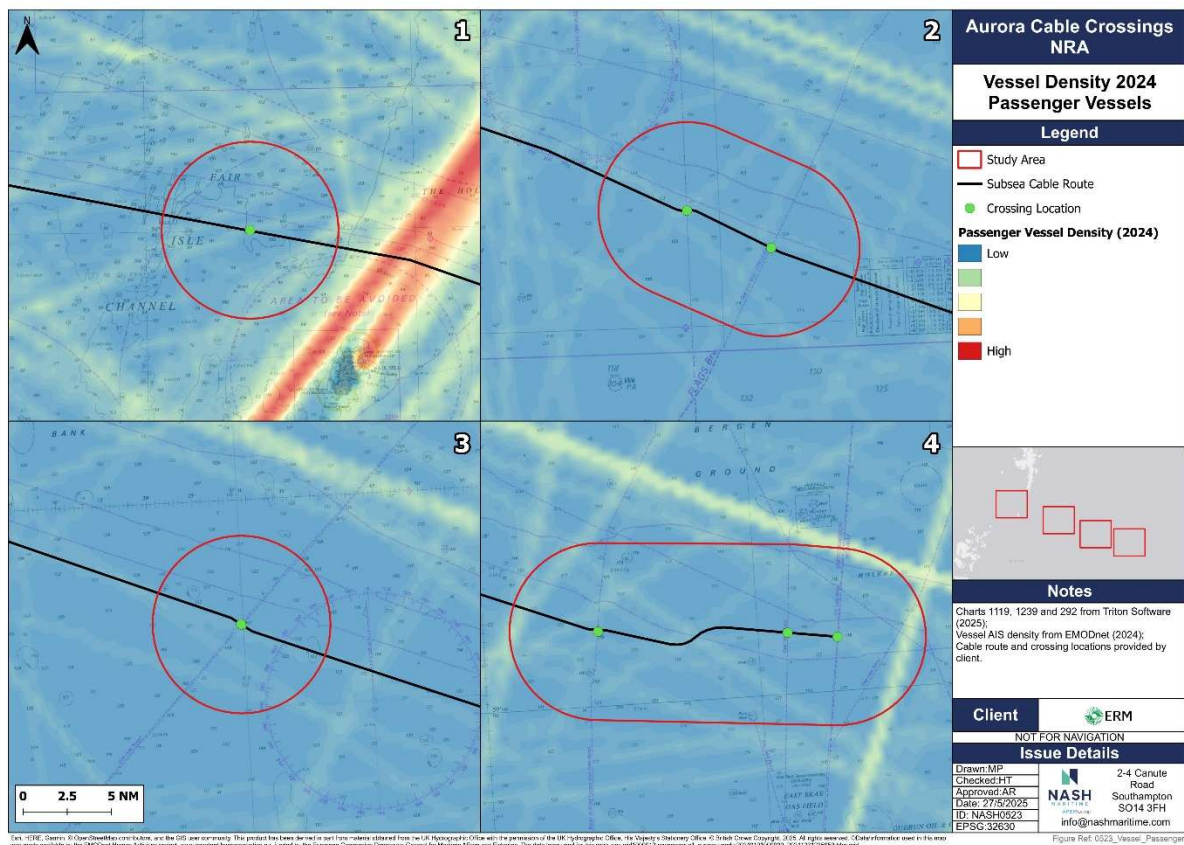


Figure 15: Vessel Density 2024 (Passenger Vessels).

Table 7: Ferry Crossings based on 2024 Timetable.

Operator	Timetable	Route	Crossings per week
NorthLink Ferries	1 Apr – 31 Oct	Kirkwall-Lerwick	7
	1 Nov – 31 Mar	Kirkwall-Lerwick	5
SIC Ferries	1 May – 30 Sept	Fair Isle – Grutness Peir	2-3
	1 Oct – 31 Apr		1

6.2.5 Recreational Vessels

The vessel density heat map for recreational vessels from May to September (inclusive) in 2014 and 2017 as provided by the RYA (2023) is presented in **Figure 16**. Recreational vessel activity was generally low throughout the Study Areas, however a medium density route was observed between the Shetland Islands and Fair Isle approximately 8.9 nm from the crossing location shown in Study Area 1. It is noted that recreational activity may be underrepresented due to AIS broadcasting requirements mandated for vessels over 15 m in length only.

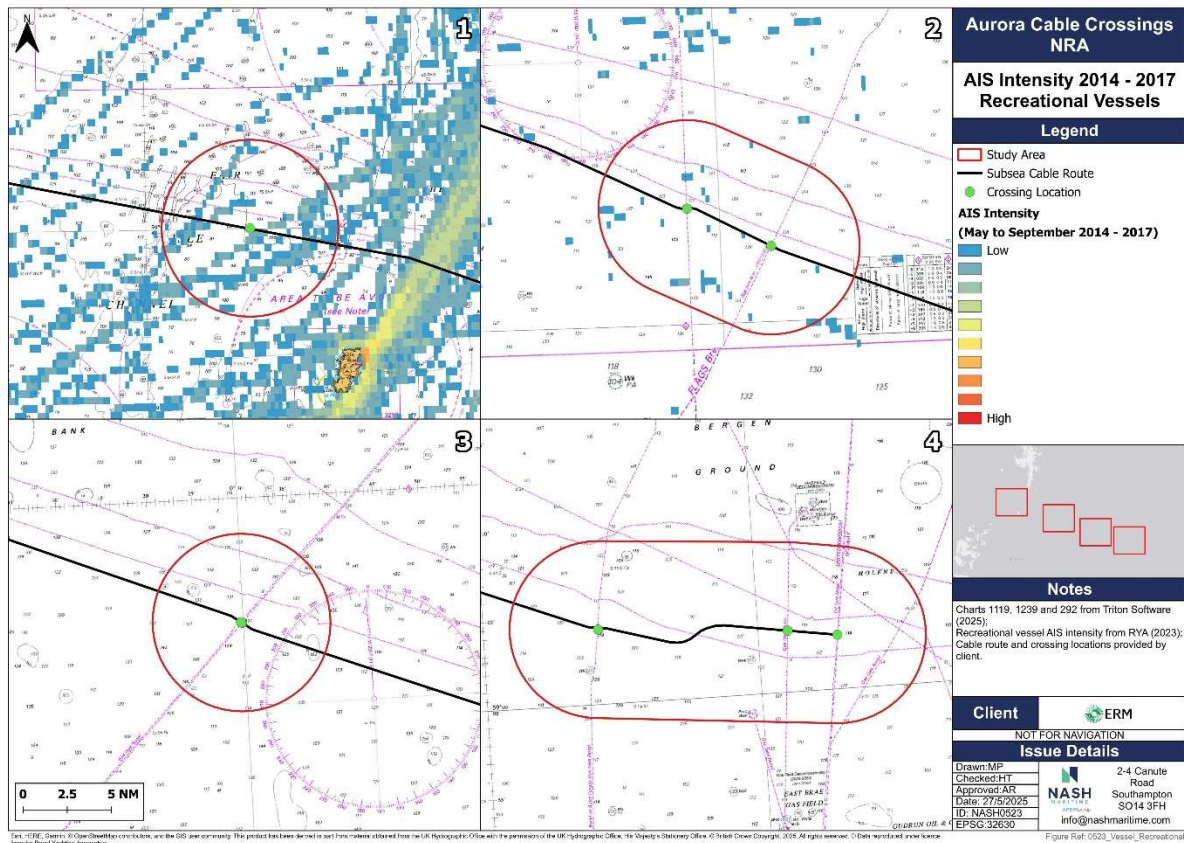


Figure 16: Vessel Density 2014 and 2017 (Recreational Vessels).

6.2.6 Fishing Vessels

The AIS vessel density heat map for fishing vessels in 2024 is presented in **Figure 17**, while the VMS fishing activity during 2020 is presented in **Figure 18**. It is noted that fishing activity may be underrepresented due to AIS broadcasting requirements mandated for vessels over 15 m in length only, and the VMS data does not include vessels less than 15 m in length.

One fishing vessel route northeast-southwest was observed crossing within Study Area 1 and crossing the Shetland HVDC Link crossing location. Medium fishing vessel density was observed in Study Areas 2 and 3. Study Area 4 contains low to medium fishing vessel density. In 2020, the Study Area with the most fishing activity recorded was Study Area 2 with a total of 1,908 hours recorded. The hours recorded within Study Areas 1, 3 and 4 were 716, 612, and 1,196 respectively. The most prominent fishing methods during 2020 used demersal gears, including bottom otter trawls, otter twin trawls, and bottom pair trawls.

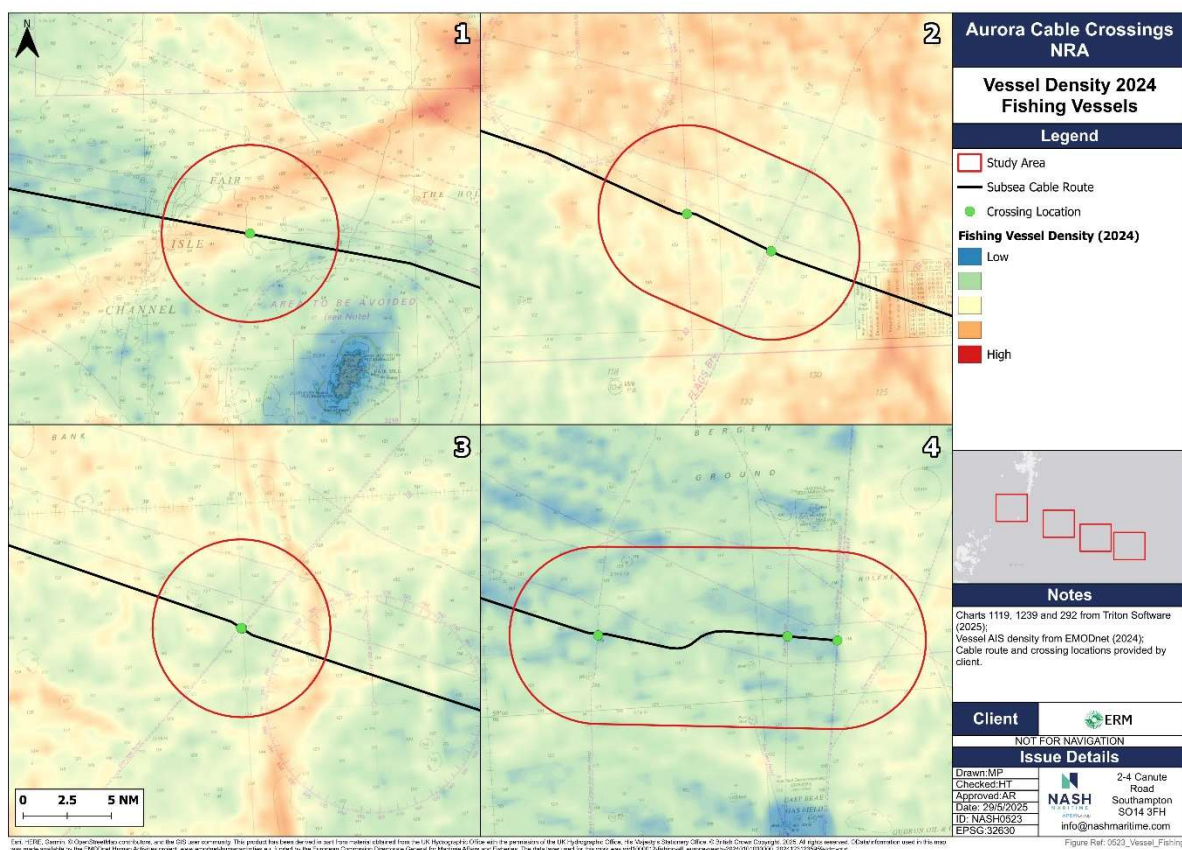


Figure 17: Vessel Density 2024 (Fishing Vessels).

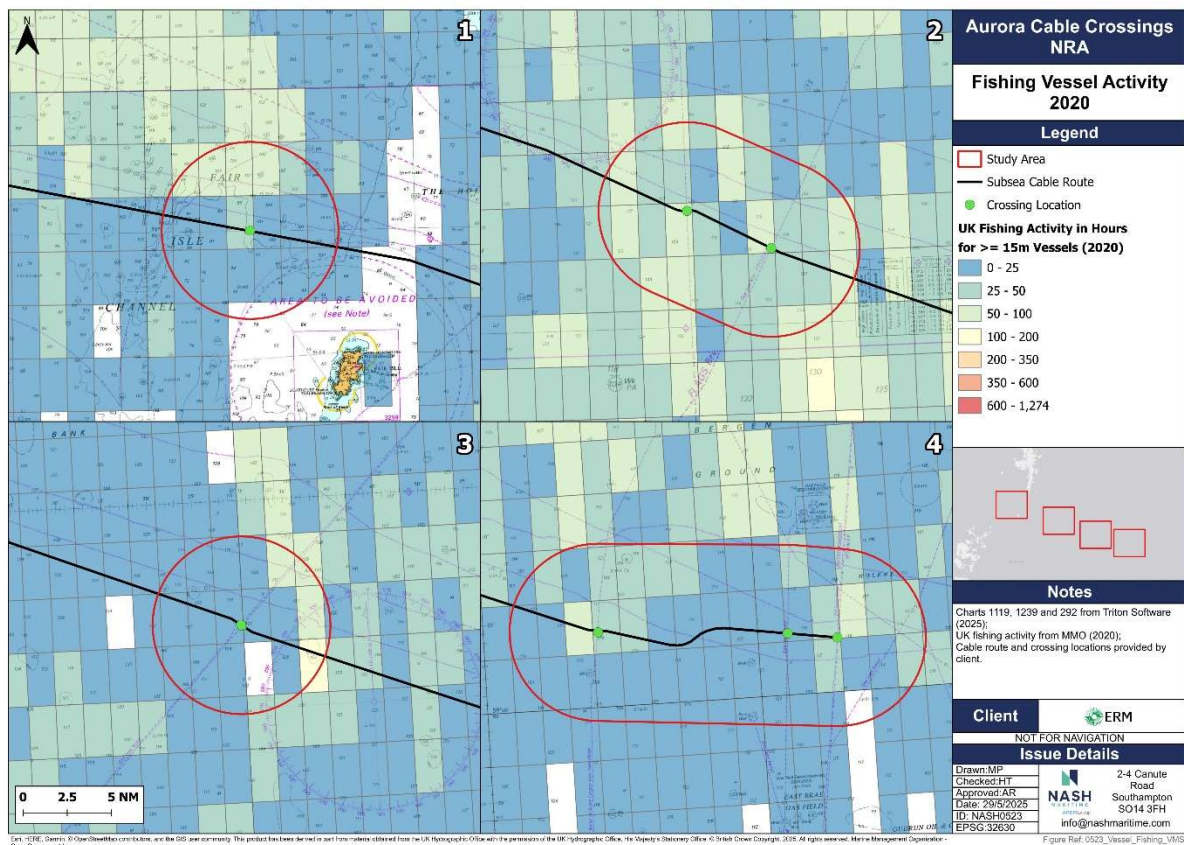


Figure 18: Fishing Vessel Activity >= 15 m 2020.

6.2.7 Other Vessels

The vessel density heat map for other vessels in 2024 is presented in **Figure 19**. Other vessels include all other vessels recorded on AIS not captured within the previous vessel categories (e.g. survey vessels, service vessels, etc.). The vessel density for other vessels was relatively low within the Study Areas in general, however there were multiple narrow medium to high density routes that intersect three of the Study Areas. Of these, one route passes over the crossing in Study Area 3 and another route passes over the Bruce to Forties crossing location in Study Area 4.

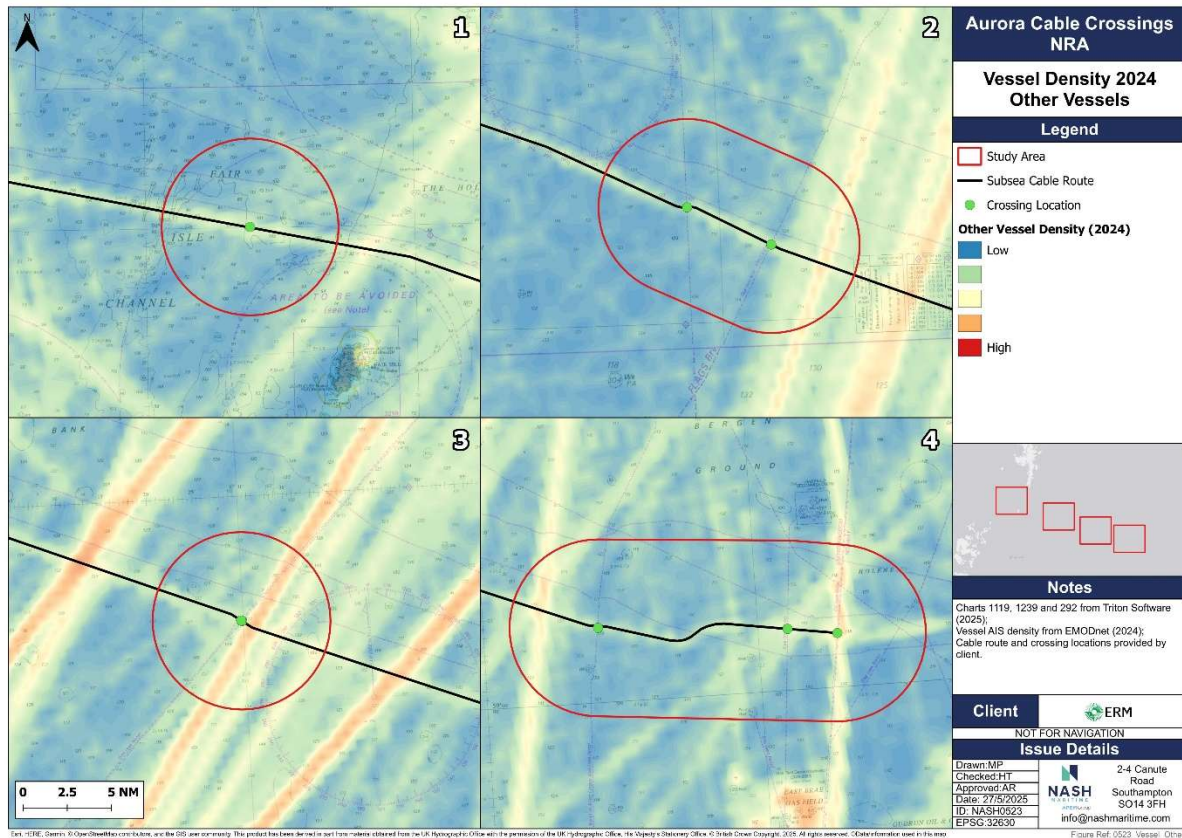


Figure 19: Vessel Density 2024 (Other Vessels).

6.3 VESSEL DRAUGHTS

To assess the impact of rock placement on vessel draught, data from the MMO was utilised and presented in **Figure 20**. The dataset includes vessel tracks for the first 14 days of each month during 2019 of four main vessel categories: cargo and tanker vessels, service and high speed craft, passenger vessels, and recreational vessels. The frequency of transits, depth, and, vessel draught is summarised by Study Area in **Table 8**. The proximity of deep-draught vessels (> 10 m) to the Crossing Locations is summarised in **Table 9**.

Of the tracks intersecting the Study Areas, transits by deep-draught vessels represent less than 1% of all tracks and were exclusively cargo or tanker vessels. The maximum draught vessel recorded drew 25.5 m and transited 5.5 nm southwest of the Shetland HVDC Link crossing location (Study Area 1). However, the maximum draught vessel recorded within the Study Areas was a cargo or tanker vessel with 17.1 m draught. The range of charted depth

within the Study Areas is 72 m – 182 m and the shallowest Crossing Location is at 104 m, which would be reduced by no more than 2.8 m by the cumulative pre and post-installation rock placement.

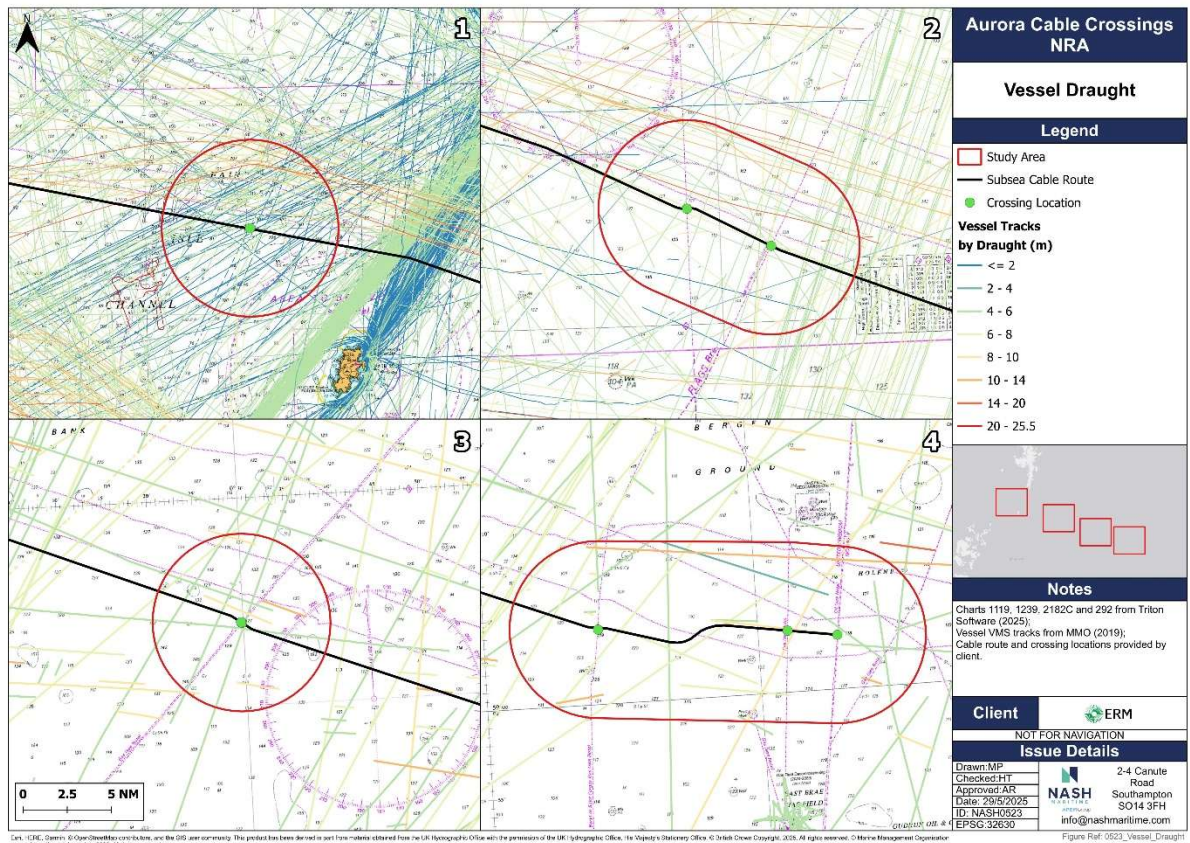


Figure 20: Vessel draughts for the first 14 days of each month in 2019.

Table 8: Summary of Vessel Draught and Charted Depth per Study Area.

Study Area	Transits (First 14 days per month in 2019)	Vessel Draught (m)		Charted Water Depth (m)	
		Mean	Max.	Min.	Max.
1	459	4.4	17	72	112
2	496	4.8	17.1	110	139
3	19	6.4	13.5	126	182
4	42	6.9	13.5	99	128

Table 9: Summary of Nearest Deep-Draught (> 10 m) Vessel Transit per Crossing Location.

Study Area	Crossing Location	Charted Water Depth (m)	Distance to Nearest Deep-Draught Vessel Transit (nm)
1	Shetland HVDC Link	104	1.3
2	SIRGE	122	1.0

Study Area	Crossing Location	Charted Water Depth (m)	Distance to Nearest Deep-Draught Vessel Transit (nm)
3	FLAGS	130	1.8
	Vesterled Pipeline	127	1.7
	Frigg to St. Fergus 1	127	1.7
4	SAGE	123	3.7
	Devenick – East Brae	119	4.2
	Bruce to Forties	116	2.8

6.4 HISTORICAL MARITIME INCIDENTS

Maritime incidents recorded in the Study Area between the MAIB (1991-2023) and RNLI (2008-2023) databases have been collated and presented. In processing the incidents, non-navigational incidents have been removed, such as shore-based activities (e.g. people cut off by the tide or swimmers in distress).

The recorded maritime incidents are presented spatially in **Figure 21**. A total of 15 incidents took place within the Study Areas, which are summarised in **Table 10**. The most frequent incident category from the MAIB and RNLI data within the Study Areas was personal injury and the most common vessel type involved in incidents was fishing. The Study Area 2 encompassed the most incidents, totalling six, while the other Study Areas each contained three. There were no instances of collision or grounding within the Study Areas.

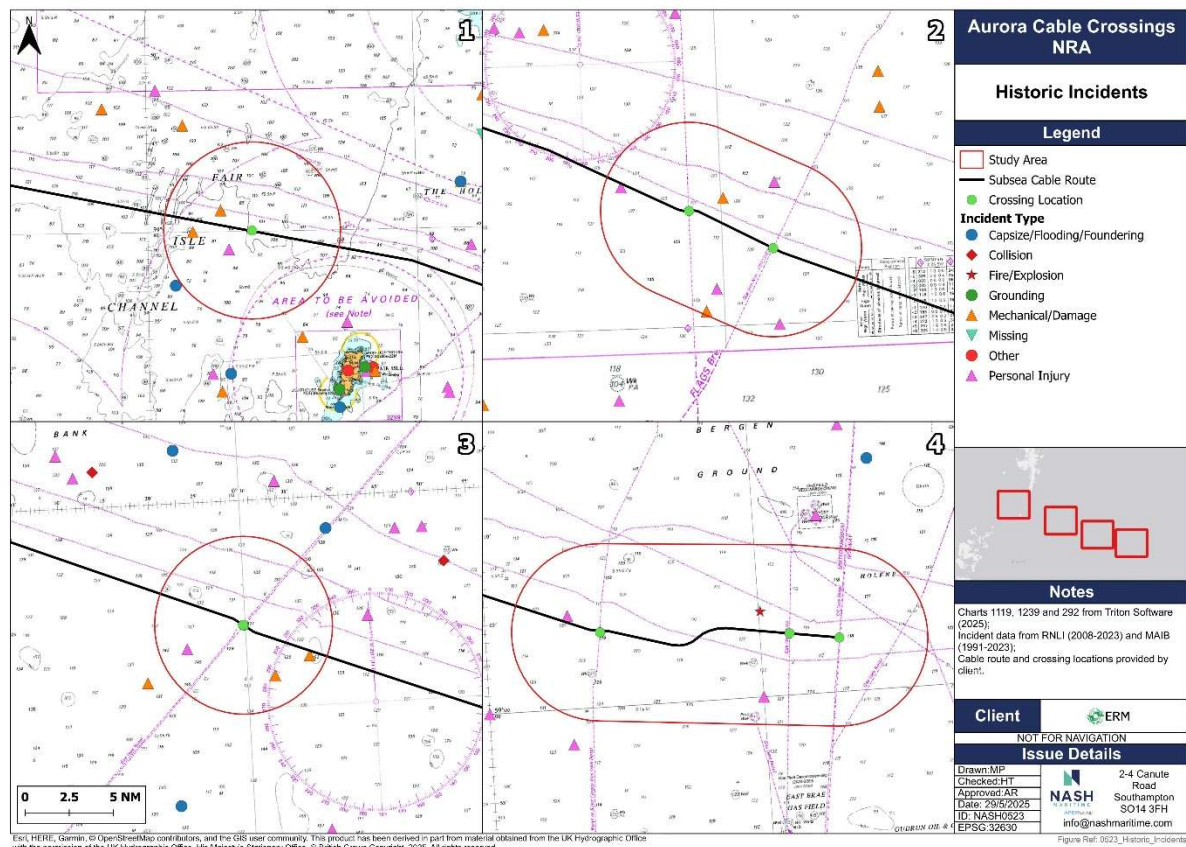


Figure 21: MAIB and RNLI Historical Incidents (1991-2023).

Table 10: MAIB and RNLi Incidents within the Study Areas Summarised by Incident Type (1991-2023).

Incident Type	1	2	3	4
Mechanical / Damage	2	2	2	-
Personal Injury	1	4	1	2
Fire / Explosion	-	-	-	1

Table 11: MAIB and RNI Incidents within the Study Areas Summarised by Vessel Type (1991-2023).

Vessel Type	1	2	3	4
Cargo	-	-	1	-
Passenger	1	-	-	-
Recreational	-	2	-	-
Fishing	2	4	2	3

7. FUTURE TRAFFIC BASELINE

7.1 INTRODUCTION

This section presents the predicted future case traffic profile within the shipping and navigation Study Areas for commercial, ferries, fishing and recreational vessel traffic.

7.2 COMMERCIAL TRAFFIC

DfT data on UK port trade is presented in **Figure 22** and shows a steady trend in ship arrivals at Lerwick and Orkney. The DfT data demonstrates that Orkney and Lerwick were affected by measures to prevent and reduce the global spread of Covid-19 throughout 2020. The DfT show an 18% increase in ship arrivals at Orkney and Lerwick combined in 2023 compared to 2014. The majority of this increase was seen between 2014 and 2015.

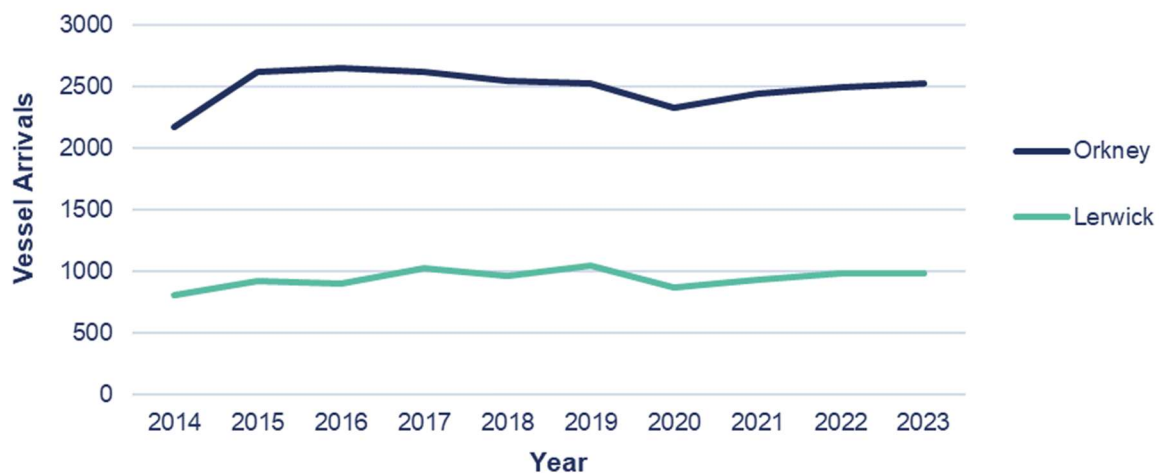


Figure 22: Port Arrivals 2014-2023 Lerwick and Orkney (DfT, 2024).

Figure 23 shows projected freight traffic into UK major ports, produced by the DfT in 2019. Overall, port traffic is forecast to remain relatively flat in the short term but grow in the long term, with tonnage 39% higher in 2050 compared to 2016. This equates to approximately a 15 % increase in national freight tonnage by 2035. The long-term growth in port traffic is driven by increases in unitised freight traffic, which compensates for decreases in other freight in the short term. Liquid bulk traffic (principally crude oil) has the largest forecasted decreases, continuing a historical trend. Similarly, general cargo is forecast to decrease, in line with the historic decreasing trend, which is likely driven by increased containerisation of goods. Dry bulk traffic is forecast to have a relatively large decrease in the short term, driven primarily by demand for coal being projected to fall. In the long term, dry bulk traffic is forecast to increase, with other dry bulk, the largest category, continuing to increase as it has done historically (principally biomass). Motor vehicles, Twenty-foot Equivalent Unit container forecast for Lift-on Lift-off and the unit forecast for Roll-on Roll-off (RoRo) are all forecast to grow strongly, driven by economic growth.

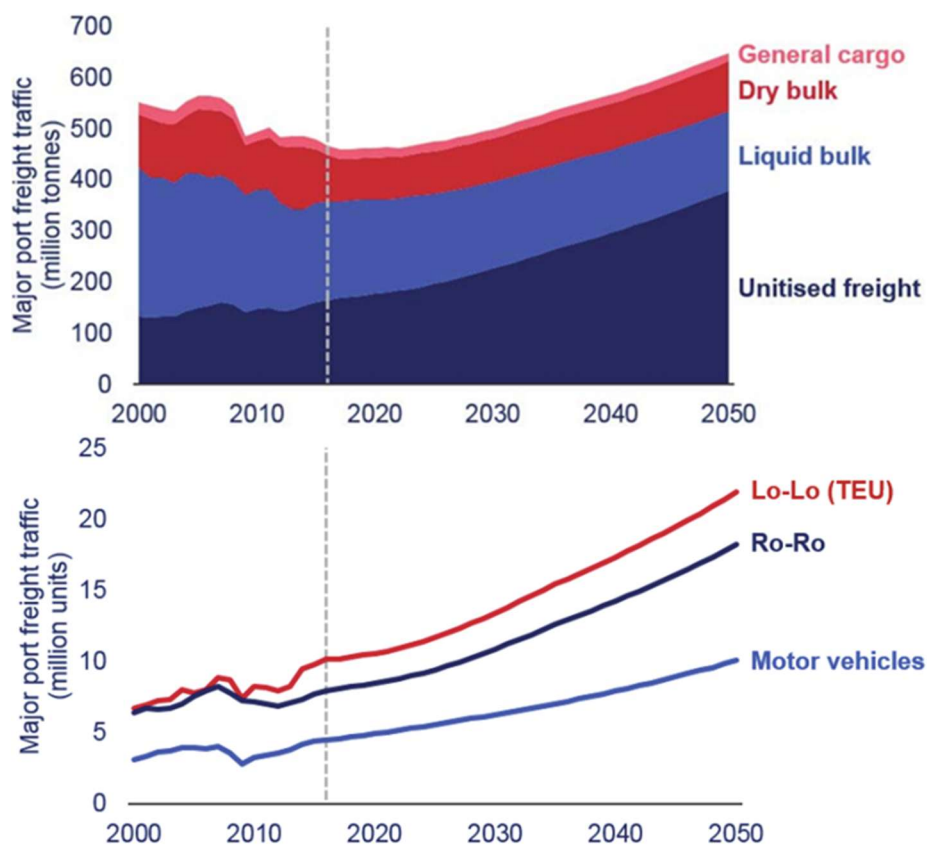


Figure 23: UK port freight Projections (DfT, 2019).

7.3 FERRIES

NorthLink Ferries were the principal ferry operator recorded within the Study Areas. Statistics for numbers of passengers and cars transported are published annually by NorthLink ferries. The number of passengers and cars transported per year over the last decade are shown in **Figure 24**. Overall, an increase in numbers was observed each year, with the exception of 2020 which saw a decrease in numbers due to the COVID-19 pandemic. Since the pandemic, the number of passengers and cars transported have recovered. Over the ten year period, a 40% increase in passengers and 59% increase in cars transported was observed.

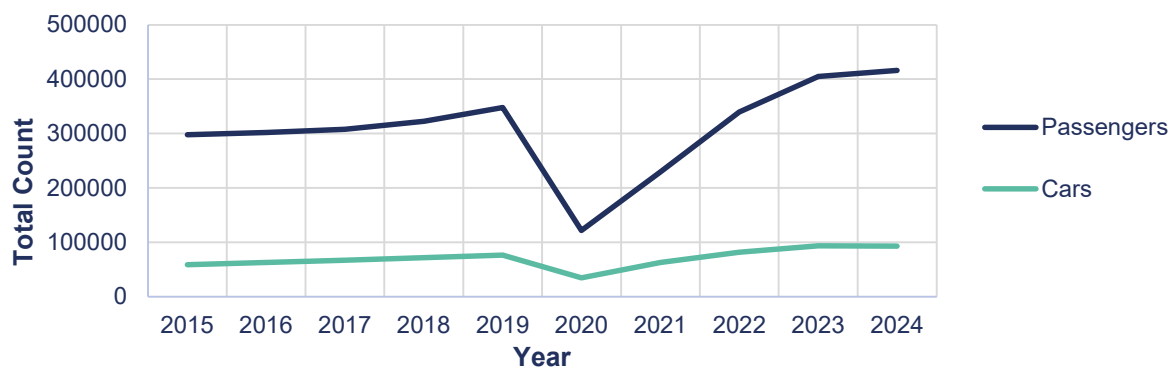


Figure 24: Passenger and Car Totals transported per Year (2015-2024) (source: northlinkferries.co.uk).

During Q2 2023, NorthLink Ferries increased the frequency of transits on their route between Scrabster and Stromness due to increased demand¹. It is therefore noted that an increase in demand for ferry services between Aberdeen and Lerwick/Kirkwall may necessitate a future increase in the frequency of vessel transits on these routes.

7.4 FISHING ACTIVITY

Fishing within the North Sea is important for both the UK and neighbouring countries. There is limited information available for future fishing vessel activity on which reliable assumptions can be made. Commercial fisheries patterns change and fluctuate based on a range of natural and management-controlled factors, including market demand, market prices, stock abundance, management, environmental management, efficiency, technology and sustainability. Therefore, fishing fleets are unlikely to be impacted by quota transfers following the UK's withdrawal from the EU.

Uncertainty remains with respect to impacts of the UK's withdrawal from the Common Fisheries Policy and how activity may be affected within the Study Area. Under the new EU-UK Trade and Co-operation Agreement (in effect since 2021) there is a five-year transition period, whereby 25% of the EU quota for British waters will be transferred to the UK fishing fleet.

It is anticipated that fishing activity is unlikely to change over the next five years, with both UK and non-UK vessels continuing to be active in the region as per the agreement. Nevertheless, as this transition period is confirmed until June 2026, in the event that there is a reduction in non-UK fishing activity due to restrictions, it is anticipated that this will be balanced by an increase in UK fleet capacity.

Given the above information, fishing activity in the area is not anticipated to change significantly, with both local and foreign vessels continuing to operate in the area.

7.5 RECREATIONAL ACTIVITY

The RYA Water Sports Participation Survey conducted in 2019 found that the proportion of adults participating in boating activities has fluctuated between 6% and 8% between 2002 and 2018. Between 2008 and 2018, the proportion participating in yacht cruising, motor boating and power boating have remained consistent at 0.8%, 1.1% and 0.7% respectively. More recent data published in the 2021 Water Sports Participation Survey is significantly influenced by COVID-19 with a significant variation between 2021 and 2022 due to national/local lockdowns.

Therefore, it is considered unlikely that there will be a significant change in the number of recreational users due to macro trends.

¹ <https://www.northlinkferries.co.uk/northlink-blog/may-2023-northlink-news-round-up/#:~:text=In%20order%20to%20accommodate%20any,Mainland%20and%20the%20Orkney%20Islands.>

8. IMPACT ASSESSMENT

Following consultation with stakeholders, analysis of data and a review of guidance, a total of 12 potential impacts of the Project on shipping and navigation were identified. These are presented in **Table 12**. Three impacts were scoped out of the assessment as based on the project design and activities, there was not deemed to be a credible pathway for a significant impact on shipping and navigation.

Table 12: Impact Identification

ID	Potential Impact	Description	Scoped In / Out	Reason if Scoped Out
1	Potential impact to commercial vessel and ferry vessel routeing	Deviations to commercial vessel and ferry routeing increasing distances may be required, resulting in additional cost and time for the passage.	In	N/A
2	Potential impact to small craft routeing/activities	Activities and safety of small craft navigation such as cruising could be impacted/displaced.	In	N/A
3	Potential impact on vessel to vessel collision risk	The risk of collision between navigating vessels, such as through the creation of choke points or increased vessel movements, could be increased.	In	N/A
4	Potential impact on emergency response/search and rescue	A vessel's ability to respond to an emergency or search and rescue access for vessels or aircraft during an emergency could be inhibited.	In	N/A
5	Potential impact to risk of snagging of anchors and fishing gear	The presence of subsea cables could pose a hazard to vessels using anchors or fishing gear	In	N/A
6	Potential impact on under keel clearance	The project could reduce the navigable depth of water, increasing the risk of grounding.	In	N/A
7	Potential impact on access to ports and harbours	The project and its activities could impede the access for vessels into ports and harbours.	In	N/A
8	Potential impact to recognised sea lanes essential to international navigation	Access into major international sea lanes could be affected.	In	N/A
9	Potential impact on oil and gas activities	The project and its activities could disrupt or impede oil and gas activities or safety of installations or vessels.	In	N/A
10	Potential impact to military exercises	Military exercises in the vicinity of the cable route could be disrupted.	Out	The Study Area does not overlap any military

ID	Potential Impact	Description	Scoped In / Out	Reason if Scoped Out
				practice areas. The closest firing practice area is located 17 nm from the closest crossing.
11	Potential impact on allision risk	A risk to vessels of allision with a stationary structure forming part of the Project.	Out	The Project has no surface piercing structures that vessels could allide with.
12	Potential impact on electromagnetic interference and vessel compasses	The project infrastructure could cause electromagnetic interference and interfere with vessel compasses.	Out	The Aurora Project is a fibre optic cable and therefore electromagnetic interference is not anticipated.

8.1 POTENTIAL IMPACT TO COMMERCIAL VESSEL AND FERRY VESSEL ROUTEING

During the installation phase of rock placement, it is expected that commercial vessels and ferries may be required to alter their course due to the presence of pre and post installation rock placement vessels and the requested safe passing distance. The project vessels are typically slow and limited in manoeuvrability during the rock placement activities.

Two main passenger routes were observed east of Study Area 1, one of which operated by NorthLink Ferries which runs between Kirkwall and Lerwick. Cargo vessels also transited through or near to all four Study Areas. Medium density tanker activity was recorded within Study Areas 1 and 4.

Whilst deviations may be required to route around rock installation activities, it is likely that these deviations will only be less than a minute given the localised nature and low spatial footprint of these activities. Minor amendments can be made by approaching vessels in advance to pass clear of the cable protection activities. Given the available sea room around the activities, there is anticipated to be only a slight impact on commercial shipping routeing. Any impacts will be of a temporary nature during the rock installation process which is anticipated to take up to 6 days total.

It is not anticipated that adverse weather routes will be negatively affected by the rock placement installation due to the localised nature of the activities and infrequency of adverse weather routeing occurring. Furthermore, it is unlikely that activities will be undertaken during adverse weather conditions. There is adequate available sea room such that safe vessel routeing, even in adverse weather conditions, is achievable.

Embedded mitigations such as circulation of information (e.g. NtMs) and lighting and marking of vessels will notify sea users of installation works. It is recommended that the ferry operators and regular users are also notified of all installation works.

The impacts during decommissioning activities are likely to be similar to those during installation. There are no anticipated impacts to commercial vessel post-installation of the rock placement.

8.2 POTENTIAL IMPACT TO SMALL CRAFT ROUTEING AND ACTIVITIES

During the installation of the rock placement, it is expected that small craft may be required to alter their route due to the presence of the project vessels and to maintain safe passing distance. One medium density recreational route was observed between the Shetland Islands and Fair Isle approximately 8.9 nm from the cable crossing location in Study Area 1 (see **Section 6.2.5**). Nearby recreational clubs on Orkney and the Shetland Islands include the Orkney Sailing Club, Holm Sailing Club, Lerwick Boating Club and Scalloway Boating Club. The rock placement will not disrupt recreational activity within coastal waters, given its distance from the shore. Occasional offshore cruisers may encounter the project vessels, but it is noted there is significant sea room around the proposed activities for recreational craft to pass clear. Embedded mitigations such as circulation of information (e.g. NtMs) and lighting and marking of vessels will notify sea users of installation works. It is recommended that relevant local marinas are also notified of all installation works.

There are no anticipated changes in small craft routeing post-installation of the rock placement. The impacts during decommissioning activities are likely to be similar to those during installation.

8.3 POTENTIAL IMPACT ON VESSEL TO VESSEL COLLISION RISK

There is an increased collision risk created during the installation phase for all passing traffic due to the presence of rock placement installation vessels. This may be either due to the direct risk of a passing vessel colliding with the project vessels or could arise due to vessels altering their route due to the works and transiting in closer proximity to other passing vessels.

Vessels associated with the rock placement installation are slow moving and restricted in manoeuvrability during installation activities meaning these vessels may have limited capability in taking avoidance action from a passing vessel on a collision course, should such a situation arise. Given the volume of traffic, distance between the cable and pipeline crossings and the existing navigational features in proximity, it is considered that there is adequate searoom should a passing vessel be required to undertake collision avoidance actions.

There is the potential that the project vessels would cause temporary deviation of vessel routes which increases collision risk between passing vessels. Collision risk for passing vessels with other passing vessels is greater in areas with a higher density of vessel activity. The density heat maps in **Section 6.2** showed that there are a number of routes used by different vessel types in proximity to all four Study Areas. As with the risk of a passing vessel colliding with an installation vessel, it is considered that there is adequate sea room should a vessel be required to undertake collision avoidance actions.

It is expected that the majority of vessels will be aware of the rock placement works prior to encountering the project vessels through embedded mitigation measures, which include circulation of information via NtM and the appropriate lighting and marking of installation vessels, making them highly visible. Installation vessels will be compliant with maritime

regulations and will broadcast their status accurately through AIS to reflect the nature of activities being undertaken. In addition to the embedded mitigations, it is noted that adequate sea room is available along the section of cable route should collision avoidance action be required.

There are no anticipated changes to vessel routing post-installation of the rock placement, hence there is no expected impact on vessel to vessel collision risk. The impacts during decommissioning activities are likely to be similar to those during installation.

8.4 POTENTIAL IMPACT ON EMERGENCY RESPONSE, SEARCH AND RESCUE

During the installation of the rock placement, the presence of the project vessels has the potential to inhibit search and rescue operations should an incident occur in close proximity to the installation activities. There is also potential for an increased need for emergency response should an accident occur aboard a project vessel. The closest RNLi base is located at Lerwick, 33 nm north of the cable route. The nearest search and rescue helicopter base is located at Sumburgh. The maritime incidents from the RNLi and MAIB databases are presented in **Section 6.3**. Based on the review of incidents, it can be seen that the areas in proximity to the cable and pipeline crossings has experienced a relatively low rate of accidents in recent years. The most common incident type within the Study Areas was personal injury. Therefore, the impact of the cable layer on existing SAR activities is minimal.

An ERCoP will be produced to safely manage the operations of the rock placement installation. It is possible that in the event of a nearby maritime incident, a project vessel may be the first vessel to respond, providing a benefit to SAR.

It is not anticipated that there will be any effects on emergency response post-installation of the rock placement. The impacts during decommissioning activities are likely to be similar to those during installation.

8.5 POTENTIAL IMPACT TO RISK OF SNAGGING OF ANCHORS AND FISHING GEAR

Subsea cables and any associated protection introduce a risk of snagging, either by vessel anchors or fishing gear.

There is a risk that an anchored vessel will lose its holding ground and subsequently drag anchor over the subsea cable. There are no designated or customary anchorages in proximity to the cable and pipeline crossings. Therefore, it is assessed that the risk of anchor dragging across the cable is very low.

Commercial ships may choose to deploy an anchor in an emergency (e.g. loss of power), and whilst unlikely, this could result in cable snagging if the anchor penetrates deep enough. This is more likely to occur in the shallower, coastal waters where there is a higher risk of grounding and a greater need for immediate action. In all cases, it is unlikely that the rock placement at the crossings would pose a risk to the vessel.

One fishing vessel route northeast-southwest was observed crossing within Study Area 1 and very close to the Shetland HVDC Link crossing. Medium fishing vessel density was observed in the Study Areas 2 and 3. Study Area 4 contained low to medium fishing vessel density.

Within the VMS data, vessels were recorded used demersal gears, which have the highest potential to interact with subsea cables. It is noted that bottom trawlers and dredgers have the potential to penetrate into the seabed and that these penetration depths of fishing gear tend to be small compared to vessel anchors, typically less than 0.5 m. It is understood that fisheries in the local area prefer cable protection measure to be carried out using rock placement considering industry standard rock size (1" - 5") with a 1:3 profile, per the design for the rock placement at cable and pipeline crossings as described in **Section 4.3**. The subsea cable and other subsea assets will be marked on nautical charts to ensure fishermen can identify locations of crossings.

Within the consultation responses, the SFF highlighted that the presence of pre-lay rock and potentially unprotected cables pose snagging hazards to fishermen, and proposed deploying a guard vessel to provide active monitoring and alerts in the period before the post-installation rock placement is undertaken. The use of guard vessels is not considered proportionate since the snagging risk introduced is a temporary, spatially limited impact with a low likelihood of occurrence. Moreover, if guard vessels were placed at each crossing location, this would increase the likelihood of other impacts, for example the risk of collision. Other appropriate mitigations are put in place to manage the risk of snagging during cable exposure, including promulgation of information and marking and charting of the crossings.

Once rock placement is installed, the subsea cable and pipeline crossings will be protected. Cable snagging is more likely where cables are exposed during the installation process. The impacts during decommissioning activities are likely to be similar to those during installation.

8.6 POTENTIAL IMPACT ON UNDER KEEL CLEARANCE

Subsea cables and associated protection have the potential to increase the risk of grounding by reducing the depth of water post-installation. A reduction in under keel clearance primarily affects nearshore areas as the reduction in clearance is not as critical within deeper waters.

Water depths at the cable and pipeline crossings range from 104 m to 130 m. The cable protection at the crossings will consist of pre-installation and/or post-installation rock placement, with heights of up to 2.0 m and 0.8 m, respectively. This equates to a maximum height of 2.8 m protection height combined.

The maximum draught vessel recorded in proximity to the crossings drew 25.5 m and transited 5.5 nm southwest of the Shetland HVDC Link crossing location. However, the maximum draught vessel recorded within the Study Areas was a cargo or tanker vessel with 17.1 m draught.

Taking a worst-case scenario, a 25.5 m draught vessel at the shallowest crossing would still have 75.7 m of UKC if the maximum height of protection were to be installed.

MGN 654 guidance published by the MCA should be adhered to, and states that:

"Any consented cable protection works must ensure existing and future safe navigation is not compromised. Consequently, 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 satisfactorily mitigated."

The maximum water depth reduction at the crossings will range from 2.2% to 2.7%, based on the maximum height of protection being installed at each crossing, giving a worst-case scenario.

Given the maximum protection height, water depths and potential water depth reductions, it is not anticipated that under keel clearance would be compromised during any phase of the project.

8.7 POTENTIAL IMPACT ON ACCESS TO PORTS AND HARBOURS

There may be a disruption to port arrivals/departures due to the presence of rock placement installation vessels operating in close proximity. The closest harbour is 5 nm southeast of Study Area 1 at North Haven on Fair Isle. The approaches to North Haven are considered to be unobstructed by the rock placement as there is adequate sea room around the installation activities. Moreover, the rock placement installation is a temporary activity, and the impact is expected to be minimal when taking into account the embedded mitigation measures, which include NtM (see **Section 4.6**).

The impacts during decommissioning activities are likely to be similar to those during installation. There are no anticipated impacts to ports and harbours post-installation of the rock placement.

8.8 POTENTIAL IMPACT TO RECOGNISED SEA LANES ESSENTIAL TO INTERNATIONAL NAVIGATION

There are IMO adopted recommended routes to the north and south of Fair Isle. The Aurora Project passes within the north channel between Fair Isle and the Shetland Islands. This area is only recommended for vessels travelling west. Vessels travelling west also have the option to pass south of the Fair Isle as indicated on nautical charts.

Where vessels require to transit north of Fair Isle, it is anticipated that their routes will not be disrupted, there is adequate sea room north of the cable and pipeline crossings for these vessels to pass safely.

Therefore, the rock placement activities are not anticipated to have an impact on sea lanes essential to international navigation during any phase of the project.

8.9 POTENTIAL IMPACT TO OIL AND GAS ACTIVITIES

As noted in **Section 5.1.7**, Study Area 4 lies between Harding Oil Field and East Brae Gas Field. The closest platform to the cable and pipeline crossing locations is 10.8 nm south. Therefore, it is not anticipated that rock placement activities will interfere with activities taking place at oil and gas fields.

Oil and gas vessels transiting to and from the fields may transit in close proximity to the project vessels undertaking rock placement activities, however with the embedded mitigations, including NtM and marking and lighting of vessels, and the available searoom, it is anticipated that oil and gas vessels can make minor deviations on approach to safely pass clear of the cable protection activities.

Therefore, no significant impacts to oil and gas activities are anticipated as a result of the rock placement activities.

The impacts during decommissioning activities are likely to be similar to those during installation. There are no anticipated impacts to oil and gas activities post-installation of the rock placement.

9. NAVIGATION RISK ASSESSMENT

9.1 INTRODUCTION

The NRA follows the IMO's FSA, with consideration given to MGN 654. MGN 654 requires that the NRA contains a hazard log of shipping and navigation hazards caused or changed by the Project which includes an assessment of risk with embedded mitigation measures in place (see **Section 4.3**).

The development of the NRA, hazard log and associated risk scoring process is based on the following data, analysis, modelling and expertise of the Project team:

- Project description (see **Section 4**);
- Overview of the marine environment (see **Section 5**);
- Description of existing maritime activities (see **Section 6**); and
- Future traffic baseline (see **Section 7**).

In addition to the above, a key component of the NRA is engagement with regulators and local stakeholders to confirm baseline shipping and navigation characteristics and elicit judgement on the levels of navigation risk associated with the proposed Project.

The risk assessment methodology employed for the Project is the IALA SIRA process, which follows both the MCA MGN 654 guidance and is also endorsed by the IMO via SN.1/Circ.296 in December 2010. The following sections outline:

- The overarching methodology of the risk assessment;
- The process of hazard identification;
- Embedded risk control measures;
- Results of the assessment of risk with the applied mitigations in place; and
- Possible additional mitigation measures if required to reduce risk to acceptable levels.

The risk assessment Project methodology follows the FSA and is based on the principles set out in IALA Guidelines 1018 and 1138 which are endorsed by the IMO in SN.1/Circ.296 and the IMO's FSA. Navigation hazards are identified through, consultation and data analysis, before being assessed in terms of their likelihood and consequence. A risk matrix is then utilised to identify the significance of each hazard with possible additional risk controls identified based on the resultant risk score to reduce the risks to acceptable levels.

A description of the FSA process is as follows.

- **FSA Step 1: Hazard Identification:** The Project team identifies navigation hazards related to defined and agreed assessment parameters, such as geographic areas, marine operation, or vessel type. This is achieved using a suite of quantitative (e.g.

statistical vessel traffic analysis) and qualitative (e.g. consultation with stakeholders) techniques which enables an evidentially robust identification of navigation hazards.

- **FSA Step 2: Risk Analysis:** A detailed investigation of the causes, including the initiating events, and consequences of the hazards identified in Step 1 is undertaken. This is completed using a risk matrix, and enables ranking of hazards based on navigation risk, and a determination of hazard acceptability tolerability. This process allows attention to be focused upon higher-risk hazards enabling identification and evaluation of factors which influence the level of risk.
- **FSA Step 3 and 4: Risk Controls:** The identification of existing risk controls measures (which are assumed to be included in the assessment of navigation risk), and the identification of possible additional risk controls, not currently in place for the assessment parameters is undertaken. Possible additional risk control measures are identified based on prioritising mitigation of higher-risk hazards. During this stage risk control measures may be grouped into a defined and thought-out risk mitigation strategy.
- **FSA Step 5: Findings:** The assessment findings are developed and documented into a technical report and then presented to the relevant decision makers in an auditable and traceable manner. The findings are based upon a comparison and a ranking of all hazards and their underlying causes; the comparison and ranking of possible additional risk control options as a function of associated costs and benefits; and the identification of those options which mitigate hazards to acceptable or ALARP.

9.2 SCORING CRITERIA

Having identified all relevant impacts and hazards as a result of the pre-installation and post-installation rock placement, a hazard log is constructed as described in MGN 654 Annex 1. Whilst there is no generally accepted standard for risk matrices, the matrix outlined in this section is proposed as suitable for the Project as it meets IMO and IALA guidance and is consistent with industry best practice.

Each hazard is scored based on its predicted frequency of occurrence (**Table 13**) and consequence (**Table 14**) for two scenarios, the 'most likely' and 'worst credible'. Severity of consequence with each hazard under both scenarios is considered in terms of damage to:

- People – hazards may result in injuries or fatalities;
- Property – hazards may result in damage or loss of vessels or structures;
- Environment – hazards may result in environmental pollution such as oil spills; and

- Commercial and reputation – hazards may result in loss of economic output, impact on vessel routes, interruption of supply/generation capacity and adverse media coverage.

This NRA assumes that vessels will be compliant with international conventions (e.g. COLREGS and STCW), and National regulations and Guidance (e.g. UK Merchant Shipping Act 1995, and MCA MGNs).

Table 13: Frequency of Occurrence Criteria

Rank	Title	Description	Definition
1	Remote	Remote probability of occurrence at Project site and few examples in wider industry.	<1 occurrence per 10,000 years
2	Extremely unlikely	Extremely unlikely to occur at Project site and has rarely occurred in wider industry.	1 per 100 – 10,000 years
3	Unlikely	Unlikely to occur at Project site during Project lifecycle and has occurred at other subsea cables.	1 per 10 – 100 years
4	Reasonably probable	May occur once or more during Project lifetime.	1 per 1 – 10 years
5	Frequent	Likely to occur multiple times during Project lifetime.	Yearly

Table 14: Severity of Consequence Categories and Criteria

Rank	Description	People	Property	Environment	Definition
1	Negligible	Minor injury	Less than £10,000	Minor spill no assistance required.	Minimal impact on activities. No cable damage.
2	Minor	Multiple minor injuries	£10,000-£100,000	Tier 1 local assistance required	Local negative publicity. Short term loss of revenue or interruption of services to ports/OWFs/oil and gas/ferries and other marine users. Cable inspection required.
3	Moderate	Multiple major injuries	£100,000-£1million	Tier 2 limited external assistance required	Widespread negative publicity. Temporary suspension of activities to ports/OWFs/oil and gas/ferries and other marine users. Cable damage requiring repairs.

Rank	Description	People	Property	Environment	Definition
4	Serious	Fatality	£1million-£10million	Tier 2 regional assistance required	National negative publicity. Prolonged closure or restrictions to ports/OWFs/oil and gas/ferries and other marine users. Significant cable damage requiring repair.
5	Major	Multiple fatalities	>£10million	Tier 3 national / international assistance required	International negative publicity. Serious and long-term disruption to ports/OWFs/oil and gas/ferries and other marine users. Cable out of service.

9.3 RISK MATRIX

The combination of the frequency and consequence scores for each scenario are then combined to produce an overall risk score, which is used to assign hazard risk rating in the Project risk matrix (**Table 15**). The methodology utilised was discussed with stakeholders during consultation and is consistent with other NRAs submitted for other offshore developments in the UK.

The assessment of risk is calculated eight times for each identified hazard; four times for the “realistic most likely” occurrence for each consequence category and four times for the “realistic worst credible” outcome for each consequence category. An overall risk score is then calculated using an averaging function weighted to the highest risk score for the “realistic most likely” and the highest risk score for the “realistic worst credible”. The weighted averaging calculation is an average of:

- average of all the “realistic most likely” risk scores;
- average of all the “realistic worst credible” risk scores;
- highest individual score from the “realistic most likely” scores; and
- highest individual score from the “realistic worst credible” scores.

The tolerability of these hazard risk scores with regards to significance and acceptability with or without further action are shown in **Table 16**.

MGN 654 Annex 1 notes that “There is no generally accepted standard for a risk matrix therefore developers the Applicants will be expected to define the following as appropriate”:

- likelihood/frequency of incident scenarios;
- severity/consequence of incident scenarios;

- risk matrix; and
- tolerability matrix scores.

The assessment criteria, including frequency and consequence bandings, are consistent with previous NRAs submitted and approved by the MCA. Furthermore, reference has been made to Intolerable/ALARP/Negligible bandings defined in IMO FSA studies, such as the FSA for Roll-on Roll-off Passenger (RoPax) Vessels (MSC 85 INF3). For example, a fatality every 10 years, or multiple fatalities every 100 years within the RoPax FSA was defined as the threshold between Unacceptable and ALARP, this translates to a score between 12-16 and 10-15 respectively on the risk matrix. Similarly, the same study determined that a fatality every 1,000 years, or multiple fatalities every 10,000 years was defined as the threshold between ALARP and Negligible, this translates to a score between 4-8 and 5-10 respectively on the risk matrix. The risk matrix presented in **Table 15** is therefore consistent with the FSA for RoPax Vessels (MSC 85 INF3).

Hazards are then defined as either Broadly Acceptable, with existing mitigation, or Unacceptable. MGN 654 Annex 1 states that where risks are scored as Medium Risk, “Further risk control options must be considered to the point where further risk control is grossly disproportionate (i.e. the ALARP principle) and an ALARP justification and declaration made.” Therefore, hazards scored as Medium Risk can only be Tolerable if ALARP is met.

Table 15: Risk Matrix

Severity of Consequences	Major	5	5	10	15	20	25
	Serious	4	4	8	12	16	20
	Moderate	3	3	6	9	12	15
	Minor	2	2	4	6	8	10
	Negligible	1	1	2	3	4	5
			1	2	3	4	5
			Remote	Extremely unlikely	Unlikely	Reasonably probable	Frequent
Likelihood of occurrence							

Table 16: Tolerability and Risk Ratings

Hazard Score	Tolerability	Description
Negligible risk (≤ 4)	Broadly Acceptable	Generally regarded as not significant and adequately mitigated. Additional risk reduction should be implemented if reasonably practicable and proportionate.
Low risk (> 4 and < 6)		
Medium risk (> 6 and ≤ 12)	Tolerable if ALARP	Generally regarded as within a zone where the risk may be tolerable in consideration of the Project. Requirement to properly assess risks, regularly review and implement risk controls to maintain risks to within ALARP where possible.

Hazard Score	Tolerability	Description
High risk (> 12 and ≤ 20)	Unacceptable	Generally regarded as significant and unacceptable for Project to proceed without further risk controls.
Extreme risk (> 20)		

9.4 HAZARD IDENTIFICATION

An NRA should consider all identified hazards of the Project on shipping and navigation receptors. In developing the hazard log, consideration was given to Project phases, areas, hazard types and vessel types.

Nine hazard types were assessed, of which six were scoped out. **Table 17** presents all hazards identified, whether they were scoped in/out, and if scoped out, an explanation.

Table 17: Identified Hazards

Hazard Type	Definition	Scoped In?	Reason if Scoped Out
Collision	Collision between two vessels underway (also includes striking of an anchored or moored vessel).	Yes	N/A
Snagging	Vessel fishing gear or anchor snags a subsurface hazard (e.g. export cable).	Yes	N/A
Grounding	Vessel makes contact with the seabed/shoreline or underwater assets.	Yes	N/A
Allision	Vessel makes contact with Fixed or Floating Object (FFO) (e.g. WTGs/substation/oil and gasG platform, etc.)	No	The cable protection and installation activities do not contain any surface piercing structures which vessels may allide with.
Foundering / capsize	Vessel sinks or grounds caused by loss of stability, buoyancy or water tight integrity (e.g. may be caused by severe adverse weather or mechanical failure).	No	The presence of subsea cables and associated protection is not deemed to have any impact on the likeliness that a vessel will founder or capsize, as this is typically caused by a previous incident (for example machinery failure or a snagging).
Personnel	Incident to personnel associated with navigation related activities - e.g. pilot / crew / passenger boarding, mooring a vessel, tender operations, etc.	No	The presence of subsea cables and associated protection is not deemed to have any impact on the probability of a personal injury to personnel. Health and safety requirements onboard the installation vessels are not considered part of the NRA and are considered by the vessel operators. Pilot boarding and port operations do not occur in close

Hazard Type	Definition	Scoped In?	Reason if Scoped Out
			proximity to the cable and pipeline crossings.
Wake wash	Vessel wave wake wash effect on other vessels.	No	The presence of subsea cables and associated protection is not deemed to increase the likeliness of wake wash effect as this is directly caused by vessels themselves.
Fire/Explosion	Fire or explosion aboard a vessel.	No	The presence of subsea cables and associated protection is not deemed to affect the risk of fire occurring on board a vessel.
Vessel Motions	Project puts vessels on routes which exposes them to increased risks associated with vessel motions such as cargo shift and injuries.	No	The presence of subsea cables and associated protection is not deemed to impact vessel motions.

The vessel types identified are shown in **Table 18**.

The NRA considers the installation (I), operation and maintenance (O), and decommissioning (D) phases of the rock placement activities. To reflect the similarity of the impacts during installation and decommissioning, these two categories were combined in all cases. Similarly, where hazards were deemed to have similar risk scores between installation and operation and maintenance, they were combined into a single hazard.

Table 18: NRA Vessel Types

ID	Description	Definition
1	Ferry / Passenger Vessel	Passenger Ferry Freight / RoRo Ferry Cruise Ship
2	Cargo Vessel / Tanker	Cargo (Container, Bulk, Reefer, General etc.) Tanker (Oil, Chemical, Gas etc.)
3	Tug / Service Vessels	Tugs Offshore Supply Vessels Standby Rescue Vessels Pilot Boats Wind Farm CTVs Other Service Vessels
4	Fishing	Trawlers Fishing Boats
5	Recreational	Sailing Yachts Pleasure Boats
6	Project Vessels	All Project Vessels

Four areas were assessed within the NRA, these were defined to be the same as the Study Areas used for the analysis (see **Section 3.2**). For each hazard, a frequency was assigned

for each specified area, however, for simplicity, the highest frequency has been used for the hazard summary. A full breakdown of each hazard with frequencies per area can be seen in **Appendix A**.

Based on the Project phases, vessel types, hazard types and hazard areas, a total of 14 hazards were identified.

9.5 RESULTS

9.5.1 Risk Assessment Summary

The results of the NRA, based on the approach described above shows that in total:

- No hazards were assessed as High Risk – Unacceptable;
- No hazards were assessed as Medium Risk – Tolerable (if ALARP); and
- 14 hazards were assessed as Low Risk – Broadly Acceptable.

The full hazard log is available in **Appendix A**. The following sections describe the hazard scores for each hazard type in more detail.

9.5.2 Collision

Table 19 presents the seven collision hazards identified and their associated hazards scores and ratings. All of the collision hazards were assessed to be Low Risk – Broadly Acceptable principally as frequencies were all scored as extremely unlikely or remote in the most likely scenario and worst-case scenario.

Table 19: Collision Hazards, Scores and Ratings

ID	Rank	Phase	Hazard title	Score	Rating
6	1	I/O/D	Collision - Project Vessel ICW. Ferry/Passenger	6.0	Low Risk - Broadly Acceptable
5	2	I/O/D	Collision - Project Vessel ICW. Cargo/Tanker	5.8	Low Risk - Broadly Acceptable
4	3	I/O/D	Collision - Small Craft ICW. Small Craft	5.8	Low Risk - Broadly Acceptable
1	4	I/O/D	Collision - Ferry/Passenger ICW. Cargo/Tanker or Ferry/Passenger	5.3	Low Risk - Broadly Acceptable
2	5	I/O/D	Collision - Cargo/Tanker ICW. Cargo/Tanker	5.1	Low Risk - Broadly Acceptable
3	5	I/O/D	Collision - Small Craft ICW. Ferry/Passenger or Cargo/Tanker	5.1	Low Risk - Broadly Acceptable
7	5	I/O/D	Collision - Recreational or Fishing or Tug/Service ICW. Project Vessel	5.1	Low Risk - Broadly Acceptable

The highest scoring collision hazard assessed relates to a project vessel in a collision with a ferry or passenger vessel. The realistic most likely scenario of such an occurrence would result in multiple minor injuries, moderate damage to vessels, minor pollution (Tier 1), national

negative publicity and may result in a vessel requiring dry dock. In the worst case scenario, multiple fatalities, constructive loss, major pollution (Tier 3) and international negative publicity were identified as the realistic scenario. The frequency of a collision between a project vessel and a ferry or passenger vessel was deemed extremely unlikely in the most likely scenario for Study Areas 1 and 4, and remote for Study Areas 2 and 3. This is due to the fact that passenger routes are present within Study Areas 1 and 4, whereas only a low density throughout Study Areas 2 and 3 was observed for passenger vessels. In the worst case scenario, the hazard was deemed to be remote for all Study Areas. The frequencies assigned take into account the embedded mitigation measures, which include the use of guard vessels, compliance with maritime regulation and circulation of information via NtMs. Therefore, it is anticipated that vessels will be well informed of installation works. Although the frequency was ranked low, the consequences were determined to be more severe than the other permutations, mainly driven by the potential for fatalities and national adverse publicity.

The second highest scoring collision hazard was for a collision between a project vessel and a cargo vessel or tanker. The scores assigned for the consequences to property, environment and business were the same as for a collision between a project vessel and a ferry or passenger vessel. The frequency for the hazard was deemed to be extremely unlikely in all Study Areas in the most likely scenario, and remote for the worst case scenario. The lower overall hazard score for the collision between a project vessel and a cargo vessel or tanker is driven by the lesser consequence to people as opposed to the scenario with the ferry or passenger vessel.

9.5.3 Snagging

Table 20 presents the four snagging hazards identified and their associated hazards scores and ratings. All of the snagging hazards had Low Risk – Broadly Acceptable scores, largely based on the low likelihood of occurrence in combination with the lack of anchorages in proximity to the cable and pipeline crossings.

Table 20: Snagging Hazards, Scores and Ratings

ID	Rank	Phase	Hazard title	Score	Rating
8	8	I/O/D	Snagging - Fishing	4.0	Low Risk - Broadly Acceptable
10	9	I/O/D	Snagging - Cargo/Tanker or Ferry/Passenger	4.1	Low Risk - Broadly Acceptable
11	9	I/O/D	Snagging - Project Vessel	4.1	Low Risk - Broadly Acceptable
9	14	I/O/D	Snagging - Recreational or Tug/Service	2.0	Negligible Risk - Broadly Acceptable

The highest ranking of the snagging hazards was the snagging risk to fishing vessels either through the use of anchors or fishing gear. The outcome of the realistic most likely scenario would be minor injuries, minor damage to gear, no pollution, cable inspection and local negative publicity, whilst the realistic worst credible outcome would be multiple fatalities, loss of gear/craft, minor pollution (Tier 1), significant cable damage and national negative publicity. The frequency of a most likely outcome was deemed to be extremely unlikely to occur at Study Areas 2 and 4, and deemed to be remote for Study Areas 1 and 3. The worst case scenario

was assigned a frequency of remote at all Study Areas to reflect that this has rarely occurred in wider industry.

On the basis that all hazards were Low Risk, the proposed use of Guard Vessels was not considered appropriate.

9.5.4 Grounding

Table 21 presents the three grounding hazards identified and their associated hazards scores and ratings. All of the grounding hazards had Low Risk – Broadly Acceptable scores, largely based on the low likelihood of occurrence in combination with the deep waters surrounding the cable and pipeline crossings.

Table 21: Grounding Hazards, Scores and Ratings

ID	Rank	Phase	Hazard title	Score	Rating
13	11	I/O/D	Grounding - Project Vessel	3.4	Negligible Risk - Broadly Acceptable
14	12	I/O/D	Grounding - Ferry/Passenger or Cargo/Tanker	2.9	Negligible Risk - Broadly Acceptable
12	13	I/O/D	Grounding - Recreational or Fishing or Tug/Service	2.8	Negligible Risk - Broadly Acceptable

The highest ranked grounding hazard relates to the grounding of a project vessel. The realistic most likely scenario for such an event would be multiple minor injuries, minor damage, no pollution, local negative publicity and a need for the cable to be inspected. In the worst case, the realistic most credible outcome is a single fatality, significant damage to the vessel, minor pollution (Tier 1) and significant cable damage. The grounding of a project vessel would have a higher potential for negative publicity than the other two scenarios. The frequency assigned for all grounding hazards in the most likely realistic scenarios and the worst-case scenarios was remote, based on the fact that it is not likely to happen at the cable site and has rarely occurred in wider industry.

10. CUMULATIVE ASSESSMENT

The assessment also considered the impact of other proposed projects in the vicinity of the cable and pipeline crossings. Existing navigational features and activities, such as anchorages and vessel routes, are included within the baseline assessment.

Following screening, one proposed floating offshore wind project was identified located approximately 20 nm west of Fair Isle (the Dolphyn Project). The Dolphyn Project is currently in the concept/early planning phase, and so limited information is available. Therefore, a full cumulative assessment was not able to be undertaken at the time of this NRA. No other proposed projects are located in proximity to the cable and pipeline crossings.

It is recognised that there are numerous proposed Scottish wind farms. This may result in increased vessel movements between Orkney and the Shetland Islands. It is unlikely that the installation of the rock placement will overlap with the development of the offshore wind projects.

No additional cumulative risks are anticipated above those assessed in **Section 9** of this NRA.

A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to shipping and navigation from cable and pipeline crossing protection upon the interests of other states has been assessed as part of this NRA. Each individual vessel may be internationally owned or operating between ports in different states. These impacts have been captured and assessed within this NRA. Therefore, no additional transboundary impacts are anticipated.

11. SUMMARY AND CONCLUSIONS

An NRA has been undertaken in line with IMO FSA methodology for eight cable and pipeline crossings requiring rock placement within the UK TS and EEZ.

Vessel traffic analysis showed that a number of ferry, cargo and passenger routes operate in proximity to the Study Areas. One of these routes is a ferry route operated by NorthLink Ferries between Shetland and Orkney. Cargo vessel routes were observed in proximity to all of the Study Areas, whilst medium-high tanker density was only observed in proximity to Study Areas 1 and 4.

Fishing activity within the Study Areas included vessels using demersal gears. Most of the activity was observed in proximity to Study Areas 1, 2 and 3. Lower fishing activity was observed in proximity to Study Area 4. Recreational activity was generally low across the Study Areas, with the exception of Study Area 1. A route was observed east of Study Area 1 between Shetland and Fair Isle. It is noted that fishing and recreational activity may be underrepresented due to AIS broadcasting requirements mandated for vessels over 15 m in length only.

A decrease was observed in commercial shipping activity during the COVID-19 pandemic; however, it was observed that vessel numbers have largely returned to pre-pandemic levels. Over the last 10 years, vessel arrivals at Orkney and Lerwick combined have increased by 18%. NorthLink Ferries passenger and car statistics showed an increase in the transportation of both over the last ten years by 40% for passengers and 59% for cars. It is not anticipated that there will be any significant changes to fishing and recreational activity in proximity to the cable and pipeline crossings.

Based on the existing activities in proximity to the cable and pipeline crossings, 12 impacts were identified, three of which were scoped out as it was determined there was no impact pathway for the Project. The majority of the impacts identified were associated with the installation of the rock placement and were deemed to be low in significance.

The IMO's FSA is a structured methodology aimed at enhancing maritime safety, including protection of life, health, the marine environment and property through risk analysis. A total of nine hazard types were identified, six of which were scoped out. Vessel categories and areas were defined, and a total of 14 hazards were assessed for each Study Area. These included various snagging, grounding and collision incidents. None of the scenarios were assessed as High Risk – Unacceptable, and none were assessed as Medium Risk. All hazards were scored as Low Risk. Therefore, all hazards are considered to be acceptable and adequately mitigated without the need for additional risk controls.

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Appendix A

Hazard Log

ID	Individual Haz. Rank	Project Phase	Hazard Type	Vessel Type	Hazard Title	Realisitic Most Likely Scenario	Realistic Most Likely Scores							Realisitic Worst Credible Scenario	Realistic Worst Credible Scores							Baseline Risk Score	Baseline Risk Rating				
							People	Property	Environment	Business	Freq. Area 1	Freq. Area 2	Freq. Area 3		Freq. Area 4	Max. Freq.	People	Property	Environment	Business	Freq. Area 1			Freq. Area 2	Freq. Area 3	Freq. Area 4	Max. Freq.
1	4	C/O/D	Collision	Ferry/Passenger ICW. Cargo/Tanker or Ferry/Passenger	Collision - Ferry/Passenger ICW. Cargo/Tanker or Ferry/Passenger	Multiple major injuries; Moderate damage to vessel; Tier 1 pollution; Widespread negative publicity; Short term interruption to ferry services.	3	3	2	3	2	1	1	2	2	Multiple fatalities; Constructive Loss; Serious pollution (Tier 2); International negative publicity. Ferry out of service.	5	5	4	5	1	1	1	1	1	5.3	Low Risk - Broadly Acceptable
2	5	C/O/D	Collision	Cargo/Tanker ICW. Cargo/Tanker	Collision - Cargo/Tanker ICW. Cargo/Tanker	Multiple minor injuries; Moderate damage to vessel; Tier 1 pollution; Widespread negative publicity; Vessel requires drydock.	2	3	2	3	2	2	2	2	2	Single fatality; Constructive Loss; Major pollution incident (Tier 3); National negative publicity.	4	5	5	4	1	1	1	1	1	5.1	Low Risk - Broadly Acceptable
3	5	C/O/D	Collision	Small Craft ICW. Ferry/Passenger or Cargo/Tanker	Collision - Small Craft ICW. Ferry/Passenger or Cargo/Tanker	Multiple major injuries; Moderate damage to vessel; Tier 1 pollution; Widespread negative publicity; Short term interruption to ferry services.	3	3	2	3	2	2	2	1	2	Multiple fatalities; Loss of small craft; Moderate damage to large vessel; Moderate pollution incident (Tier 2); National negative publicity; Ferry out of service.	5	4	3	4	1	1	1	1	1	5.1	Low Risk - Broadly Acceptable
4	3	C/O/D	Collision	Small Craft ICW. Small Craft	Collision - Small Craft ICW. Small Craft	Multiple minor injuries; Moderate damage to small craft; No pollution; Local negative publicity.	2	2	1	2	2	2	2	1	2	Single fatality; Loss of small craft; Moderate pollution incident (Tier 2); National negative publicity.	4	4	3	4	2	2	2	1	2	5.8	Low Risk - Broadly Acceptable
5	2	C/O/D	Collision	Project Vessel ICW. Cargo/Tanker	Collision - Project Vessel ICW. Cargo/Tanker	Multiple minor injuries; Moderate damage to vessel; Tier 1 pollution; National negative publicity; Vessel requires drydock.	2	3	2	4	2	2	2	2	2	Single fatality; Constructive Loss; Major pollution incident (Tier 3); International negative publicity.	4	5	5	5	1	1	1	1	1	5.8	Low Risk - Broadly Acceptable

ID	Individual Haz. Rank	Project Phase	Hazard Type	Vessel Type	Hazard Title	Realisitic Most Likely Scenario	Realistic Most Likely Scores							Realisitic Worst Credible Scenario	Realistic Worst Credible Scores							Baseline Risk Score	Baseline Risk Rating				
							People	Property	Environment	Business	Freq. Area 1	Freq. Area 2	Freq. Area 3		Freq. Area 4	Max. Freq.	People	Property	Environment	Business	Freq. Area 1			Freq. Area 2	Freq. Area 3	Freq. Area 4	Max. Freq.
6	1	C/O/D	Collision	Project Vessel ICW. Ferry/Passenger	Collision - Project Vessel ICW. Ferry/Passenger	Multiple minor injuries; Moderate damage to vessel; Tier 1 pollution; National negative publicity; Vessel requires drydock.	3	3	2	4	2	1	1	2	2	Multiple fatalities; Constructive Loss; Major pollution incident (Tier 3); Ferry out of service; International negative publicity.	5	5	5	5	1	1	1	1	1	6.0	Low Risk - Broadly Acceptable
7	5	C/O/D	Collision	Recreational or Fishing or Tug/Service ICW. Project Vessel	Collision - Recreational or Fishing or Tug/Service ICW. Project Vessel	Multiple major injuries; Moderate damage to vessel; Tier 1 pollution; Widespread negative publicity; Short term interruption to ferry services.	3	3	2	3	2	2	2	1	2	Multiple fatalities; Loss of small craft; Moderate damage to large vessel; Moderate pollution incident (Tier 2); National negative publicity.	5	4	3	4	1	1	1	1	1	5.1	Low Risk - Broadly Acceptable
8	8	C/O/D	Snagging	Fishing	Snagging - Fishing	Minor injuries; Minor damage to gear; No pollution; Cable inspection; Local negative publicity.	1	2	1	2	3	3	3	2	3	Multiple fatalities; Loss of gear/small craft; Tier 1 pollution; Significant cable damage; National negative publicity.	5	4	2	4	1	1	1	1	1	4.8	Low Risk - Broadly Acceptable
9	14	C/O/D	Snagging	Recreational or Tug/Service	Snagging - Recreational or Tug/Service	Minor injuries; Minor damage to gear; No pollution; Cable inspection; Local negative publicity.	1	2	1	2	1	1	1	1	1	Single fatality; Loss of small craft; Tier 1 pollution; Significant cable damage; National negative publicity.	4	4	2	4	1	1	1	1	1	2.8	Negligible Risk - Broadly Acceptable
10	9	C/O/D	Snagging	Cargo/Tanker or Ferry/Passenger	Snagging - Cargo/Tanker or Ferry/Passenger	Minor injuries; No property damage; No pollution; Widespread negative publicity; Cable damage requiring repairs.	1	1	1	3	2	2	2	2	2	Minor injuries; Loss of the vessel's anchor Minor pollution; Cable out of service; International negative publicity.	1	2	2	5	1	1	1	1	1	4.1	Low Risk - Broadly Acceptable

ID	Individual Haz. Rank	Project Phase	Hazard Type	Vessel Type	Hazard Title	Realisitic Most Likely Scenario	Realistic Most Likely Scores								Realisitic Worst Credible Scenario	Realistic Worst Credible Scores							Baseline Risk Score	Baseline Risk Rating			
							People	Property	Environment	Business	Freq. Area 1	Freq. Area 2	Freq. Area 3	Freq. Area 4		Max. Freq.	People	Property	Environment	Business	Freq. Area 1	Freq. Area 2			Freq. Area 3	Freq. Area 4	Max. Freq.
11	9	C/O/D	Snagging	Project Vessel	Snagging - Project Vessel	Minor injuries; Minor damage; No pollution; Cable inspection; Local negative publicity.	1	1	1	3	2	2	2	2	2	Minor injuries; Loss of the vessel's anchor Tier 1 pollution; Cable out of service; International negative publicity.	1	2	2	5	1	1	1	1	1	4.1	Low Risk - Broadly Acceptable
12	13	C/O/D	Grounding	Recreational or Fishing or Tug/Service	Grounding - Recreational or Fishing or Tug/Service	Multiple minor injuries; No pollution; Cable inspection; Local negative publicity.	2	2	1	2	1	1	1	1	1	Single fatality; Loss of small craft; Tier 1 pollution; Significant cable damage; National negative publicity.	4	4	2	4	1	1	1	1	1	2.8	Negligible Risk - Broadly Acceptable
13	11	C/O/D	Grounding	Project Vessel	Grounding - Project Vessel	Multiple minor injuries; Minor damage; No pollution; Cable damage requiring repairs; Widespread negative publicity.	2	2	1	3	1	1	1	1	1	Single fatality; Significant damage to vessel; Tier 1 pollution; Significant cable damage; Cable out of service.	4	4	2	5	1	1	1	1	1	3.4	Negligible Risk - Broadly Acceptable
14	12	C/O/D	Grounding	Ferry/Passenger or Cargo/Tanker	Grounding - Ferry/Passenger or Cargo/Tanker	Multiple minor injuries; Minor damage; No pollution; Cable inspection; Local negative publicity.	2	2	1	2	1	1	1	1	1	Single fatality; Significant damage to vessel; Moderate pollution (Tier 2); Significant cable damage; National negative publicity.	4	4	3	4	1	1	1	1	1	2.9	Negligible Risk - Broadly Acceptable



NASH
MARITIME

+44 (0) 2380 381 681

info@nashmaritime.com

www.nashmaritime.com



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ERM's Edinburgh Office

6th Floor
102 West Port
Edinburgh
Scotland
EH3 9DN

T: +44 131 221 6750

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