Aurora: United Kingdom

Environmental Assessment Report

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ALCATEL SUBMARINE NETWORKS

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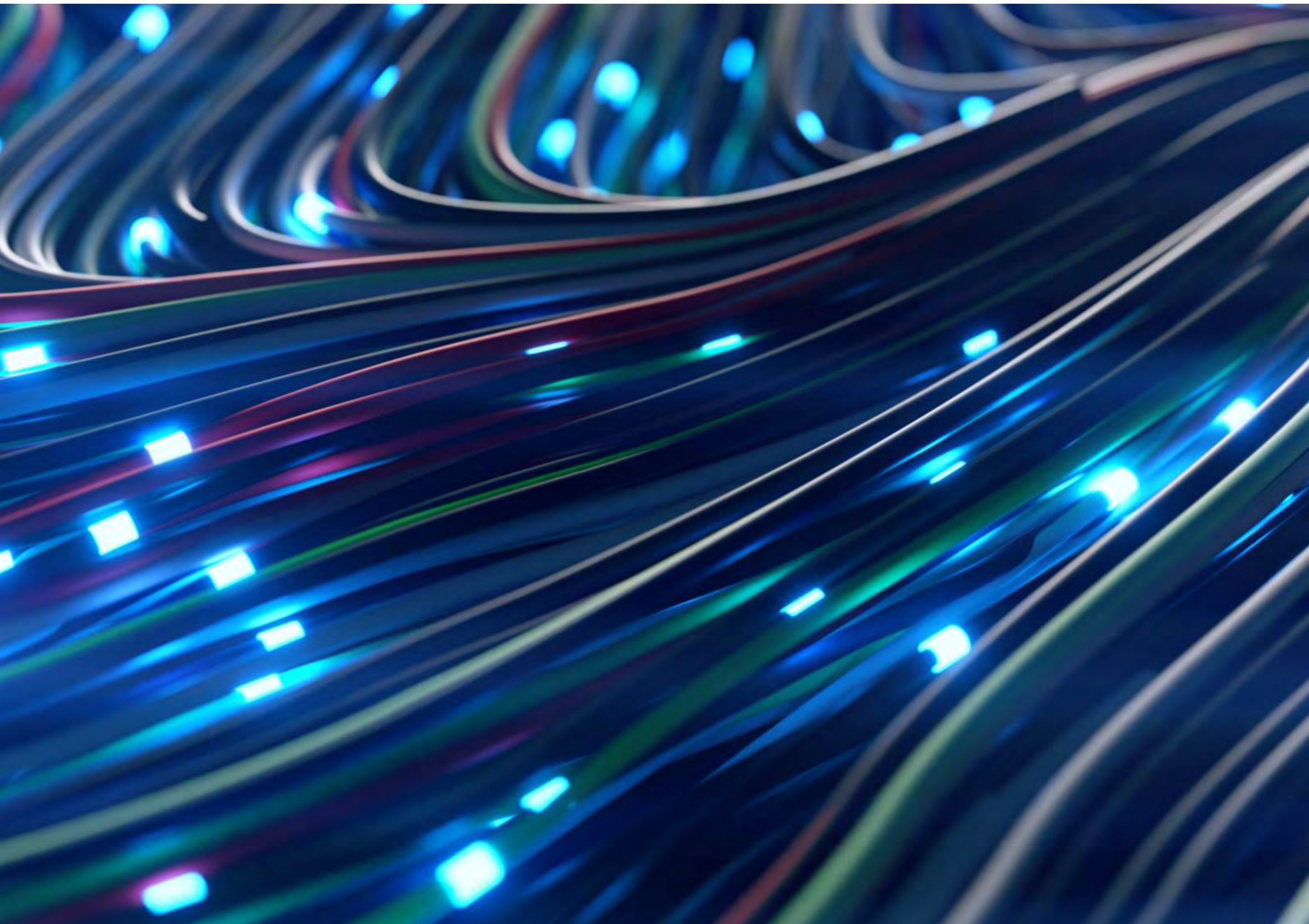

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Environmental Assessment Report

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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

Acronyms	Description
°C	Degrees Celsius
μM	Micromolar
AA	Appropriate Assessment
AIS	Vessel traffic dataset
AL	Action Level
AoI	Area of Interest
As	Arsenic
ASN	Alcatel Submarine Networks
BMH	Beach Manhole
BPEO	Best Practicable Environmental Option
BSH	Broad-Scale Habitat
BWM Convention	International Convention for the Control and Management of Ships' Ballast Water and Sediments
CBRA	Cable Burial Risk Assessment
CCS	Carbon Capture Sequestration
Cd	Cadmium
CES	Crown Estate Scotland
CGNS	Celtic and Greater North Sea
CHSR	The Conservation of Habitats and Species Regulations 2017
CIA	Cumulative Impact Assessment
cm	Centimetres
COHSR	The Conservation of Offshore Habitats and Species Regulations 2017
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea

Acronyms	Description
Cr	Chromium
CRS	Cable Route Survey
CSEMP	Clean Seas Environment Monitoring Programme
Cu	Copper
DAS	Discretionary advice service
dB	Decibel
DBT	Dibutyltin
DIN	Dissolved Inorganic Nitrogen
DIP	Dissolved Inorganic Phosphorous
DRMPA	Demonstration and Research Marine Protected Area
EA	Environmental Assessment
EAC	Environmental Assessment Criteria
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EPS	European Protected Species
EQS	Environmental Quality Standards
EQSD	Environmental Quality Standards Directive
ERCoP	Emergency Response Cooperation Plan
ERM	Environmental Resources Management
ESMP	Environmental and Social Management Plan
EU	European Union
FSA	Formal Safety Assessment
GEP	Good Ecological Potential
GES	Good Ecological Status
GHG	Greenhouse Gas
GIS	Geographic Information System
GMDB	Global Marine Cable Database
GNS	Greater North Sea
HER	Historic Environmental Records
HES	Historic Environment Scotland
HF	High frequency
Hg	Mercury
HND	Holistic Network Design
HRA	Habitats Regulations Assessment
HVDC	High-Voltage Direct Current

Acronyms	Description
ICES	International Council for the Exploration of the Sea
ICPC	International Cable Protection Committee
IHR	International Health Regulations
ILO	International Labour Organisation
IMO	International Maritime Organization
IT	Information technology
ITU	International Telecommunications Union
JNCC	Joint Nature Conservation Committee
Kg	Kilograms
km	Kilometres
LNCS	Local Nature Conservation Site
LF	Low frequency
LoD	Limit of Detection
m	Metres
MaCAA	Marine and Coastal Access Act
MAIB	Marine Accident and Investigations Branch
MarESA	Marine Evidence Based Sensitivity Assessment
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MD-LOT	Marine Directorate - Licensing Operations Team
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
mm	Millimetres
MMO	Marine Management Organisation
MOD	Ministry of Defence
MPA	Marine Protected Area
MPS	Marine Policy Statement
MSS	Marine Scotland Science
MU	Management Unit
NAP	Naphthalene
NC MPA	Nature Conservation Marine Protected Area
NFTA	Northeast Fishermen's Training Association
NGO	Non-Governmental Organisation
Ni	Nickel

Acronyms	Description
NLB	Northern Lighthouse Board
nm	Nautical Mile
NMP	National Marine Plan
NPF	National Planning Framework
NR	None recorded
NS	North Sea
NSTA	North Sea Transition Authority
NtM	Notice to Mariners
OOS	Out-of-Service
OPRC	International Convention on Oil Pollution Preparedness, Response, and Co-operation
OSH	Occupational Safety and Health
OSPAR Convention	The Convention for the Protection of the Marine Environment of the North-East Atlantic
PA	Penanthrene
PAD	Protocol for Archaeological Discoveries
PAH	Polycyclic Aromatic Hydrocarbon
Pb	Lead
PCB	Polychlorinated Biphenyl
PEXA	Exercise areas and danger areas
PLGR	Pre-Lay Grapnel Run
PLIB	Post-Lay Inspection and Burial
PLI	Post-Lay Inspection
PLB	Post-Lay Burial
PMF	Priority Marine Feature
PP	Polypropylene
PPE	Personal Protective Equipment
PRIB	Post-Repair Inspection and Burial
PSU	Practical Salinity Units
PTS	Permanent Threshold Shift
PVC	Polyvinyl Chloride
PYR	Pyrene
RC	Route Clearance
RNLI	Royal National Lifeboat Institution
ROV	Remotely operated vehicle
RSPB	Royal Society for the Protection of Birds

Acronyms	Description
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and rescue
SCANS	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	Shetland Fishermen's Association
SFF	Scottish Fishermen’s Federation
SFO	Scottish Fishermen’s Organisation
SIRMP	Shetland Islands Regional Marine Plan
SMU	Seal Management Unit
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
SSC	Suspended Sediment Concentration
SSMO	Shetland Shellfish Management Organisation
SSSI	Site of Special Scientific Interest
SST	Sea Surface Temperatures
SWFPA	Scottish White Fish Producers Association
TBT	Tributyltin
TCE	The Crown Estate
THC	Total Hydrocarbons
The ERM IA Standard	The ERM Impact Assessment Standard v1.1
TS	Territorial Seas
TTS	Temporary Threshold Shift
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organisation
US	United States
VHF	Very high-frequency

Acronyms	Description
VMS	Vessel Monitoring Systems
VTS	Vessel traffic service
WFD	Water Framework Directive
WHO	World Health Organisation
WMP	Waste Management Plan
WS	West Scotland
WSI	Written Scheme of Investigation
WWII	World War II
Zn	Zinc
ZoI	Zone of interest

EXECUTIVE SUMMARY

INTRODUCTION

This Executive Summary (ES) provides a summary of the Environmental Assessment (EA) Report for the proposed installation and operation of the Aurora Cable System in UK Territorial Seas (TS). The ES outlines the key project components and the potential for significant effects on related potential environmental and social receptors of the Aurora Project.

This EA Report has been prepared in support of the Marine Licence Application (MLA) process to the Scottish Government Marine Directorate - Licensing Operations Team (MD-LOT), and forms part of the MLA supporting documentation for telecommunications subsea cable installation within the UK TS, under the Marine (Scotland) Act, 2010.

PROJECT OVERVIEW AND LOCATION

Aurora is a planned subsea fibre optic telecommunication cable system connecting landings at Manasquan, New Jersey in the United States (US) and Blaabjerg in Denmark, traversing through both United Kingdom (UK) and Norwegian waters, and is expected to go live in 2027/2028.

The Aurora Project will consist of the installation and operation of the subsea cable within UK waters, with approximately 43 kilometres (km) of subsea cable to be installed in the TS and 958 km within the Exclusive Economic Zone (EEZ)[1] boundary. It is customary for coastal states to be notified of subsea cable installations across their EEZs and as such, appropriate notifications for this EEZ portion of the Aurora Project would be made available in advance of installation. The wider subsea cable system beyond the limits of the UK TS is therefore excluded from further assessment, other than to provide context for the EA Report.

The Direct Area of Influence for the Aurora Project comprises the footprint of the subsea cable within the TS and the 'immediate area' (or 'area of influence' [AoI] or 'zone of influence') of the subsea cable, forming a corridor approximately 250 m either side of the proposed subsea cable route. Where there are differences in the AoI for a specific assessment, this has been described in the relevant topic chapter of this EA Report.

STAKEHOLDER ENGAGEMENT

A summary of the initial stakeholder engagement prior to the submission of the MLA undertaken as part of the EA process is presented in **Section 3** of the EA Report. This presents the engagement approach and identifies stakeholders and the mechanisms through which stakeholders have been engaged. The comments raised during the stakeholder engagement were taken into consideration in the EA Report, as required. The main comment themes comprised:

- Agreement with proposed EA methodologies;
- Recommendations to consult with specific stakeholders and prepare assessments relevant to each topic, for example, a Navigational Risk Assessment (NRA) and Cable Burial Risk Assessment (CBRA);

[1] The EEZ is an area beyond and adjacent to a coastal state's TS, extending to a limit of 200 nm (approximately 370 km) from its baseline

- Initial opinions that the Aurora Project is not anticipated to be a hazard to navigation, having manageable effects if mitigation measures are utilised;
- Stakeholders unable to comment at an early stage, but requested opportunity to provide comment when further details published; and
- Requests from fisheries stakeholders for more information and a meeting to discuss potential effects.

PROJECT BACKGROUND AND DESCRIPTION

PROJECT COMPONENTS

Section 4 of the EA Report provides a description of the proposed Aurora Project components and installation activities.

The Aurora Project activities can be divided into the following phases:

- Installation: including both pre-installation activities (such as route clearance [RC] and pre-lay grapnel run [PLGR]), and the installation (such as surface lay and plough burial) of the subsea cable.
- Operation: the operation of the subsea cable system and associated infrastructure; and
- Maintenance/ Decommissioning: maintenance relates to rare requirements to repair subsea cable system faults / breaks[2]. Decommissioning relates to the procedure(s) to employed at the end of system life.

PROJECT INSTALLATION SCHEDULE

The Aurora Project is planned to be installed in Q2 2027, with installation activity expected to take up to three (3) weeks, weather dependent.

IMPACT ASSESSMENT

Section 5 of the EA Report presents the methodology and approach used to carry out the assessment of potential effects.

A description of the existing environment (environmental and social baseline data) is described in **Section 6** of the EA Report. **Table 1** presents a summary of the key baseline receptors which have been scoped in to the assessment, while **Section 7** of the EA Report describes any receptors which have been scoped out of further assessment on the basis that no interaction between Project activities and the receptor are predicted to occur.

TABLE 1 SUMMARY OF KEY BASELINE SENSITIVITIES IN THE AURORA PROJECT AREA OF INFLUENCE

Feature	Description
Marine Physical Processes	The key factors investigated to establish the baseline geological and oceanographic conditions are: Bathymetry; Seabed geology - Including bedrock and overlying sediment;

[2] The subsea cables to be installed have a life expectancy of 25 years and no maintenance is expected throughout this lifetime.

Feature	Description
	Waves and tidal processes; and Sediment transport in the Study Area. Marine physical processes are pathways, therefore, any changes to these processes may result in potential effects on other receptor groups.
Water and Sediment Quality	The water and sediment baseline considers the following receptors: Water quality; and Sediment quality.
Benthic Ecology	The subsea cable crosses an area characterised as deep circalittoral coarse sediment with small patches of faunal communities on deep moderate energy circalittoral rock. In the shallower waters surrounding the Shetland Islands, north and south of the subsea cable, there is a greater variety of biotopes present and the following have been considered: Deep circalittoral sand; Sublittoral biogenic reefs; and Circalittoral coarse sediment.
Marine Mammals	The key marine mammal receptors present in the marine mammal Study Area can be categorised into two taxonomic groups: Cetacea (whales, dolphins and porpoises); and Pinnipeds (seals).
Fish and Shellfish Ecology	The fish and shellfish ecology receptors present in the fish and shellfish Study Area can be categorised into five (5) groups: Elasmobranchs; Demersal fish; Pelagic fish; Shellfish; and Migratory fish.
Commercial Fisheries	The commercial fisheries receptor groups identified for consideration in the impact assessment are: Inshore pelagic mobile gear fisheries; Inshore demersal mobile gear fisheries; and Inshore static gear fisheries.
Shipping and Navigation	The sensitive receptors identified within the Territorial Seas include the following groups, which utilise the key vessel routes within the shipping and navigation Study Area: Commercial vessels including Cargo vessels; Passenger / Ferry vessels; Fishing vessels; and Other vessels (i.e. survey vessels, service vessels, or any other vessel type not included within the vessel categories listed). A full assessment of the baseline environment for shipping and navigation is provided in the NRA (**Appendix 5**), which include details of: Navigational features and existing infrastructure; Emergency response resources; Existing maritime activities including vessel traffic; and Future vessel traffic.
Marine Archaeology	Marine cultural heritage assets can be divided into known and unknown assets, with the known cultural heritage assets being further split between designated and non-designated assets. Designated marine assets may include: World Heritage Sites; Historical Marine Protected Areas (MPAs); and Protected World War II (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.

Feature	Description
	Unknown assets include assets that have not as yet been identified or located, though 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.
Other Users	The key receptors within the other users Study Area across both the UK EEZ and UK TS around Shetland have been identified as: Offshore oil and gas infrastructure; Subsea cables and pipelines; Recreational and tourism receptors; and Military Practice and Exercise Areas (PEXA).

The impact assessment in **Section 6** of the EA Report identifies the potential interactions of the Aurora Project with the biological, physical and socio-economic environments and specifies mitigation and management measures that will be implemented to avoid, minimise or reduce adverse effects and enhance positive effects. The impact assessment includes the consideration of the inbuilt control measures (such as advanced route planning to avoid sensitivities on the seabed) and adherence to both local and international regulations.

For this assessment, significance pre-mitigation and post mitigation has been defined based on four (4) levels:

- **Negligible:** impacts are indistinguishable from the background / natural level of environmental and socioeconomic change.
- **Minor:** is one where a resource / receptor will experience a noticeable effect, but the impact magnitude is sufficiently low and / or the resource / receptor is of low sensitivity / vulnerability / importance.
- **Moderate:** within acceptable limits and standards, but impact of a low magnitude affecting high value / sensitive receptors/areas, or moderate magnitude affecting moderate value / sensitive receptors, or of high magnitude affecting moderate sensitive receptors / areas.
- **Major:** exceeds acceptable limits and standards, is of high magnitude affecting high or moderate value / sensitive receptors/areas or of moderate magnitude affecting high value / sensitive receptors/areas.

Generally, subsea cable installation activities result in temporary and highly localised effects. Once installed, the footprint of the subsea cable is very small and the operation of subsea cables does not have any significant ongoing environmental impact.

Table 2 below provides a summary of the potential for significant effects from the assessment, and the residual effect rating. Only the potential significant effects deemed as Major or Moderate (pre-mitigation) are summarised below. The potential Minor and Negligible effects (pre-mitigation) have not been included in the summary but are discussed in full in the EA Report.

TABLE 2 SUMMARY OF THE KEY POTENTIAL SIGNIFICANT EFFECTS DEEMED AS MAJOR OR MODERATE (PRE-MITIGATION)

Potential Impacts	Control / Mitigation measures	Residual Effect (post-mitigation)
Direct physical impacts - the damage or full removal of a cultural heritage asset through installation, operation and maintenance, and decommissioning on submerged pre-history, marine archaeology and aviation archaeology.	Initial investigation to include geophysical survey, with mitigation to include micro-siting and exclusion zones to avoid any potential sites identified during survey. A Protocol for Archaeological Discoveries (PAD) should be followed in the event any archaeological discoveries are made, with any necessary mitigation procedures being based on a Written Scheme of Investigation (WSI) in order to avoid damage to cultural heritage assets and targets of archaeological potential. These techniques will reduce the potential for loss and serve to mitigate the potential effect of the Aurora Project in UK TS.	Not Significant

CONCLUSION

During this EA process embedded / inbuilt mitigation measures have been identified as part of the Aurora Project to manage the anticipated effects (**Appendix 3**). Implementation of the measures will ensure that the Aurora Project is compliant with the national regulations.

All mitigation measures will be implemented during the course of the Aurora Project (throughout installation and operation where applicable) to ensure ongoing compliance and to reduce potential adverse effects to a level that is deemed acceptable.

The assessment has concluded that with the embedded controls and specified mitigation measures in place, the Aurora Project is predicted to have at most **Minor** residual effects, with the majority being assessed as **Negligible** (**Section 10**).

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) (**Figure 1-1**). The Aurora Project will connect landings at Manasquan, New Jersey in the United States (US) and Blaabjerg in Denmark, traversing through both United Kingdom (UK) and Norwegian waters, and is expected to go live in 2027/2028.

The objective of the Aurora Project is to install a subsea fibre optic cable to provide connectivity across the Atlantic Ocean and North Sea. This will increase telecommunication reliability and security and increase data transmission capacity and speeds between the United States and Europe.

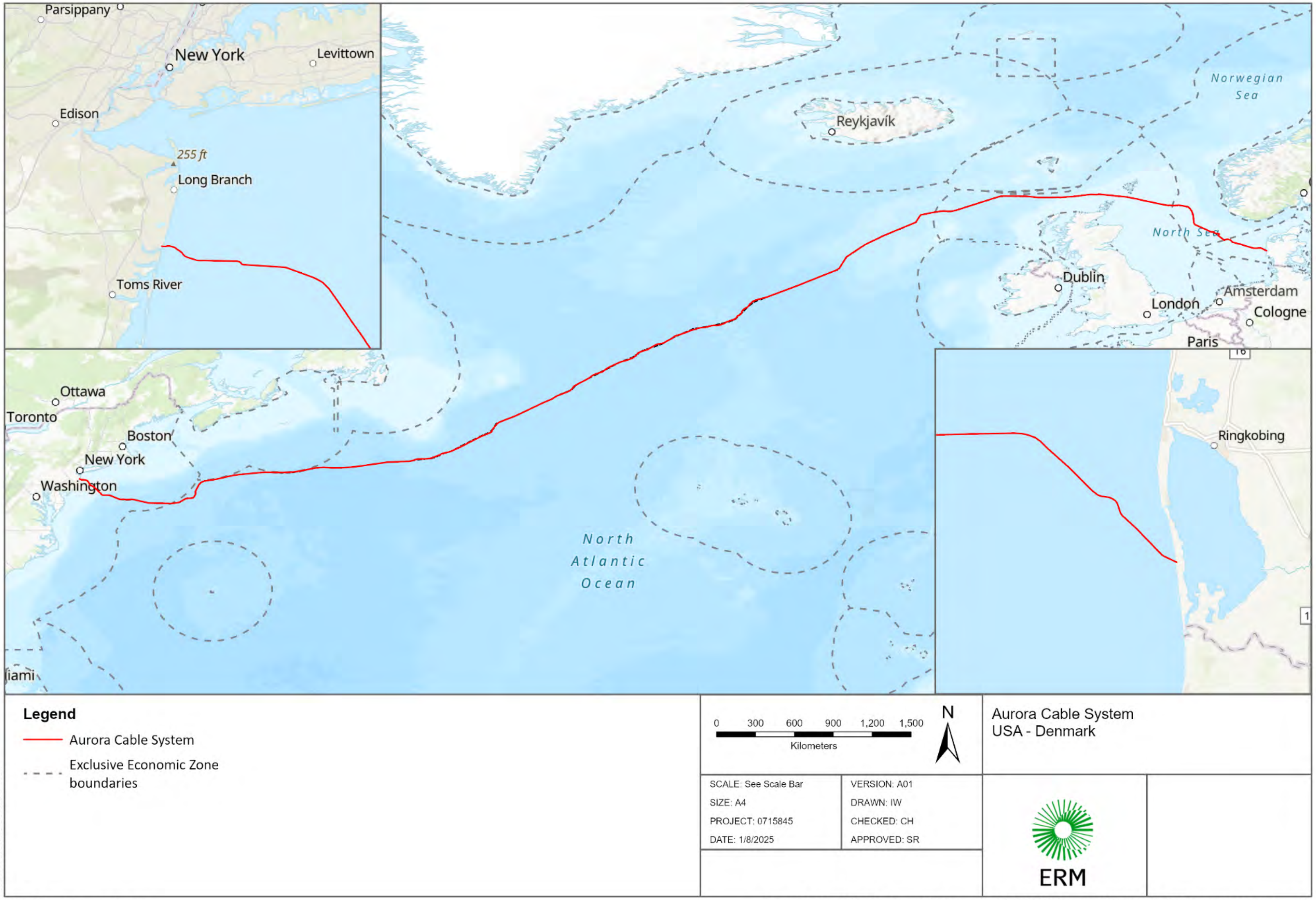
Alcatel Submarine Networks (ASN) has been contracted to design, build and install the system, and Environmental Resources Management (ERM) have been appointed by ASN to obtain the necessary permits for the installation of the Aurora Project in UK waters.

Within the UK Territorial Seas (TS), approximately 43 km of subsea cable will be installed. The subsea cable will be installed within approximately 87 m to 112 m water depth in the UK TS, being either surface laid or plough buried (i.e. simultaneously laid and buried) to a target depth of 2 m, where feasible. Within the Exclusive Economic Zone (EEZ)[3] boundary, approximately 958 km of subsea cable will be installed (**Figure 4-1**). The freedom to lay such subsea cables in EEZs beyond the TS is governed by the United Nations Convention on the Law of the Sea (UNCLOS) {Part V Article 58}, of which UK acceded on 25 July 1997. It is customary, however, for coastal states to be notified of subsea cable installations across their EEZs and as such, appropriate notifications for this EEZ portion of the Aurora Project will be made available in advance of installation. The EEZ is therefore excluded from permit or licence applications for the installation of the subsea cable in UK waters, with only the portion to be installed through UK's TS being considered in this report.

The planning of the route is being performed in accordance with industry recognised standards and codes including those of the International Telecommunications Union (ITU). Installation, operation and maintenance, and decommissioning will be undertaken in accordance with approved and certified ISO quality systems.

[3] As defined by the UNCLOS (1982), the EEZ is an area beyond and adjacent to a coastal state's territorial sea, extending to a limit of 200 nautical miles (nm) (approximately 370 km) from its baseline.

FIGURE 1-1 PROPOSED ROUTE OF THE AURORA PROJECT



SOURCE: World Topographic Map, ESRI.

Path: G:\7_Cables\ASN_Meta_Denmark\Workspaces\E_A_R\UK\0715845_Aurora_EAR_UK_A01_202501.aprx / Route_Overview_A01

1.2 PROJECT NEED

The Aurora Project will create a diverse connection between the US and Denmark. The subsea cable will support the needs of the web-scale providers that underpin today's international cloud industry. The route will enable connectivity for global carriers, cloud-based networks, data centres, information technology (IT) companies and the global media. There is increasing demand for high-capacity connectivity. As such, the Aurora Project will facilitate this in combination with existing fibre optic routes, and will deliver a reliable and resilient connection to support the rise of the digital economy.

1.3 PURPOSE OF THIS REPORT

This Environmental Assessment (EA) Report has been prepared in support of the Marine Licence Application (MLA) process to the Scottish Government Marine Directorate - Licensing Operations Team (MD-LOT), and forms part of the MLA supporting documentation for subsea telecommunications cable installation within the UK TS, under the Marine (Scotland) Act 2010. This EA Report aims to identify potential effects associated with installation, operation and maintenance, and decommissioning of the subsea cable, determine the significance of each potential effect 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 the UK segment of the subsea cable route, only potential effects of the Aurora Project 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.

1.4 OUTLINE OF THE REPORT

The remainder of this report is structured as follows:

- Section 2: Planning Policy and Legislative Framework
- Section 3: Stakeholder Consultation
- Section 4: Project Description
- Section 5: Assessment Methodology
- Section 6: Environmental Assessment
- Section 7: Topics Scoped out of Assessment
- Section 8: Cumulative Impact Assessment
- Section 9: Transboundary Impacts
- Section 10: Conclusion

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

- Appendix 1: Habitat Regulations Assessment
- Appendix 2: Nature Conservation Marine Protected Area
- Appendix 3: Embedded / Inbuilt Mitigation Measures for the Aurora Project in UK Waters

Appendix 4 (A-J): Fish and Shellfish Ecology and Conservation Information

Appendix 5: Navigational Risk Assessment

2. PLANNING POLICY AND LEGISLATIVE FRAMEWORK

This section of the EA Report describes the relevant international conventions, guidelines and standards, as well as the national legislation and policies that regulate the activities involved with the UK segment of the Aurora Project. Context is also provided with respect to the Aurora Project and relevant Marine Planning Frameworks.

2.1 INTERNATIONAL CONVENTIONS, GUIDELINES AND STANDARDS

The UK is a signatory to several international conventions and agreements targeted toward the conservation and protection of the environment to ensure sustainable development. The relevant international conventions and regulations most applicable to the UK segment of the Aurora Project are highlighted below in **Table 2-1**.

TABLE 2-1 LIST OF RELEVANT INTERNATIONAL CONVENTIONS AND REGULATIONS

Conventions	Year Adopted	Overview
Convention on the High Seas, Geneva	1958	The 1958 Convention on the High Seas, signed in Geneva, ratified by the UK in 14 March 1960, is an international agreement that outlines rules for the use of the high seas, which are areas of the ocean not under any one country's jurisdiction. It covers various aspects like navigation, fishing, and scientific research, emphasising freedom of navigation, the obligation to assist vessels in distress, and the promotion of global marine scientific research. This treaty is a crucial development in international maritime law, providing guidelines for the peaceful and responsible use of the high seas by all nations.
Convention on the International Regulations for Preventing Collisions at Sea (COLREGs)	1972	The regulations are published by the International Maritime Organisation (IMO) and set out, among other things, the "rules of the road" or navigation rules to be followed by ships and other vessels at sea to prevent collisions between two (2) or more vessels. COLREGs can also refer to the specific political line that divides inland waterways, which are subject to their own navigation rules, and coastal waterways which are subject to international navigation rules.
Convention for the Protection of the World Cultural and Natural Heritage	1972	The Convention defines the kind of natural or cultural sites which can be considered for inscription on the World Heritage List. The Convention sets out the duties of States Parties in identifying potential sites and their role in protecting and preserving them.
International Convention for the Safety of Life at Sea (SOLAS)	1974	The main objective of the SOLAS Convention is to specify minimum standards for the construction, equipment and operation of ships, compatible with their safety. Flag States are responsible for ensuring that ships under their flag comply with its requirements, and a number of certificates are prescribed in the Convention as proof that this has been done. Control provisions also allow Contracting Governments to inspect ships of other Contracting States if there are clear grounds for believing that the ship and its equipment do not substantially comply with the requirements of the Convention - this procedure is known as port State control.
International Convention for	1978	This Convention is the main international convention covering prevention of pollution of the marine environment by ships

Conventions	Year Adopted	Overview
the Prevention of Pollution from Ships (MARPOL 73/78)		from operational or accidental causes. The Convention includes regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations - and currently includes six (6) technical Annexes.
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), 1979	1979	This Convention, also known as the Bonn Convention, was adopted in 1979 and entered into force in 1983. It stipulates actions for the conservation and management of migratory species including habitat conservation.
UNCLOS	1982	UK is signatory to UNCLOS (ratified in 25 July 1997) and claims rights within 12 nm of the TS and 200 nm of the EEZ. According to the UNCLOS, the sovereignty of a coastal state extends beyond its land territory and internal waters to an adjacent area of sea. In UK, this relates to maritime boundaries. The Aurora Project and related activities fall within the jurisdiction of the TS.
ITU	1989	The provisions of these regulations supplement the International Telecommunication Convention, with a view to attaining the purposes of the International Telecommunication Union in promoting the development of telecommunication services and their most efficient operation while harmonizing the development of facilities for world-wide telecommunications. The regulations establish general principles which relate to the provision and operation of international telecommunication services offered to the public as well as to the underlying international telecommunication transport means used to provide such services.
International Convention on Oil Pollution Preparedness, Response, and Co-operation (OPRC)	1990	Parties to the International Convention on OPRC are required to establish measures for dealing with pollution incidents, either nationally or in co-operation with other countries. Parties to the convention are required to provide assistance to others in the event of a pollution emergency and provision is made for the reimbursement of any assistance provided. Ships and operators are required to carry a shipboard oil pollution emergency plan, oil pollution emergency plans or similar arrangements which must be coordinated with national systems for responding promptly and effectively to oil pollution incidents.
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	1992	The objective of this convention is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter.
The Rio Declaration on Environment and Development	1992	The Declaration was made in 1992 in Rio de Janeiro, reaffirming the declaration of the United Nations Conference on Human Environment adopted at Stockholm in 1972. The principle works towards international agreement which respects the interest of all and protects the integrity of the

Conventions	Year Adopted	Overview
		global environment and development. The principles of the declaration relevant to the Aurora Project include: Principle 4: In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it. Principle 17: EIA as a national instrument shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.
The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)	1992	The OSPAR Convention is an international co-operation to protect the marine environment which replaced the Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft (the Oslo Convention) (adopted in 1972) and the Convention for the Prevention of Marine Pollution from Land-Based Sources (the Paris Convention) (adopted in 1974). OSPAR was signed and ratified in the UK in 1998. Further to addressing pollution within the maritime area, OSPAR outlines assessment of the ecological quality of the marine environment as well as the requirements for protection and conservation of ecosystems and biological diversity.
The Aarhus Convention	1998	The Aarhus Convention (ratified by the UK in 23 February 2005) grants the public rights regarding access to information, public participation and access to justice in governmental decision-making processes on environmental matters.
Convention on Conservation of Underwater Cultural Heritage	2001	The Convention on the Conservation of the Underwater Cultural Heritage is a treaty that was adopted on 2 November 2001 by the General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO). The Convention is intended to protect "all traces of human existence having a cultural, historical or archaeological character" which have been under water for over 100 years. This extends to the protection of shipwrecks, sunken cities, prehistoric artwork, treasures that may be looted, sacrificial and burial sites, and old ports that cover the oceans' floors.
International Labour Organisation (ILO): ILO-OSH, 2001 - Guidelines on Occupational Safety and Health (OSH) Management	2001	These guidelines call for coherent policies to protect workers from occupational hazards and risks while improving productivity. The guidelines present practical approaches and tools for assisting organisations, competent national institutions, employers, workers and other social partners in establishing, implementing and improving occupational safety and health management systems, with the aim of reducing work-related injuries, ill health, diseases, incidents and deaths. At the organisational level, the guidelines encourage the integration of OSH management system elements as an important component of overall policy and management arrangements. Organisations, employers, owners, managerial staff, workers and their representatives are motivated in applying appropriate OSH management principles and methods to improve OSH performance.
International Convention for the Control and Management of Ships' Ballast Water and Sediments	2004	This Convention aims to prevent, minimise, and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments.

Conventions	Year Adopted	Overview
(BWM Convention)		
International Health Regulations (IHR)	2005	The IHR is an international legal instrument that is binding on 196 countries across the globe, including all the Member States of World Health Organisation (WHO). This binding instrument of international law was first adopted in 1969, revised in 2005 and entered into force on 15 June 2007. The purpose and scope are "to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks and which avoid unnecessary interference with international traffic and trade".

2.2 NATIONAL LEGISLATIONS

2.2.1 MARINE CONSENTING LEGISLATION

2.2.1.1 MARINE LICENSING

This EA Report presents an overview of the baseline environment and an impact assessment, to support a Marine Licence application as required for the Aurora Project under the legislation detailed in this section.

The Marine and Coastal Access Act 2009

Part 4 of the Marine and Coastal Access Act (MaCAA) 2009 details licensable marine activities and sets out the requirements for marine licences in the area between the 12 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 7: as an activity 'To construct, alter or improve any works within the UK marine licensing area either (a) in or over the sea, or (b) on or under the seabed.' For the Scottish EEZ, marine licence applications are submitted to MD-LOT and are also considered by Scottish Ministers.

For the Aurora Project, the activities meet the terms of an exemption under Part 4, Chapter 1, Section 81 Paragraph 1:

'Nothing in this Part applies to anything done in the course of laying or maintaining an offshore stretch of exempt submarine cable.'

Marine (Scotland) Act 2010

Part 4 of the Marine (Scotland) Act 2010 details licensable marine activities and sets out the requirements for marine licences within Scottish territorial waters (0-12 nm). Part 4, Section 21 defines the licensable marine activities which require a marine licence to be authorised by MD-LOT and considered by Scottish Ministers.

For the Aurora Project, the activities are considered licensable under Part 4, Chapter 21, Paragraph 5: as an activity 'To construct, alter or improve any works within the Scottish marine area either— (a) in or over the sea, or (b) on or under the seabed.'

2.2.1.2 THE MARINE LICENSING (PRE-APPLICATION CONSULTATION) (SCOTLAND) REGULATIONS 2013

Public pre-application consultation must be undertaken for projects involving submarine cables longer than 1,853 m and which cross the intertidal boundary. It is not expected that the Aurora Project will cross the intertidal boundary, however, prospective applicants for marine licences for certain activities are required under the Scottish National Marine Plan (NMP) (refer to **Section 2.2.2.2**) to carry out early stakeholder engagement and public Pre-Application Consultation that is appropriate, proportional and meaningful. Details on stakeholder consultation undertaken for the Aurora Project are provided in **Section 3**.

2.2.1.3 SUBMARINE TELEGRAPH ACT 1885

Under the Submarine Telegraph Act 1885, more recently updated by the Merchant Shipping Act 1995, submarine telegraph cables are to be protected. The act provides a code of conduct in relation to navigational safety and avoidance of damage to other ships and offshore assets. It is an offence to cause damage to a submarine telegraph cable under provision 58 of the Act.

2.2.1.4 MARINE WORKS LICENCE (CROWN ESTATE SCOTLAND)

Crown Estate Scotland (CES) is a public corporation that manages Scottish seabed assets, as well as other areas of coastline and rural estates. They are a separate entity to The Crown Estate (TCE), that operates across England, Wales and Northern Ireland and who are responsible for seabed / coastal assets in these countries. Under the Scotland Act 2016, CES provide licences to the Project Proponent, giving them the property rights required to lay, maintain and operate cables and pipelines on the seabed up to 12 nm from the Scottish coast. This includes oil and gas pipelines, electricity and telecommunications cables.

Beyond 12 nm, CES has responsibility for the licensing of renewable energy generation, including subsea cable connections to shore, but do not provide licences for other types of cables such as telecommunication cables which are instead managed directly with the prospective owner. Although licences are not required for telecommunications cables beyond 12 nm, CES ask to be informed of any cables laid in the sea within the 12 to 200 nm limit of their jurisdiction, in order to ensure they assess interactions with other activities.

As the Aurora Project traverses through the 12 nm TS, the Project Proponent will apply for a licence to be agreed under the "Crown Estate Scotland Heads of Terms for Sub-Sea Telecommunications Cables within Scottish Territorial Waters" (hereafter referred to as CES' "Heads of Terms") for pre-installation (e.g. route clearance [RC] and pre-lay grapnel run [PLGR]) and installation activities of the subsea cable with the Scottish TS.

In the event that the "Heads of Terms" cannot be agreed between CES and the Project Proponent in time for the commencement of the pre-installation activities, the Aurora Project will apply for a Marine Works Licence, and will keep CES informed of the subsea cable laid beyond 12 nm within the UK EEZ.

2.2.1.5 SHETLAND ISLANDS COUNCIL WORKS LICENCE POLICY 2017

The Shetland Islands' Council is involved in the implementation of the Shetland Islands Regional Marine Plan (SIRMP) (built upon the Shetland Islands Marine Spatial Plan 2015) which incorporates the entire area of TS surrounding the Shetland Islands which the subsea cable route traverses through. An integral component of this plan is the Works Licence Policy which states that "Under the Zetland County Council Act 1974, as amended, the Shetland Islands' Council has a duty to promote the conservancy of, and control of development in, the coastal area of Shetland…". Under this legislation a Works Licence is required for works in the coastal area of Shetland from Mean High Water Spring (MHWS) to the limit of TS. The Shetland Islands' Council is responsible for granting such Works Licences.

2.2.2 MARINE PLANNING FRAMEWORK

2.2.2.1 UK MARINE POLICY STATEMENT

The Marine Policy Statement (MPS) for the UK sets the framework for Marine Plans in the UK Marine Area. It has, therefore, been adopted for the purposes of section 44 of the MaCAA 2009 by the relevant authorities: HM Government, the Scottish Government, the Welsh Assembly Government, and the Northern Ireland Executive.

The purpose of the MPS is to provide a framework for the preparation of Marine Plans and decision making which may affect the UK marine environment. All national and regional Marine Plans must be prepared in accordance with the framework set out in the MPS. The UK MPS forms a relevant part of the marine licensing decision making process and will therefore be considered by MD-LOT, the relevant authority in Scotland, in determining applications.

The UK MPS is implemented throughout the UK through marine plans which provide detailed policy and spatial guidance for a marine area that will contribute to the overall aims of the UK MPS and High Level Marine Objectives:

Promote sustainable economic development;

Enable the UK's move towards a low-carbon economy, in order to mitigate the causes of climate change and ocean acidification and adapt to their effects;

Ensure a sustainable marine environment which promotes healthy, functioning marine ecosystems and protects marine habitats, species and our heritage assets; and

Contribute to the societal benefits of the marine area, including the sustainable use of marine resources to address local social and economic issues.

2.2.2.2 SCOTLAND'S NATIONAL MARINE PLAN

Overview

Part 3, section 5 of the Marine (Scotland) Act 2010, set out the requirement to produce a National Marine Plan for the Scottish inshore region which must include policies for the sustainable development of Scotland's seas and set objectives for economic, social and marine ecosystems and mitigation of and adaptation to climate change. This legislation also facilitated the designation of 11 Scottish Marine Regions under the Scottish Marine Regions Order 2015 for which regional marine plans would need to be developed.

In March 2015, the Scottish Government published 'Scotland's National Marine Plan – a Single Framework for Managing our Seas' (the NMP) (Scottish Government, 2015). The NMP set out strategic policies for the sustainable development of Scotland's marine resources out to 200 nm (370 km). The plan was reviewed in 2018 and 2021 and an announcement was made in October 2022 on the development of NMP2, which is in development as of August 2024, following similar objectives to the NMP, but also with an aim to better support net zero targets and the climate change and biodiversity loss crises. The draft NMP2 will then be subject to public consultation in 2025.

Policies from the NMP (and subsequently NMP2), of relevance to the Aurora Project are detailed below in the subsequent sections.

Sea Fisheries

The Sea Fisheries chapter of Scotland's NMP details five (5) marine planning policies that should be considered when developing in the areas used for commercial fishing activities (further detail on impact assessment can be found in **Section 6.6** [Commercial Fisheries]). Of these five (5) policies, policies 1, 2 and 3 are relevant to the Aurora Project. These are:

Fisheries 1 – which takes account of the European Union (EU)'s Common Fisheries Policy, Habitats Directive, Birds Directive and Marine Strategy Framework Directive to protect fishing opportunities, protect fish stocks and ensure their resilience and managing conflicts between fishermen and other users of the marine environment;

Fisheries 2 – Allowing the cultural and economic importance of fishing to be considered in decision making and considering the potential impact of a marine development on fishing areas; and

Fisheries 3 – For areas where fishing cannot be safeguarded assessing the socio-economic impact on fisheries and mitigating potential impacts/constraints on the fishing industry from a marine development.

Shipping, Ports, Harbours and Ferries

The Shipping, Ports, Harbours and Ferries chapter of Scotland's NMP details seven (7) marine planning policies that should be considered when developing in areas used by shipping, ports, harbours, ferries and other elements of marine traffic. Of these seven (7) policies, policies 1, 3 and 6 are relevant to the Aurora Project. These are:

Transport 1 – which accounts for the navigational safety in relevant areas used by shipping now and in the future according to UNCLOS. The following factors are considered when reviewing the development and use of a project:

- *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 can be achieved at no significant cost to the shipping or ports sector.*

Transport 3 – Safeguard ferry routes and maritime transport to island and remote mainland areas to provide essential connections, so that proposed developments will not interfere with their operation; and

Transport 6 – Minimises marine planners and decision makers and developers ability to displace shipping 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.

Submarine Cables

The Submarine Cables chapter of Scotland's NMP details four (4) marine planning policies that have consideration to submarine cables. All four of these policies are relevant to the Aurora Project and can be found in more detail in **Table 2-2**. The objectives of these Submarine Cables marine planning policies are as follows:

1. Protect submarine cables whilst achieving successful seabed user co-existence.
2. Achieve the highest possible quality and safety standards and reduce risks to all seabed users and the marine environment.
3. Support the development of a Digital Fibre Network, connecting Scotland's rural and island communities and contributing to world-class connectivity across Scotland.
4. Safeguard and promote the global communications network.
5. Support the generation, distribution and optimisation of electricity from traditional and renewable sources to Scotland, UK and beyond.

TABLE 2-2 SCOTLAND NATIONAL MARINE PLAN SUBMARINE CABLE POLICIES

Policy Number	Policy Text
CABLES 1	Cable and network owners should engage with decision makers at the early planning stage to notify of any intention to lay, repair or replace cables before routes are selected and agreed. When making proposals, cable and network owners and marine users should evidence that they have taken a joined-up approach to development and activity to minimise impacts, where possible, on the marine historic and natural environment, the assets, infrastructures and other users. Appropriate and proportionate environmental consideration and risk assessments should be provided which may include cable protection measures and mitigation plans. Any deposit, removal or dredging carried out for the purpose of executing emergency inspection or repair works to any cable is exempt from the marine licensing regime with approval by Scottish Ministers. However, cable replacement requires a marine licence. Marine Licensing Guidance should be followed when considering any cable development and activity.
CABLES 2	The following factors will be taken into account on a case-by-case basis when reaching decisions regarding submarine cable development and activities: Cables should be suitably routed to provide sufficient requirements for installation and cable protection. New cables should implement methods to minimise impacts on the environment, seabed and other users, where operationally possible and in accordance with relevant industry practice. Cables should be buried to maximise protection where there are safety or seabed stability risks and to reduce conflict with other marine users and to protect the assets and infrastructure. Where burial is demonstrated not to be feasible, cables may be suitably protected through recognised and approved measures (such as rock or mattress placement or cable armouring) where practicable and cost-effective and as risk assessments direct. Consideration of the need to reinstate the seabed, undertake post-lay surveys and monitoring and carry out remedial action where required.
CABLES 3	A risk-based approach should be applied by network owners and decision makers to the removal of redundant submarine cables, with consideration given to cables being left *in situ* where this would minimise impacts on the marine historic and natural environment and other users.

Policy Number	Policy Text
CABLES 4	When selecting locations for landfall of power and telecommunications equipment and cabling, developers and decision makers should consider the policies pertaining to flooding and coastal protection in Chapter 4 and align with those in Scottish Planning Policy and Local Development Plans.

2.2.2.3 SCOTTISH MARINE REGIONS

In 2010-2011, Marine Scotland launched a consultation to identify if there was support for the establishment of Scottish Marine Regions. This consultation concluded that there was strong support for Scottish Marine Regions, with particular support for them to be defined based on physical characteristics. 11 Marine Regions were established within the Scottish TS, covering marine areas out to 12 nm. The details and boundaries of the established 11 Marine Regions are found in the Scottish Marine Regions Order 2015. Marine Planning Partnerships have developed Regional Marine Plans for each Marine Region. As the Aurora Project passes through the Shetland Isles Marine Region, the relevant Regional Marine Plan is the SIRMP.

The SIRMP aims to guide marine users, planners and regulators in the placement of existing and proposed activities, operations or developments. The SIRMP outlines the Legislative Requirements and Policy Framework that must be complied with when considering any proposed activity or development. The policies within the SIRMP are in place to achieve the visions and objectives of the SIRMP, ultimately achieving the aim to "Ensure that use of the marine and coastal environment of Shetland is sustainable".

Many of the policies detailed in the SIRMP are relevant to the Aurora Project. These include:

- Policy MP SHIP1: Safeguarding Navigation Channels and Port Areas
- Policy MP ACBP1: Avoidance of Cables and Pipelines
- Policy MP MPA1: Plans or projects that may affect Special Areas of Conservation (SACs), Special Protected Areas (SPAs) (collectively known as European sites) and Ramsar Sites
- Policy MP MPA2: Nature Conservation Marine Protected Areas (NC MPAs)
- Policy MP MPA3: Demonstration and Research Marine Protected Areas (DRMPAs)
- Policy MP MPA4: Habitat Protected Areas
- Policy MP COAST1: Developments in or near Site of Special Scientific Interest (SSSIs)
- Policy MP COAST2: Development on or near to a Local Nature Conservation Site (LNCS)
- Policy MP SPCON1: Development and European Protected Species and Schedule 5 Species
- Policy MP SPCON4: Priority Marine Features
- Policy MP BIOD1: Furthering the Conservation of Biodiversity
- Policy MP GEOD1: Safeguarding Marine Geodiversity
- Policy MP HIS1: Historic Marine Protected Areas
- Policy MP HIS2: Safeguarding Nationally Important Heritage Assets
- Policy MP HIS3: Safeguarding Locally Important Heritage Assets

Policy MP DEV1: Marine Developments

Policy MP DEV2: Decommissioning of Assets

Policy MP DEV3: Development Restricted Areas

Policy MP FISH1: Safeguarding Fishing Opportunities

Policy MP CBP1: Placement of Utility Cable and Pipelines

For those policies with particular relevance to the Aurora Project (in bold above), more details are provided in **Table 2-3**.

TABLE 2-3 RELEVANT SHETLAND ISLANDS REGIONAL MARINE PLAN POLICIES TO THE AURORA PROJECT

Policy Number	Policy Heading	Policy Text
ACBP1	Avoidance of Cables and Pipelines	Activities that could damage any cable or pipeline (e.g. dredging or mooring attachments to the seabed) must not be carried out in the following situations: Within the 500 m exclusion zone(s) established under the Petroleum Act 1987 around oil and gas platforms, well heads and associated pipelines; and Within a 250 m exclusion zone either side of utility (telecommunications, electricity or water supply) cables or pipelines, unless there is a proximity agreement in place with the asset owner.
MPA1	Plans or projects that may affect SACs, SPAs (collectively known as European sites) and Ramsar Sites	Developments or uses that might affect a European site (including proposed sites) must comply with legal requirements for these protected areas and must be subject to a Habitat Regulations Assessment (HRA) undertaken by a competent authority (normally the licensing or consenting authority / body). Proposals which may adversely affect the site's integrity (i.e. compromise any of the conservation objectives for the site), either alone or in-combination, as determined by appropriate assessment (AA), will not normally be permitted. Where a competent authority may wish to consent a proposal despite the potential for an adverse effect on the site's integrity, the competent authority must first show that there are no alternative solutions, and that it is imperative, and of over-riding public interest to grant consent.
COAST1	Developments in or near SSSIs	Development likely to have an effect on SSSIs will only be permitted: If there is no adverse impact on the special interest of the site or it can be subject to conditions that will prevent damaging impacts on those interests; and Where there is no reasonable alternative or less ecologically damaging location and the reasons for the development clearly outweigh the value of the site by virtue of social or economic benefits of national importance.
SPCON1	Development and European Protected Species (EPS) and Schedule 5 Species	Development or uses that could affect a EPSor Schedule 5 species will be permitted only if: It can be shown that the development is not likely to result in an offence being committed under Regulation 39 of The Conservation (Natural Habitats, &c.) Regulations 1994 (the Habitats Regulations) or Section 9 of the Wildlife and Countryside act 1981 (as amended); or If an offence might result, it is determined that a licence would be, or has been, issued by the appropriate authority (either NatureScot or Marine Scotland). An EPS licence can only be issued if it passes three strict legal tests:

Policy Number	Policy Heading	Policy Text
		The licence must relate to one of seven purposes listed in Regulation 44 of the Habitats Regulations. There must be no satisfactory alternative, which means that all reasonable alternatives must have been considered and judged to be unsatisfactory. The action authorised must not be detrimental to the maintenance of the population at a favourable conservation status in their natural range.
CBP1	Placement of Utility Cable and Pipelines	The laying or replacement of utility cables and pipelines must: Comply with all policies included in Policy Framework Section (a) and (b) and Policy MP DEV1; Demonstrate there will be no adverse effects on the integrity of a European site or a proposed site; Be within a 250 m exclusion zone either side of utility (telecommunications, electricity or water supply) cables or pipelines, unless there is a proximity agreement in place with the asset owner; and Demonstrate that they have taken account of the implications for landing points including any seasonal sensitivities and impacts to existing land use. Where possible, cables and pipelines should use existing routes and landing points.

2.2.3 NATIONAL PLANNING FRAMEWORK 4

Scotland's National Planning Framework (NPF) 4 was published in 2023 and replaces NPF3. The framework sets out the National Spatial Strategy and National Planning Policies for the development and use of the Scottish environment.

NPF4 focuses on setting out the strategy and principles of future planning for Sustainable, Liveable and Productive Places, outlining national strategies and developments, alongside regional priorities. The spatial principles set out are supported by a National Planning Policy in place for the future planning of Sustainable Places, Liveable Places and Productive Places.

2.2.4 NATURE CONSERVATION LEGISLATION

2.2.4.1 HABITATS REGULATIONS ASSESSMENT

The Habitats Directive (EC Directive 92/43/EEC) is transposed into UK and Scottish law both through the Conservation of Habitats and Species Regulations 2017, which covers the onshore area and up to 12 nm, and the Conservation of Offshore Marine Habitats and Species Regulations 2017 which covers the marine environment from 12 nm out to the UK EEZ boundary (200 nm). Regulation 63(1) of The Conservation of Habitats and Species Regulations 2017 (CHSR) and Regulation 28 (2) of The Conservation of Offshore Habitats and Species Regulations 2017 (COHSR) require that any plan or project which has the potential to adversely affect a Natura 2000 Site, no matter how far away from that site, be subject to the HRA process.

These regulations provide designation for the conservation and protection of Natura 2000 sites, i.e. SPAs for wild birds and their habitats and SACs for habitats and species other than birds, and RAMSAR sites. The potential effects of the Aurora Project on any designated Natura 2000 sites are considered **in Appendix 1**(Habitats Regulations Assessment).

2.2.4.2 NATURE CONSERVATION MARINE PROTECTED AREAS

NC MPAs are marine areas which are designated for nature conservation, protection of biodiversity, demonstrating sustainable management, and protecting national heritage. The NC MPA network consists of 36 sites: 23 NC MPAs under the Marine (Scotland) Act 2010 in Scottish territorial waters and 13 NC MPAs under the MaCAA 2009. The potential effects of the Aurora Project on these are considered in **Appendix 2**(Nature Conservation Marine Protected Areas).

2.2.4.3 SITES OF SPECIAL SCIENTIFIC INTEREST

SSSIs are areas of land that have been scientifically identified as being of the highest degree of conservation value. In Scotland, SSSIs were first designated under the National Parks and Access to the Countryside Act 1949 and are now designated under the Nature Conservation (Scotland) Act 2004. The potential effects of the Aurora Project on these are considered in **Appendix 2** (NC MPA).

2.3 EIA LEGISLATION

Standalone submarine cable projects are not listed as Environmental Impact Assessment ("EIA") projects under Schedule 1 or 2 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended), therefore, a statutory EIA is not required to support the Marine Licence applications for the Aurora Project. However, the Aurora Project will require an application for a marine licence to be accompanied by an assessment of the potential environmental effects, in this case termed an EA Report (i.e. this document).

3. STAKEHOLDER ENGAGEMENT

A well-planned and executed stakeholder consultation is key to the successful consenting/permitting of any marine development project. Aurora Project-specific consultation is planned with the relevant stakeholders, and 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 Aurora Project and to gather details regarding the required permits for the subsea cable installation phase. 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
Statutory			
Northern Lighthouse Board (NLB)	Responsible for the management of all lighthouses, buoys and beacons within Scottish waters.	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the shipping and navigation assessment approach.	**19 September 2024** Confirmed receipt of pre-application consultation letter, and acknowledged the Aurora Project's advice that an Navigational Risk Assessment (NRA) will be completed, including standard mitigation measures of Notices to Mariners (NtMs) and chart updates. Advised that NLB do not anticipate the subsea cable to impact NLB operations throughout the Aurora Project lifespan. The NLB advised that the Aurora Project is not expected to be a hazard to navigation, and that with standard mitigation measures, potential effects will be manageable.
Maritime and Coastguard Agency (MCA)	Authority for enforcing merchant shipping legislation	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the shipping and navigation assessment approach. **14 November 2024** As requested, latest shapefiles of the Aurora Project route in UK waters provided to MCA.	**17 October 2024** Request for shapefiles of the Aurora Project route in UK waters. **24 October 2024** Confirmed receipt of pre-application consultation letter, noting that the MCA would have an interest in the NRA conclusions. The MCA response detailed the content they would expect in the NRA, and noted that the area carries a significant amount of vessel traffic, therefore, specific attention and consideration is required for installation vessel routing/re-routing. A Cable Burial Risk Assessment (CBRA) should detail burial parameters, and rock protection measures, where required. The MCA noted they would welcome any data for the inclusion on nautical charts, and requested they are included in future consultations for the Aurora Project.
Scottish Environment Protection Agency (SEPA)	Non-departmental body of the Scottish Government responsible for	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the benthic	**20 September 2024** Confirmed receipt of pre-application consultation letter, noting 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
	regulating and protecting Scotland's environment	ecology, and water and sediment quality assessment approach.	
NatureScot	Lead advisory body on nature, wildlife management, and landscape management across Scotland. Responsible for MPAs.	**30 August and 03 September 2024** Formal letter has been issued to obtain stakeholders opinion on various environmental assessment methodology. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation. **19 November 2024** Correspondence and letter forwarded to direct point of contact at NatureScot. **28 and 29 November, and 03 December 2024** Correspondence to set up meeting with NatureScot. **09 December 2024** Introductory meeting conducted with NatureScot to discuss route and Ecology assessment approach.	**28 November 2024** Request for meeting to be set up to discuss the Aurora Project in more detail, specifically to find out more about the route passing between Orkney and Shetland. **09 December 2024** Items discussed in meeting: Noted that a few of the protected sites within the proximity of the Aurora Project fall into NatureScot's remit of 12 nm, and that they will provide comments on the Aurora Project, separate to MD-LOT and Shetland Island Council's. However, the majority of the feedback regarding protected sites will be provided by Joint Nature Conservation Committee (JNCC). Discussed the installation process and methods, specifically the locations of burial or surface lay of the Aurora Project within the UK TS. NatureScot advised that the Fair Isle DRMPA should also be considered, and that it is be worth reviewing the other proposed projects (e.g. the Holistic Network Design [HND]) and the offshore grid connections, in regards to the cumulative assessment of the Aurora Project.
Non-Statutory			
Orkney Islands Council	Local council	**12 August 2024** Request submitted for Historic Environmental Records (HER) for Shetland. **30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the consenting approach.	**12 August 2024** Confirmation from Orkney Islands Archaeologist that route passes through Shetland's Authority, therefore, no items to include from Orkney. No response to formal letter received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		19 September 2024 Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	
Shetland Islands Council	Local council, provides works licence for any installation works that fall with 12 nm of Shetland	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the consenting approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation. **10 December 2024** Per advice, a pre-application enquiry was submitted Shetland Island Council.	**25 November 2024** Recalled previous engagement regarding CRS, and requested the Aurora Project to provide pre-application enquiry for initial review. **10 December 2024** Confirmation of receipt of the pre-application enquiry. **20 December 2024** Feedback provided on the pre-application enquiry documents.
CES	Manages the seabed out to 12 nm and provides licences for property rights of cables and licences	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the consenting approach and to provide initial Aurora Project information in advance of a virtual meeting conducted on 4 September 2024. **4 September 2024** Introductory meeting conducted with CES to discuss permitting requirements for the Aurora Project. Meeting minutes provided for CES' confirmation and reference on 9 September 2024.	**1 August 2024** Active engagement from CES with the Aurora Project, to better understand the proposed Aurora Project activities. **September – November 2024** Regular communications with the Aurora Project to discuss permitting timelines, and application requirements for CES' "Heads of Terms".
MD-LOT	Regulator who grants the Marine Licences.	**30 August and 03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the consenting approach and offer a virtual meeting to discuss.	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		19 September 2024 Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	
JNCC	Statutory nature advisor to all four countries of the UK	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on various environmental assessment methodology.	**03 September 2024** Confirmed receipt of pre-application consultation letter, and noted JNCC will comment on the EA Report in due course. JNCC welcomed the opportunity to comment on the EA Report once available. JNCC noted that they offer a discretionary advice service (DAS) to Project Proponents for non-statutory engagement on projects at the pre-application stage.
Chamber of Shipping	Shipping industry representative	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the shipping and navigation assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Ministry of Defence (MOD)	Responsible for military activities	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
National Trust for Scotland	Own the Fair Isle, Shetland	**09 September 2024** Formal letter has been issued to obtain stakeholders opinion on the Archaeology and Cultural Heritage assessment approach.	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		19 September 2024 Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	
Historic Environment Scotland (HES)	Responsible for Scotland's heritage sites	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the Archaeology and Cultural Heritage assessment approach.	**19 September 2024** Confirmed receipt of pre-application consultation letter, and welcomed inclusion of marine archaeology and cultural heritage in report. Noted that HES cannot provide comments at this early stage, due to lack of information, but that they look forward to receiving further consultation in due course.
HM Coastguard (Orkney and Shetland)	Coordinate all maritime search and rescue operations	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the shipping and navigation assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Royal National Lifeboat Institution (RNLI)	Charity that operates with HM coastguard with local lifeboat stations in Orkney and Shetland	**03 September 2024** Contacted by web enquiry form and followed-up by telephone.	Email address requested for correspondence; however no response received.
Scottish Fishermen's Federation (SFF)	Fishing industry representative	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **16 October 2024** Virtual meeting held with SFF, Shetland Fishermen's Association (SFA), Scottish White Fish Producers Association (SWFPA), Orkney Fisheries Association to introduce	**03 September 2024** Noted that more information would be appreciated, in order to determine impact on SFF members. Requested to meet to discuss potential effects on commercial fisheries.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		Aurora Project and discuss approach to fisheries baseline. **22 and 25 October 2024** Meeting minutes from the virtual meeting on 16 October 2024 provided to the participants.	
Fisheries Management Scotland	Fishing industry representative	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Northeast Fishermen's Training Association (NFTA)	Fishing industry representative	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Seafood Scotland	Fishing industry representative	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
SWFPA	Fishing industry representative	**03 September 2024**	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **16 October 2024** Virtual meeting held with SFF, SFA, SWFPA, Orkney Fisheries Association to introduce Aurora Project and discuss approach to fisheries baseline. **22 and 25 October 2024** Meeting minutes from the virtual meeting on 16 October 2024 provided to the participants.	
SFA	Fishing industry representative	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **16 October 2024** Virtual meeting held with SFF, SFA, SWFPA, Orkney Fisheries Association to introduce Aurora Project and discuss approach to fisheries baseline. **17 October 2024** Request for further details of Shetland Shellfish Management Organisation (SSMO) data. **22 and 25 October 2024** Meeting minutes from the virtual meeting on 16 October 2024 provided to the participants. **05 November 2024** Follow up request for details of SSMO data.	**03 September 2024** Requested to meet to discuss potential effect of the Aurora Project on commercial fisheries.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
Scottish Fishermen's Organisation (SFO)	Fishing industry representative	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Scottish Creel Fishermen's Federation (SCFF)	Fishing industry representative	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Scottish Pelagic Fishermen's Association (SPFA)	Fishing industry representative	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
North Atlantic Fishing Company	Fishing industry representative	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
Western Isles Fishermen’s Association	Fishing industry representative	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Mallaig and Northwest Fishermen’s Association	Fishing industry representative	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Royal Society for the Protection of Birds (RSPB)	Non-Governmental Organisation (NGO) often consulted by MD-LOT	**03 September 2024** Formal letter has been issued to obtain stakeholders opinion on the Ornithology and HRA assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Whale and Dolphin Conservation	NGO often consulted by MD-LOT	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the Marine Mammal assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
Orkney Islands Council Port Harbour Authority	Responsible for the management of Orkneys ports and harbours	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Shetland Islands Council Harbour Authority	Responsible for the management of Shetlands piers and harbours	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
NorthLink Ferries	Commercial vessel operator	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Streamline Shipping Group	Commercial vessel operator	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
Orkney Ferries	Commercial vessel operator	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Royal Yachting Association (RYA)	National governing body for recreational boating	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach.	**02 September 2024** Noted that impacts on recreational boating can likely be scoped out, and that subsea cable laying is covered by the COLREGs. RYA would be happy to read and comment on the EA Report in due course.
Shetland Inter-Club Yachting Association	Local recreational group	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Orkney Sailing Club	Local recreational group	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
Orkney Islands Sea Angling Association	Local recreational group	**05 September 2024** Contacted via web enquiry but unable to obtain email address for correspondence.	Email address requested for future correspondence; however no response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
Shetland Anglers Association	Local recreational group	**05 September 2024** Contacted via web enquiry but unable to obtain email address for correspondence.	Email address requested for future correspondence; however no response received.
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	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
The North Sea Transition Authority (NSTA)	Oil and Gas authority	**30 August 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach.	**05 September 2024** Confirmed receipt of pre-application letter, and noted NSTA will comment on the EA Report once available. NSTA noted that, should the subsea cable cross any oil and gas pipelines, the relevant Pipeline Operators should be contacted, who will be responsible for liaising with the NSTA. Additionally, the Project Proponent should contact owners of any petroleum blocks / licences the subsea cable crosses to discuss whether any crossing agreements are needed.
Cruising Association	Recreational boating association	**06 September 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach. **19 September 2024** Follow up correspondence issued, reiterating opportunity to respond to pre-application consultation.	No response received.
SSMO	Manage and regulate commercial fisheries within inshore 6 nm	**22 November 2024** Formal letter has been issued to obtain stakeholders opinion on the commercial fisheries assessment approach.	No response received.

Stakeholder	Function	Engagement	Responses Received by the Aurora Project
		Request for SSMO data as discussed with SFA in meeting dated 16 October 2024. **26 November 2024** Follow up request for SSMO data.	
Shetland Amenity - Shetland Regional Archaeologist	Local council	**12 August 2024** Request submitted for HER for Shetland **26 November 2024** Formal letter has been issued to obtain stakeholders opinion on the Archaeology and Heritage assessment approach.	**16 August 2024** Confirmation from Shetland Regional Archaeologist that HER contain no sites within the search area for the Aurora Project. Archaeologist request that this be noted within the Archaeology and Heritage assessment. **27 November 2024** Responded to letter, recommending HER should be reviewed (see engagement on 12 and 16 August 2024), and confirmed they agree with proposed Archaeology and Heritage assessment approach and content.
Dunrossness Community Council	Commercial vessel operator	**26 November 2024** Formal letter has been issued to obtain stakeholders opinion on the Consents assessment approach.	No response received.
Shetland Islands Council Ferry Operations Team	Community-led initiative to protect marine resources around Fair Isle	**26 November 2024** Formal letter has been issued to obtain stakeholders opinion on the other users assessment approach.	No response received.
Fair Isle Marine Environment and Tourism Initiative	Shetland Regional Archaeologist	**26 November 2024** Formal letter has been issued to obtain stakeholders opinion on the Ecology assessment approach. **02 December 2024** Subsea cable route figure sent via email.	**02 December 2024** Request for figure showing the subsea cable route.

4. PROJECT DESCRIPTION

This section of the EA Report provides a detailed description of the Aurora Project in UK waters, including the location of the subsea cable, components of subsea cable, Aurora Project activities by phase within UK TS (i.e. pre-installation, installation, and post-installation), and current Aurora Project schedule.

4.1 ROUTE SELECTION

For the UK segment of the Aurora Project, the subsea cable will not make landfall in the UK but will traverse through the northern-most areas of UK waters, off the coast of the outer Hebridean Islands in Scotland, and will pass through the UK TS between Orkney and the Shetland Islands, as demonstrated in **Figure 1-1**.

The subsea cable route was developed through an iterative process of reviewing desktop and cable route survey (CRS) information. The CRS consisted of geophysical and geotechnical surveys along the proposed subsea cable route in UK waters. The surveys were completed in September 2024 and have been used to inform the selection of the final preferred subsea cable route. The preferred route has been developed to avoid sensitive marine environmental and physical features (i.e. seamounts, rocky outcropping) as far as is reasonably practicable.

The Aurora Project is located in an area which also includes shipping and fishing activities and has been engineered to minimise interaction with existing seabed infrastructure and areas of greatest anthropogenic activity. The Aurora Project also aims to utilise areas with relatively low usage from other maritime industries in order to maximise burial potential and system security. To achieve this, the effect of environmental and anthropogenic factors on the subsea cable routing, engineering, installation, operation and maintenance, and decommissioning were considered.

The final UK segment of the Aurora Project comprises:

- Approximately 958 km of subsea cable traversing through the UK's EEZ; and
- Approximately 43 km of the subsea cable traversing through the UK's TS.

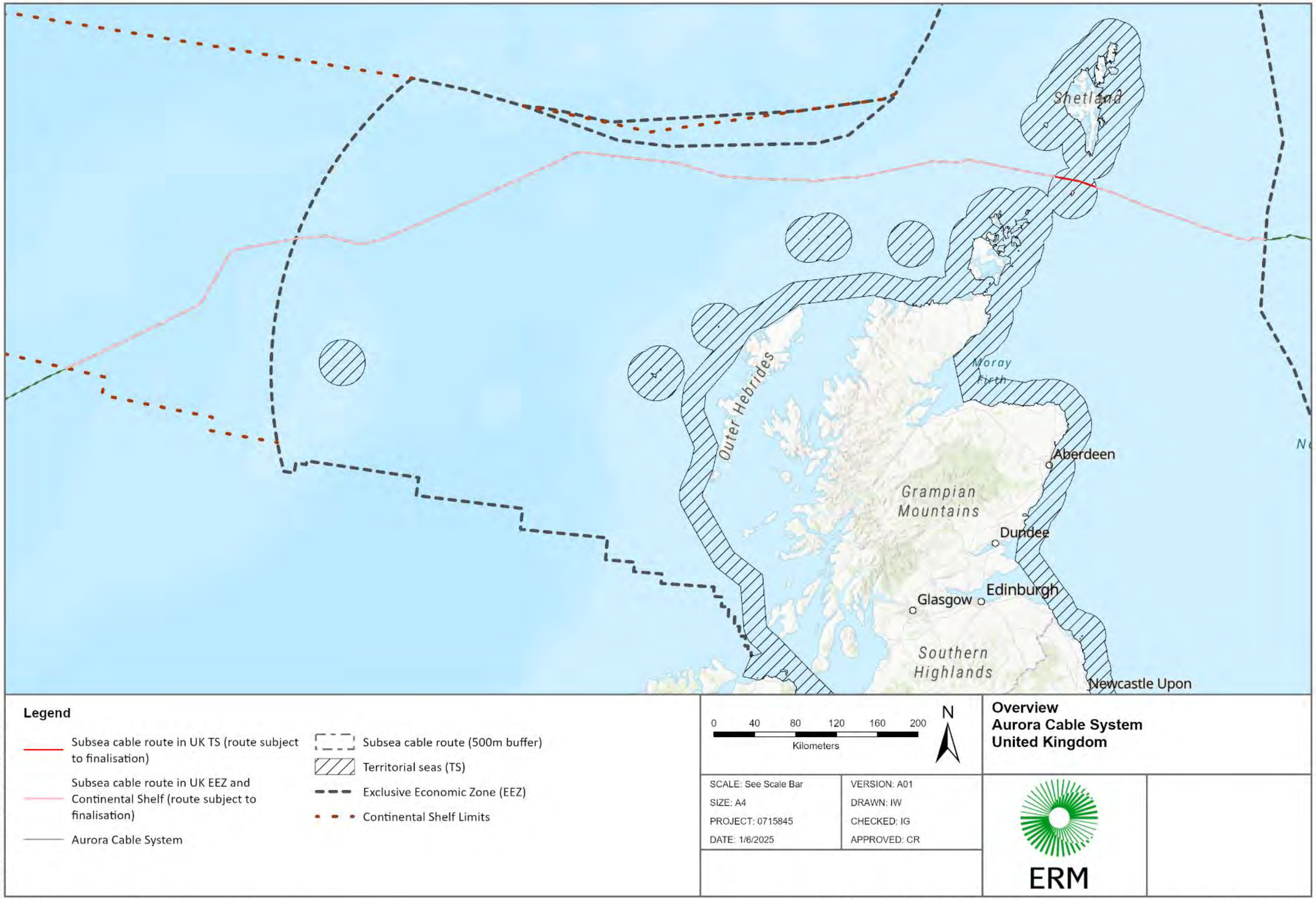
Table 4-1 provides a summary of the coordinates where the subsea cable traverses the UK's EEZ and TS.

TABLE 4-1 UNITED KINGDOM SUBSEA CABLE LOCATIONS

Location Description	Latitude	Longitude
Enter UK EEZ	058° 35.9190' N	014° 47.0018' W
Enter UK TS	059° 40.8938’ N	001° 56.4920’ W
Exit UK TS towards Norway	059° 34.7934’ N	001° 12.7171’ W
Exit UK EEZ towards Norway	059° 03.0370’ N	001° 38.7294’ E

Note: WGS84 Datum in degrees decimal minutes.

FIGURE 4-1 PROPOSED UNITED KINGDOM SUBSEA CABLE ROUTE



SOURCE: World Topographic Map: Esri UK, Esri, TomTom, Garmin, FAO, NOAA, USGS
World Hillshade: Esri, USGSContains public sector information licensed under the Open Government Licence v3.0.

Path: G:\7_Cables\ASN_Meta_Denmark\Workspaces\E_A_R\UK\0715845_Aurora_EAR_UK_A01_202501.aprx / UK overview

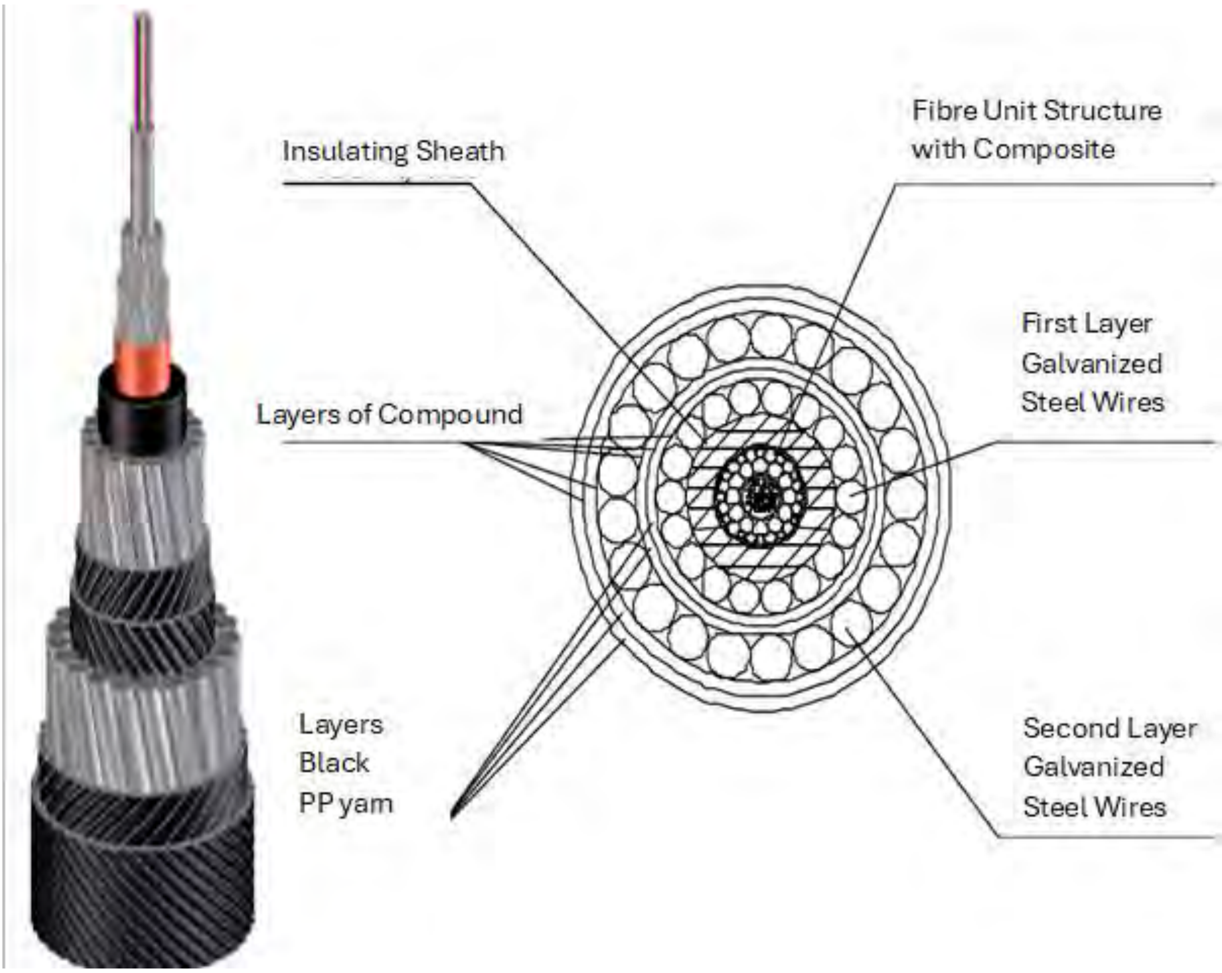
4.2 MARINE INFRASTRUCTURE

4.2.1 THE SUBSEA FIBRE OPTIC CABLE

The subsea fibre optic cable type that will be used within the UK TS is the OALC4 cable with double amour, developed and manufactured by ASN The composition of the subsea cable is shown in **Figure 4-2**

The subsea cable will have a maximum diameter of 37.5 mm. The core of the subsea cable is the fibre unit structure, where the optical fibres are set in a steel tube and insulated with high-density polyethylene which provides abrasion resistance. The fibre unit and insulation sheath are surrounded by layers of galvanised steel wires and layers of black polypropylene (PP) yarn that provide additional protection against external threats. Only the outer layer of PP yarn which is inert, will be in contact with the surrounding environment.

FIGURE 4-2 EXAMPLE OF A DOUBLE ARMOUR FIBRE OPTIC CABLE



Source: ASN, 2024

4.3 PROJECT ACTIVITIES

The Aurora Project will involve the following activities in UK TS:

Pre-Installation Activities in the marine environment:

- RC of Out-of-Service (OOS) Cables;
- PLGR;

- Main Subsea Cable Lay (Surface Lay and Ploughing);
- Post-Lay Inspection and Burial (PLIB);
- In-Service Cable Crossings;
- Subsea Cable Operation and Maintenance; and
- Retirement, Abandonment or Decommissioning.

4.3.1 PRE-INSTALLATION ACTIVITIES

4.3.1.1 ROUTE CLEARANCE OF OUT-OF-SERVICE CABLES

The purpose of RC is to clear the subsea cable path of obstacles such as redundant cables that were identified during the CRS (completed in September 2024), as these can be hazardous to both the installation vessel's equipment and the subsea cable itself. RC is only carried out in areas where subsea cable burial by ploughing is planned.

Utilising the Global Marine Cable Database (GMDB), the CRS identified three (3) OOS cables that require removal from the proposed subsea cable route in the UK TS. The details and locations of the OOS cables are provided in **Table 4-2**.

TABLE 4-2 DETAILS AND LOCATIONS OF OUT-OF-SERVICE CABLES

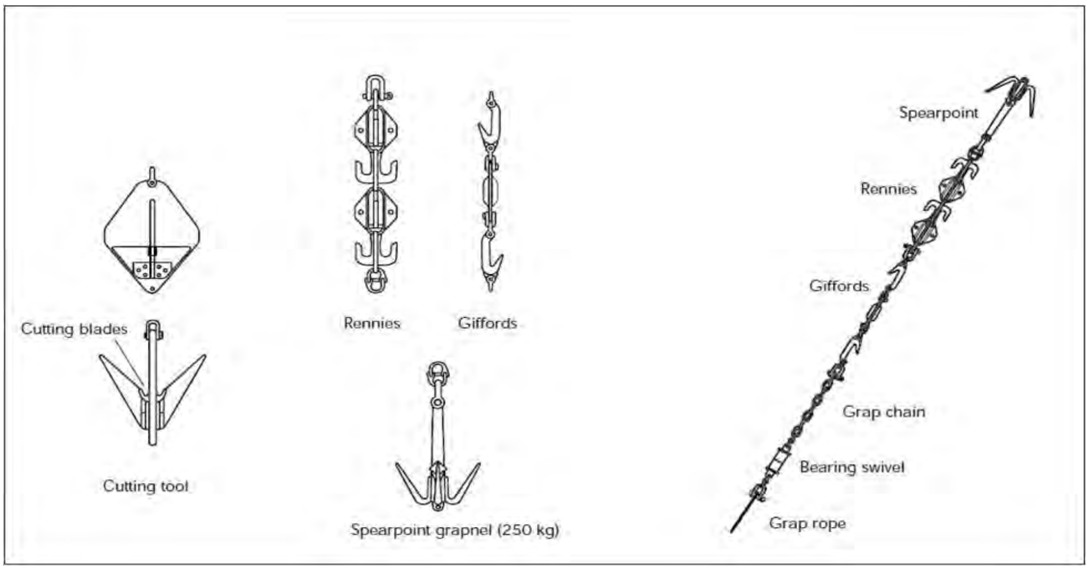
OOS Cable	Latitude	Longitude	Water Depth (m)
TELE DB Fair Isle-Sandwick Bay	059º 36.9296' N	001º 24.0665' W	97
COAX DB Orkney-Shetland	059º 35.5685' N	001º 16.9971' W	98
TELE DB Sandwick Bay-Sinclair Bay	059º 35.4498' N	001º 16.3003' W	99

Depending on availability, the RC operations will be conducted using the main lay installation vessel or a third-party vessel, and will be conducted in accordance with International Cable Protection Committee (ICPC) Recommendation 1 "Management of Redundant and Out of Service Cables" (ICPC, 2020), involving the following steps:

- The vessel will position itself perpendicular and close to the OOS cable;
- A grapnel is lowered from the stern of the vessel (Figure 4-3);
- The vessel moves towards the OOS cable, with the flukes of the grapnel penetrating up to 1.5 m of the seabed to unbury the OOS cable;
- The vessel will continue to move until the OOS cable is broken, leaving the two (2) ends of the OOS cable on the seabed (Figure 4-4);
- The vessel will then undertake grapnel runs to retrieve each OOS cable end, individually;
- Once the OOS cable is on the back deck, clump weights are attached to the cut OOS cable ends;
- The vessel will return the cut OOS cable ends (with the weights) to the seabed, leaving an empty space on seabed that corresponds to the width of the proposed subsea cable route; and
- The OOS cable cut is kept onboard and disposed of onshore in accordance with MARPOL 73/78 regulations, UK standards and waste disposal best practice.

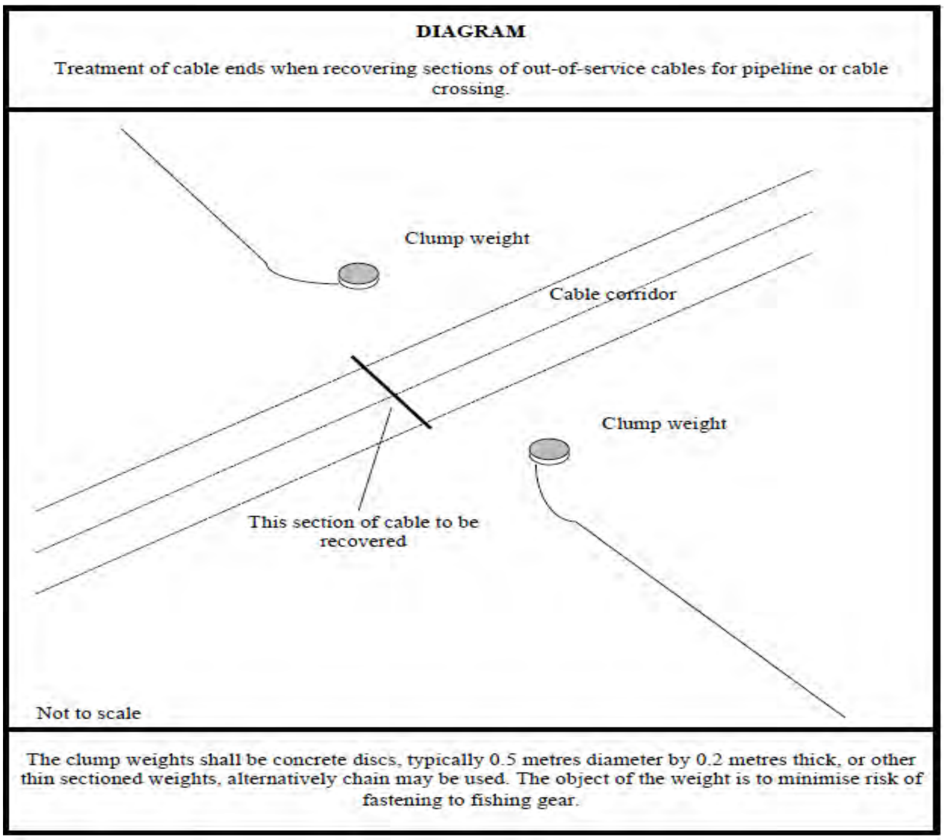
All RC operations would be conducted using the same navigational accuracy as that proposed for the subsea cable installation.

FIGURE 4-3 TYPICAL EXAMPLE OF GRAPNELS USED FOR THE ROUTE CLEARANCE OPERATIONS



Source: ASN, 2021

FIGURE 4-4 DIAGRAM SHOWING SECTION OF CUT OUT-OF-SERVICE CABLE TO BE RECOVERED



Source: ICPC, 2020

4.3.1.2 PRE-LAY GRAPNEL RUN

PLGR will only be carried out along segments of the route where subsea cable burial by plough is planned. Undertaken just before ploughing, PLGR is intended to clear the route of obstacles and debris (e.g. discarded fishing gear, hawsers, scrap, etc.) that could potentially impede the safe progress of the subsea cable burial equipment (i.e. the sea plough) or cause damage to the installed subsea cable.

Depending on availability, the main lay installation vessel or a third-party vessel will be utilised for the PLGR.

During the PLGR, one (1) or an array of grapnels (**Figure 4-3**) will be towed by the vessel along the length of the route to be ploughed. The vessel moves at a speed that allows the grapnels to remain in continuous contact with the seabed.

Should the first pass encounter any type of debris, two (2) additional parallel passes, on either side of the centre-line of the proposed subsea cable route, will be made.

The footprint of the PLGR will be limited to areas dredged by the grapnels and will not extend beyond the width of the proposed subsea cable route. As the grapnel is pulled across the seabed, typical blade seabed penetration of up to 40 cm to 80 cm is achieved, depending on seabed composition.

PLGR will not be conducted in hard bottom or rocky areas and will avoid in-service marine infrastructure.

Any debris retrieved by the grapnels is kept onboard the vessel and will be disposed of onshore in accordance with MARPOL 73/78 regulations, UK standards and waste disposal best practice.

4.3.2 MAIN SUBSEA CABLE LAY

4.3.2.1 INSTALLATION VESSEL

The subsea cable will be installed using a purpose-built installation vessel (**Figure 4-5**).

The exact installation vessel to be utilised has yet to be confirmed but will be fully equipped with all the necessary equipment, tools, and facilities to safely handle and install, joint and test the subsea cable and power submerged equipment, such as the sea plough and remotely operated vehicle (ROV) (**Figure 4-12**). In addition, the vessel will have sufficient power and dynamic positioning capability to carry out the installation in the expected weather and current conditions without the need for anchors. This reduces the impact to the seabed as compared to older models that used anchors to stabilise and position the vessel while burying subsea cables under the seabed.

Subsea cable lay software is used to install the subsea cable along the route with high positional accuracy and control of the subsea cable tension in combination with the ship's navigational systems. The average subsea cable installation speed is approximately 0.3 knots (14.4 km per day) for ploughing / subsea cable burial, and approximately 2 knots (90 km per day) during surface lay installation. The speed of the installation vessel may be amended to suit the topography of the seabed or any operational complexity encountered.

FIGURE 4-5 TYPICAL INSTALLATION VESSEL

Source: ASN, 2024

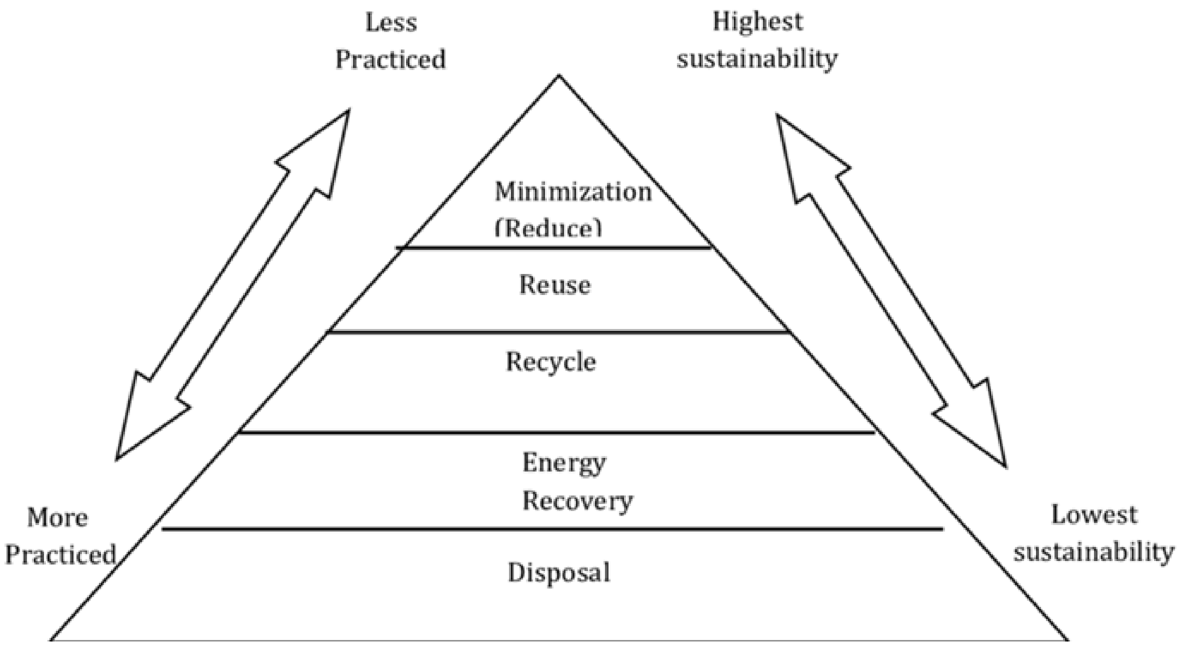
If necessary, a guard vessel will accompany the installation vessel to maintain surveillance around the worksite ensuring other vessels are kept clear to reduce the risk of collision. The guard vessel may be a local vessel employed for their knowledge of the installation area and other vessels operating in the area.

Waste Generation and Management

The vessel will be entirely self-sufficient for the duration of the installation and will also conform to IMO / MARPOL 73/78 standards and applicable UK regulations in relation to waste management and ballast water management. This includes general requirements over the control of waste oil, engine oil discharges and grey and black wastewater discharges; prevention of pollution by garbage from ships and prevention of air pollution; and operating procedures for dealing with incidents such as oil and waste spillages that potentially may threaten the marine environment, specifically:

- Waste will be dealt with by the vessel operators in accordance with the waste hierarchy presented in Figure 4-6 below;
- Suitably approved and fully licensed companies providing waste disposal services will be selected by review and evaluation in line with best practice;
- Waste tracking procedures will be implemented to provide traceability from source of generation to end point where required; and
- Non-hazardous waste will be segregated and recycled where possible.

FIGURE 4-6 WASTE HIERARCHY



Source: Mallak *et al.,* 2016

It is anticipated that minor quantities of wastes will be produced during the installation phase, with a significant portion of the waste streams associated with the installation phase activities being generated from the main installation vessel. The anticipated wastes that will be generated during installation from the main installation vessel are summarised in **Table 4-3**. The vessel involved in the installation, operation and maintenance, and / or decommissioning activities will adhere to MARPOL 73/78 requirements regarding discharges to sea.

TABLE 4-3 SUMMARY OF GENERAL AMOUNTS OF WASTES GENERATED BY MAIN INSTALLATION VESSEL DURING INSTALLATION

Type Of Waste	Generation Rate	Driver	Onboard Treatment
Oily bilge water	0.01-13 m^3 per day, larger ships generate larger quantities.	Condensation and leakages in the engine room; size of the vessel at approximately 140 x 23 m.	Use of an oil water separator to reduce waste volume by 65-85%, with the water fraction discharged to sea and the oil portion retained and stored for disposal onshore at an appropriate waste disposal facility.
Grey water	0.22 m^3 per person per day.	Number of persons on-board (the installation vessel can accommodate up to 70 people)	On-board sewage treatment unit to comply with MARPOL 73/78 Annex IV: no floating solids or discolouration of surrounding water. No discharges of treated sewage from vessel within 3 nm of the

Type Of Waste	Generation Rate	Driver	Onboard Treatment
			nearest land. Residual chlorine content <1.0 mg/L
Sewage (Black water)	0.01 to 0.06 m^3 per person per day. Sewage is sometimes mixed with other waste water. The total amount ranges from 0.04 to 0.45 m^3 per day per person.	Number of persons on-board; type of toilets; length of voyage.	Effluent from treatment plants may be discharged at sea where permitted under MARPOL 73/78 Annex at a distance of more than 12 nm from the nearest land when the ship is enroute at no less than 4 knots.
Plastics	0.001 to 0.008 m^3 of plastics per person per day.	Number of person on-board.	Stored onboard for appropriate disposal onshore
Food wastes	0.001 to 0.003 m^3 per person per day	Number of persons on-board; provisions	Where permitted under MARPOL 73/78 Annex V, food waste may be discharged at sea. Ground or crushed food waste is permitted for discharge at more than 3 nm from the nearest land. Non ground or crushed food waste is permitted for discharge at more than 12 nm from the nearest land.
Domestic wastes / packaging material	0.001 to 0.02 m^3 per day per person.	Number of persons on-board; type of products used.	Stored onboard for appropriate disposal onshore
Ballast Water	To be confirmed	To be confirmed	To be confirmed

Source: Modified from:

Under normal circumstances the vessel therefore represents no risk as a source of marine pollution. A vessel Waste Management Plan (WMP) will be implemented to manage the waste streams associated with the Aurora Project.

4.3.2.2 SUBSEA CABLE INSTALLATION

The subsea cable will be installed within approximately 87 m water depth to 112 m water depth in the UK TS. Depending on the seabed conditions, some segments of the subsea cable would either be surface laid or plough buried (i.e. simultaneously laid and buried) to a target depth of 2 m, where feasible. The plough burial process is described in **Section 4.3.2.2** below.

Table 4-3 and **Figure 4-7** provides a summary of the subsea cable installation method within the UK TS.

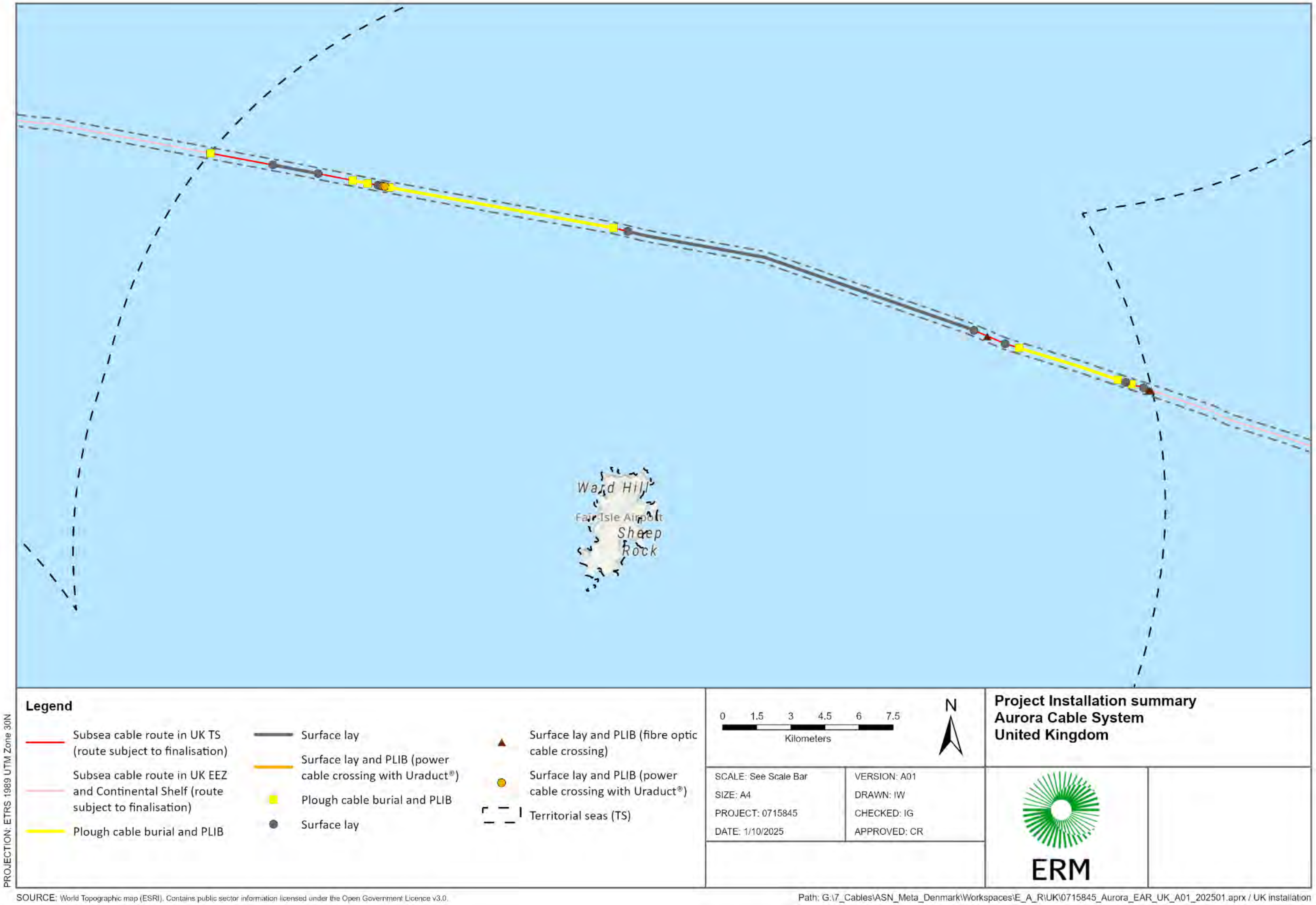
TABLE 4-4 SUMMARY OF AURORA PROJECT INSTALLATION WITHIN THE UNITED KINGDOM TERRITORIAL SEAS

Aurora Project Location Coordinates (Start)	Aurora Project Location Coordinates (End)	Subsea Cable Installation Description
059° 40.8938' N 001° 56.4920' W	059° 40.8938' N 001° 56.4920' W	Plough cable burial and PLIB
059° 40.5949' N 001° 53.5918' W	059° 40.3695' N 001° 51.4638' W	Surface lay
059° 40.1938' N 001° 49.8520' W	059° 40.1176' N 001° 49.1536' W	Plough cable burial and PLIB
059° 40.0666' N 001° 48.6610' W	059° 40.0559' N 001° 48.5575' W	Surface lay
059° 40.0448' N 001° 48.4502' W	059° 40.0340' N 001° 48.3459' W	Surface lay and PLIB (power cable crossing with Uraduct®)
059° 40.0116' N 001° 48.1303' W	059° 38.9503' N 001° 37.6861' W	Plough cable burial and PLIB
059° 38.8609' N 001° 37.0219' W	059° 36.3252' N 001° 20.9226' W	Surface lay
059° 36.1826' N 001° 20.3065' W	059° 36.1826' N 001° 20.3065' W	Surface lay and PLIB (fibre optic cable crossing)
059° 35.9916' N 001° 19.4815' W	059° 35.9916' N 001° 19.4815' W	Surface lay
059° 35.8814' N 001° 18.8344' W	059° 35.0644' N 001° 14.2445' W	Plough cable burial and PLIB
059° 35.0001' N 001° 13.8819' W	059° 35.0001' N 001° 13.8819' W	Surface lay
059° 34.9505' N 001° 13.6027' W	059° 34.9505' N 001° 13.6027' W	Plough cable burial and PLIB
059° 34.8533' N 001° 13.0545' W	059° 34.8533' N 001° 13.0545' W	Surface lay
059° 34.8089' N 001° 12.8040' W	059° 34.7934' N 001° 12.7171' W	Surface lay and PLIB (fibre optic cable crossing)

Note: WGS84 Datum in degrees decimal minutes.

Source: ASN, 2024

FIGURE 4-7 SUBSEA CABLE INSTALLATION IN UNITED KINGDOM TERRITORIAL SEAS



4.3.2.3 PLOUGH BURIAL

Wherever feasible, simultaneous subsea cable installation with plough burial will be undertaken along the proposed subsea cable route within UK TS.

Plough burial involves a sea plough (**Figure 4-8**), towed behind an installation vessel, burying the subsea cable into the seabed as it progresses along the route. A typical ploughing configuration is shown in **Figure 4-9** with the towed plough normally positioned two (2) or three (3) times the water depth behind the vessel.

During this activity, the subsea cable is fed through the plough into a narrow furrow at the bottom of a share blade which cuts into the seabed creating a trench for the subsea cable. As the share blade moves forward, the wedge of sediment falls back into the trench to cover the subsea cable. The plough target burial depth is 2.0 m, where seabed sediments and slopes allow.

The footprint of the plough on the seabed is limited to where the four (4) plough skids are in contact with the seabed and the plough share, which is approximately 0.2 m wide. A schematic of the plough footprint is provided in **Figure 4-10**.

The seabed will be left nearly undisturbed after ploughing. Only temporary track marks from the skids and the plough share will remain visible for a short period after installation, but will normally be rapidly reinstated due to seabed currents and wave action.

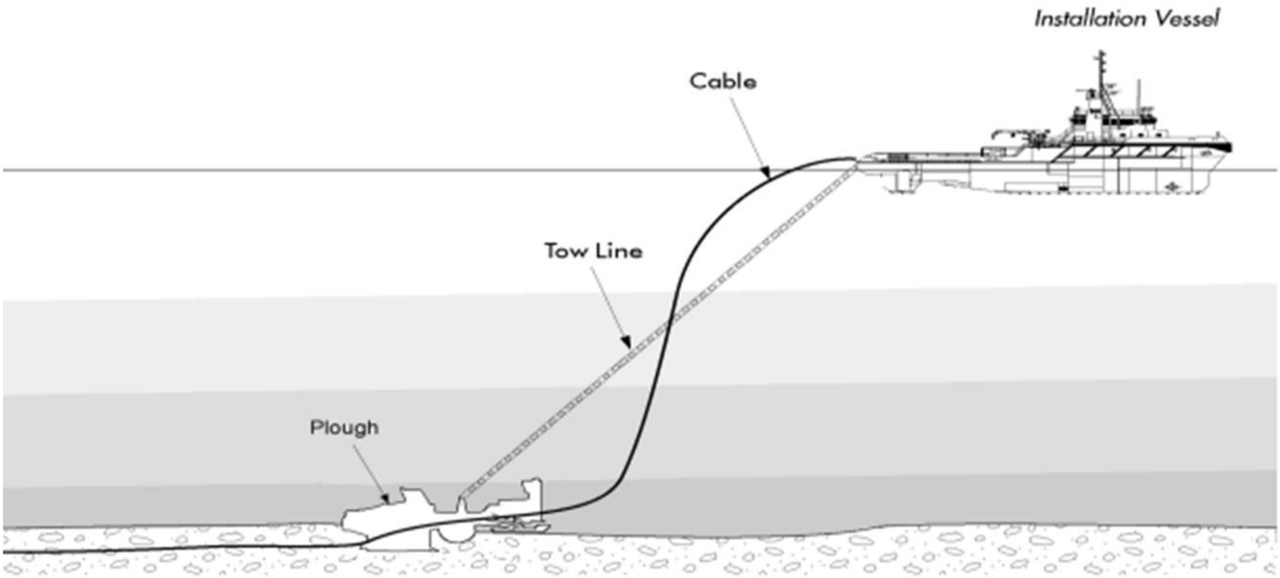
Ploughing is a well proven industry standard subsea cable burial process which will minimise the environmental impact compared to other available burial techniques such as water jetting, airlifting, sediment dredging, rock cutting and rock placement.

The plough will not be deployed in areas where steep or side slopes prevent it, or where the route crosses in-service infrastructures.

FIGURE 4-8 A SEA PLOUGH READY TO BE DEPLOYED FROM INSTALLATION VESSEL

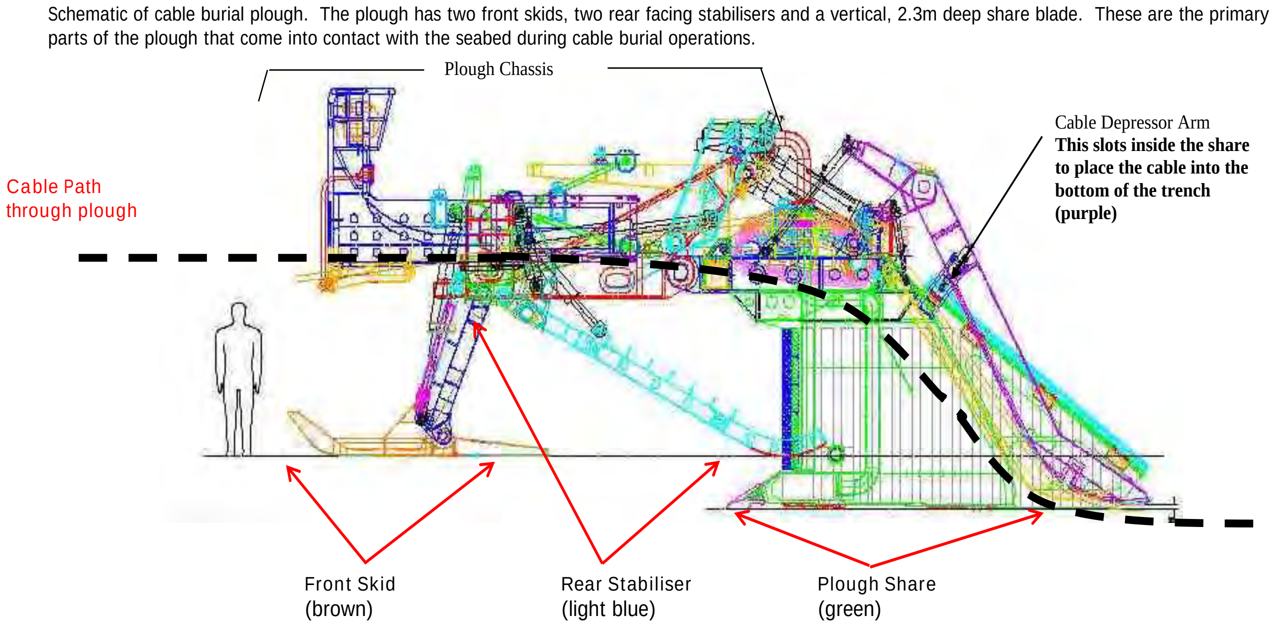
Source: ASN, 2024

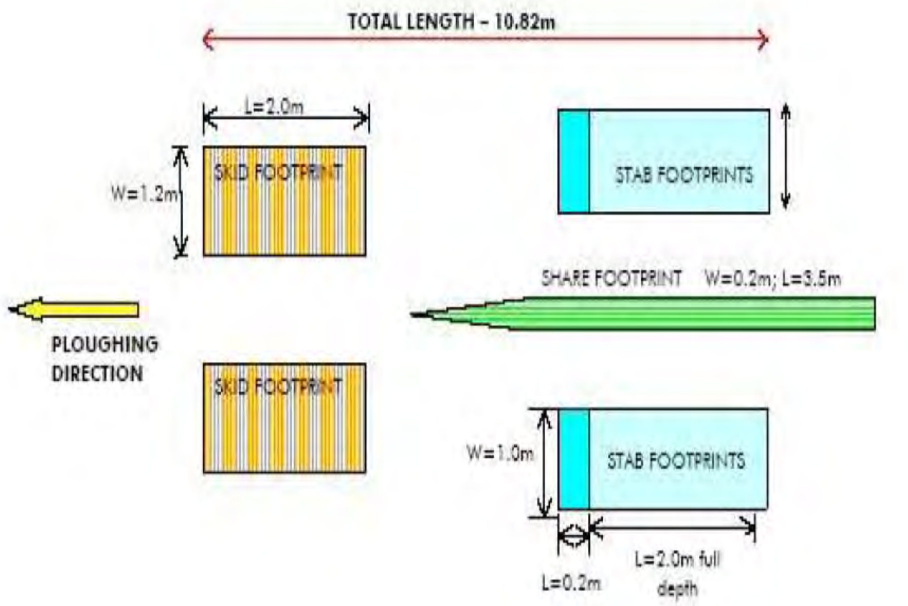
FIGURE 4-9 TYPICAL PLOUGHING CONFIGURATION



Source: ASN, 2024

FIGURE 4-10 SCHEMATIC OF A SEA PLOUGH AND PLOUGH FOOTPRINT



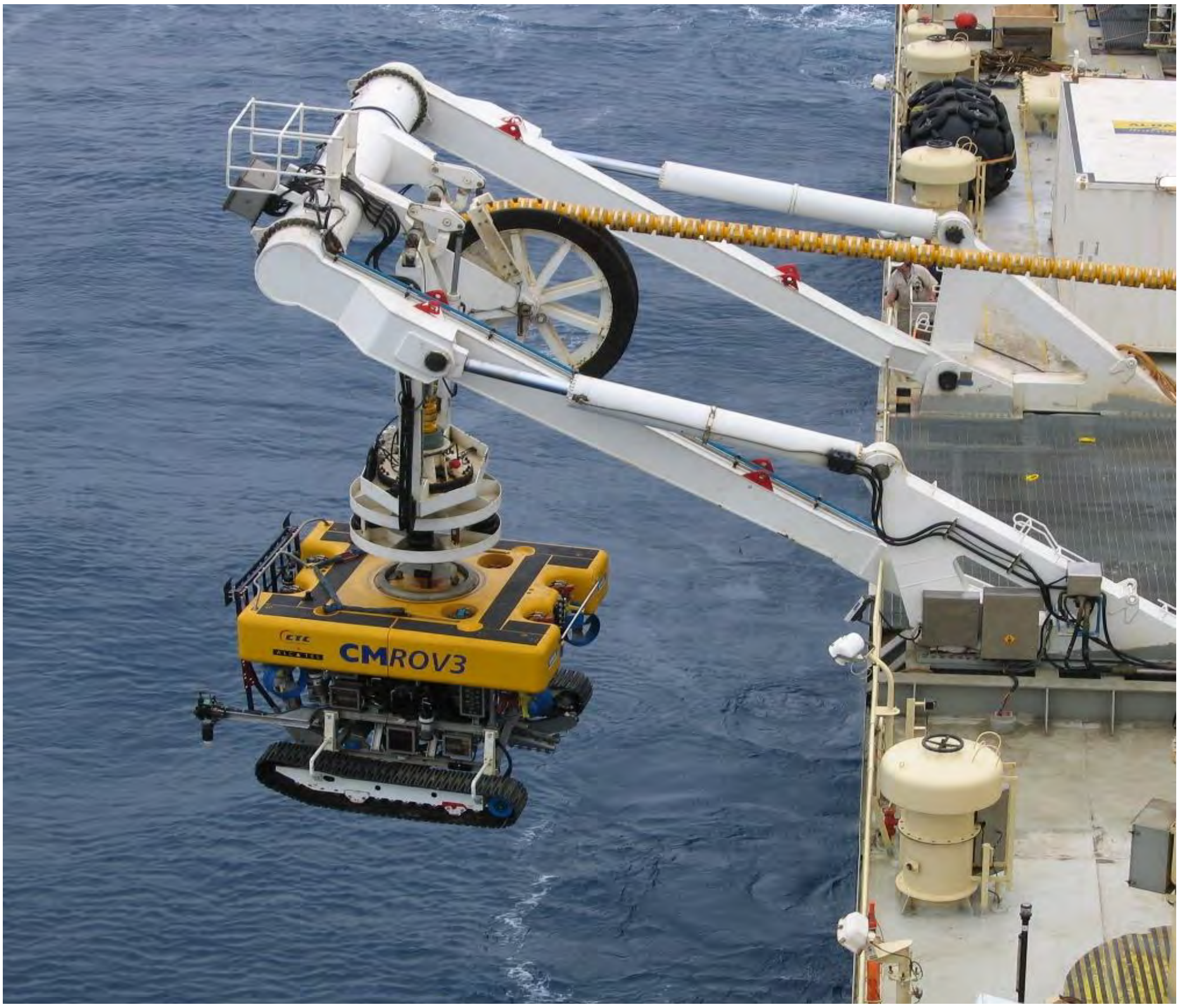


Source: ASN, 2024

4.3.3 POST-LAY INSPECTION AND BURIAL

Post-Lay Inspection and Burial (PLIB) is the last step of the subsea cable installation process where the subsea cable has been left unburied. This process will involve the use of a ROV deployed and operated from the installation vessel or third-party vessel via a control umbilical (**Figure 4-11**).

FIGURE 4-11 ROV DEPLOYMENT FROM THE VESSEL



Source: ASN, 2024

Post-lay inspection (PLI) of the planned subsea cable burial areas is undertaken to check and verify the success of subsea cable burial. During the PLI, the ROV with on-board cameras and detectors, tracks along the route recording and measuring burial depths and identifying areas that may require further burial.

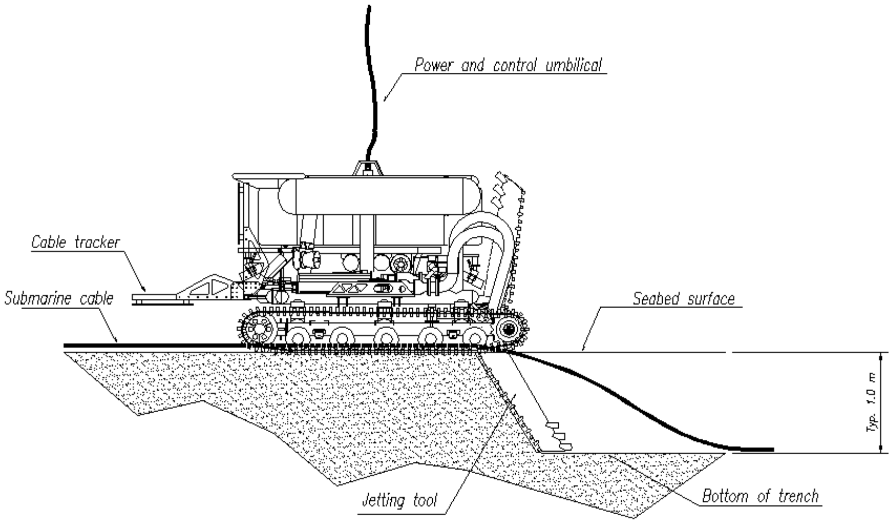
Post-lay burial (PLB) will be performed in planned plough burial areas at the following locations, using the same ROV:

- Crossings of in-service power and telecommunications cables;
- Unplanned plough skips; and
- Areas where seabed slopes are not suited for ploughing and where jetting burial is possible.

The ROV will be operated either in tracked or free flying (neutral buoyancy) mode. In free flying mode less power is available for water jetting tool(s). In tracked mode maximum water jetting power is available to bury the subsea cable. PLBs at subsea cable crossings will normally be performed in tracked mode.

During the PLB, a tracked ROV will use seawater jetting tools to cut a narrow trench approximately 0.2 m wide and liquefy the sediment to a target depth of approximately 2 m or to hard ground (whichever comes first) beneath the subsea cable, which then sinks under its own weight to the bottom of the trench. Most of the emulsified material will remain in the trench and quickly consolidate. Any residual open trench will backfill naturally (**Figure 4-12**).

FIGURE 4-12 POST-LAY BURIAL USING A TRACKED REMOTELY OPERATED VEHICLE



Source: ASN, 2024

4.3.4 IN-SERVICE CABLE CROSSINGS

According to the CRS (completed in September 2024), within the UK TS, three (3) existing subsea cables have been positively identified that will be crossed by the Aurora subsea cable. Details of the crossing locations are provided in **Table 4-5**.

No pipelines are expected to be crossed by the Aurora Project within the UK TS.

TABLE 4-5 CABLE CROSSINGS WITHIN THE UNITED KINGDOM TERRITORIAL SEAS

Crossing Type	Crossing Name	Latitude	Longitude	Water Depth (m)
Telecommunications cable	BT R100	059° 36.1826′ N	001° 20.3065′ W	98
Telecommunications cable	SHEFA-2	059° 34.8089′ N	001° 12.8040′ W	112
Power Cable	Shetland High-Voltage Direct Current (HVDC) Link	059° 40.0393′ N	001° 48.3978′ W	104

Note: WGS84 Datum in degrees decimal minutes.

Source: ASN, 2024

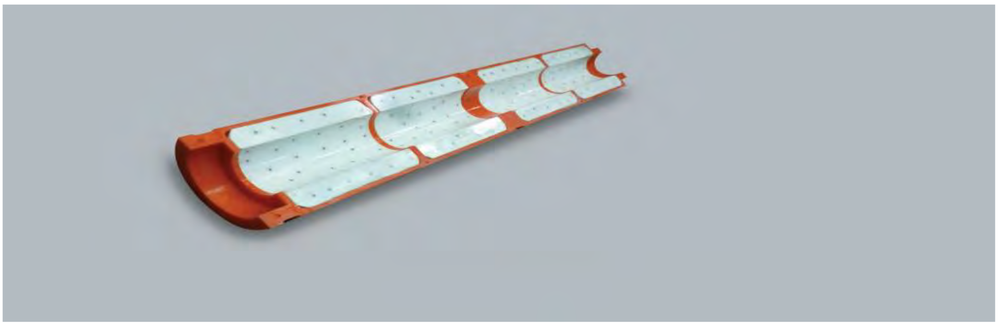
In order to avoid damage to the existing telecommunication cables and power cable in burial areas other at the crossing points, ploughing will stop at a minimum distance of 250 m, with the subsea cable being surface laid over the existing telecommunication cables and power cable, before resuming at a minimum distance of 250 m on the other side. Where the crossed cable have not been able to be identified with magnetometer during the CRS, a 500 m exclusion area will be applied on either side of the crossing.

At the telecommunications cable crossings, the subsea cable will be surface laid over the existing infrastructure. The crossings will follow the ICPC guidelines and the crossing angle will be as perpendicular as possible.

At the power cable crossing, before laying the subsea cable over the existing infrastructure, 100 m of the subsea cable will be encased in Uraduct® to provide a protective barrier between the subsea cable and the existing power cable. The fitting of the Uraduct (which consists of polyurethane, an inert material) on the subsea cable will take place onboard the installation vessel before deployment and will be bound together with bands of 19 mm stainless steel / titanium or similar sea water resistant banding material. **Figure 4-13** shows a typical Uraduct and its application on the cable. No other additional protection or separation (such as Pre-Rock Dump and Post Rock Dump) is proposed for the power cable crossing unless specifically required by the power cable owner as per the crossing agreement (yet to be reached).

If required, PLIBs will be undertaken at the crossings to increase the subsea cable protection.

FIGURE 4-13 TYPICAL URADUCT AND ITS APPLICATION ON A SUBSEA CABLE



Source: ASN, 2024

4.3.5 SUBSEA CABLE OPERATION AND MAINTENANCE

The subsea cable is intended to operate with no regular maintenance throughout the projected 25-year lifespan. However, should a problem be detected and the analysis concludes that the subsea cable is damaged or broken, it may be necessary to retrieve and remove the damaged segment of the subsea cable and replace with new subsea cable, which is spliced into the system. Recovery of the damaged subsea cable involves grapnel activities similar to those used in RC operations (**Section 4.3.1.1**).

A repair vessel would be deployed and an ROV or electrodes used to determine the location of the fault. Once located, the subsea cable would be retrieved to the vessel by grapnels and then cut. The cut segment will be recovered on board the repair vessel and retained for disposal when onshore.

Following testing, the faulty portion of the subsea cable would be removed, and a new subsea cable segment joined to one end of the subsea cable. The two ends of the subsea cable would be re-joined and then lowered back into position on the seabed. If necessary, post-repair inspection and burial (PRIB) may be carried out following any subsea cable repairs to bury the repaired subsea cable. The repair process itself (including PRIB) would take a minimum of seven (7) days, subject to weather conditions. However, this does not take into account regional location of the subsea cable and jointing spares, vessel availability and the operational / work permits that may be required by the repair vessel.

4.3.6 RETIREMENT, ABANDONMENT OR DECOMMISSIONING

The Aurora Project has a planned in-use life span of 25 years, however the Aurora Project could operate long after this period.

At the end of its life span, the subsea cable and the associated terrestrial infrastructure will be dealt with in line with the legislation in force at the time and based on consideration of the Best Practicable Environmental Option (BPEO), taking into account socio-economic and environmental impacts, technical and financial feasibility and local regulations. The subsea cable may be dealt with differently in accordance with the following options:

The subsea cable itself can either be removed or left *in situ*. Standard international industry practice is to leave subsea cables *in situ* where they have been colonised by benthic organisms and the impacts of removal would be greater than the impacts of leaving the subsea cable in place, or where removal of the subsea (and often partially buried) cable is technically or economically impractical. The subsea cable will be inert and there are no significant long-term environmental impacts from leaving subsea cables *in situ*.

Should removal of the subsea cable be undertaken, this would involve mobilising a vessel to recover the subsea cable and transport it to a suitable location for reuse, recycling or disposal at an appropriate facility. Impacts of removal would be similar in nature to the impacts of installation.

Should a full or partial recovery of the subsea cable be required, a decommissioning plan that aligns with industry recommendations and standards (i.e. ICPC Recommendation 1-14A '*Management of Decommissioned and Out-of-Service Cables*') will be developed and adhered to.

It should be noted that United Nations Environment Program (UNEP) documentation (Carter *et al.,* 2009) points out that the removal of subsea telecommunication cables and associated infrastructure should be evaluated on a case-by-case basis, as the procedures for withdrawal and some local conditions (based on soil / sediment type, crossing other cables, etc.) can often have a greater environmental impact than the procedures related to the installation itself.

4.4 PROJECT SCHEDULE

4.4.1 CABLE ROUTE SURVEYS

The CRS were completed in September 2024. The results of the CRS were used to inform the final subsea cable route, identifying any obstacles to be avoided, as well as informing the characterisation of the environment.

4.4.2 SCHEDULE FOR ACTIVITIES WITHIN UK TS

The activities within UK TS are currently anticipated to commence in Q2 2027. The estimated duration of the activities (subject to weather conditions) is presented in **Table 4-6**. These activities will operate on a daily 24-hours working schedule.

TABLE 4-6 ESTIMATED DURATION FOR THE ACTIVITIES WITHIN UNITED KINGDOM TERRITORIAL SEAS

Activity	Estimated Duration (subject to weather conditions)
RC and PLGR	3 days
Subsea Cable Installation (including ploughing)	5 days
PLIBs	3 days

5. ASSESSMENT METHODOLOGY

This EA Report assesses whether the Aurora Project is 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 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**.

5.1 SCOPING

5.1.1 TOPICS SCOPED IN TO THE ASSESSMENT

Table 5-1 outlines which topics have been scoped in and scoped out of this EA Report. Justification for each scoping decision has been included in each corresponding section, with **Section 7** detailing the scoped out topics in full.

TABLE 5-1 SCOPING RESULTS: TOPICS TO BE CONSIDERED IN THE ENVIRONMENTAL ASSESSMENT

Topic	Scoping Decision	Further Details
Marine Physical Processes	Scoped In	See **Section 6.1**
Water and Sediment Quality	Scoped In	See **Section 6.2**
Benthic Ecology	Scoped In	See **Section 6.3**
Marine Mammals	Scoped In	See **Section 6.4**
Fish and Shellfish Ecology	Scoped In	See **Section 6.5**
Ornithology	Scoped Out	See **Section 7**
Commercial Fisheries	Scoped In	See **Section 6.6**
Shipping and Navigation	Scoped In	See **Section 6.7**
Aviation and Radar	Scoped Out	See **Section 7**
Airborne Noise and Vibration	Scoped Out	See **Section 7**
Marine Archaeology	Scoped In	See **Section 6.8**
Other Users	Scoped In	See **Section 6.9**
Seascape, Landscape and Visual Amenity (SLVA)	Scoped Out	See **Section 7**

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 subsea cable projects, the Study Area will be defined with consideration to several key factors, including the footprint of the project, characteristics of the subsea cable, 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 Aurora Project.

Stage 4: assessment of these activities and their potential impacts against the sensitivity of each identified receptor, to produce an overall effect significance. Embedded mitigation measures agreed with the Aurora Project are considered when assessing the overall potential effect significance within each topic's assessment. Whilst a formal 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 Aurora Project.

Effect: the specific consequence (to a resource / receptor) arising from an alteration of existing conditions (impact) caused by 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 Aurora Project activities that are likely to result in changes to the natural and human environment throughout the life 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 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 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 5-2**. 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 5-2 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 5-3**. The magnitude is defined differently according to the type of impact.

TABLE 5-3 DEFINITIONS OF MAGNITUDE

Magnitude	**Environmental Impact**
Negligible	Slight environmental damage contained within the premises.
	Impacts unlikely to be discernible or measurable.

Magnitude	Environmental Impact
	No contribution to transboundary or cumulative impacts.
Low	Minor environmental damage, but no lasting impacts.
	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.
Medium	Environmental damage that will persist or require cleaning up.
	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.
High	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 5-4**.

TABLE 5-4 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 and embedded as part of the Project

Description (**Section 4**) are accounted for in the evaluation of effect significance and summarised in **Appendix 3**. 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 the Aurora Project and are inherent to the Aurora Project for which consent is sought. The EA process, which includes consultation, has informed the optioneering and design process in order to optimise the Aurora Project 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 3**). 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 3**.

5.2.2.5 CUMULATIVE IMPACT ASSESSMENT

The cumulative impact assessment considers combined impacts of the Aurora Project with the impacts from other planned projects, on the same single receptor / resource.

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

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

Stage 1 Identification of activities, receptors and pressures

Projects included in the cumulative impact assessment are identified based on their likelihood to interact with common receptors and pressures with the Aurora Project. Cumulative impacts arise from other planned activities. The ongoing 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 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 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

This section provides the environmental effects assessment for the topics which have been scoped in to the EA Report, as indicated in **Table 5-1**. For each topic, the structure within each subsection will include the following information, according to the stages detailed in **Section 5.2**:

- Identification of suitable Study Area, specifically for the topic to be discussed;
- Description of the baseline environment;
- Identification of the Aurora Project activities that may cause potential effects to the environment related to the individual topic, and subsequent assessment of the potential direct, indirect, primary and / or secondary impacts; and
- An assessment conclusion for the individual topic in each subsection.

Topics which have been scoped out of the EA Report are discussed in **Section 7**.

6.1 MARINE PHYSICAL PROCESSES

This subsection describes and assesses the potential for significant effects that the installation of the subsea cable may have on any marine physical processes. For this assessment, only marine physical processes within the UK TS, which extends 12 nm from the baseline at Mean Low Water Springs (MLWS), have been considered.

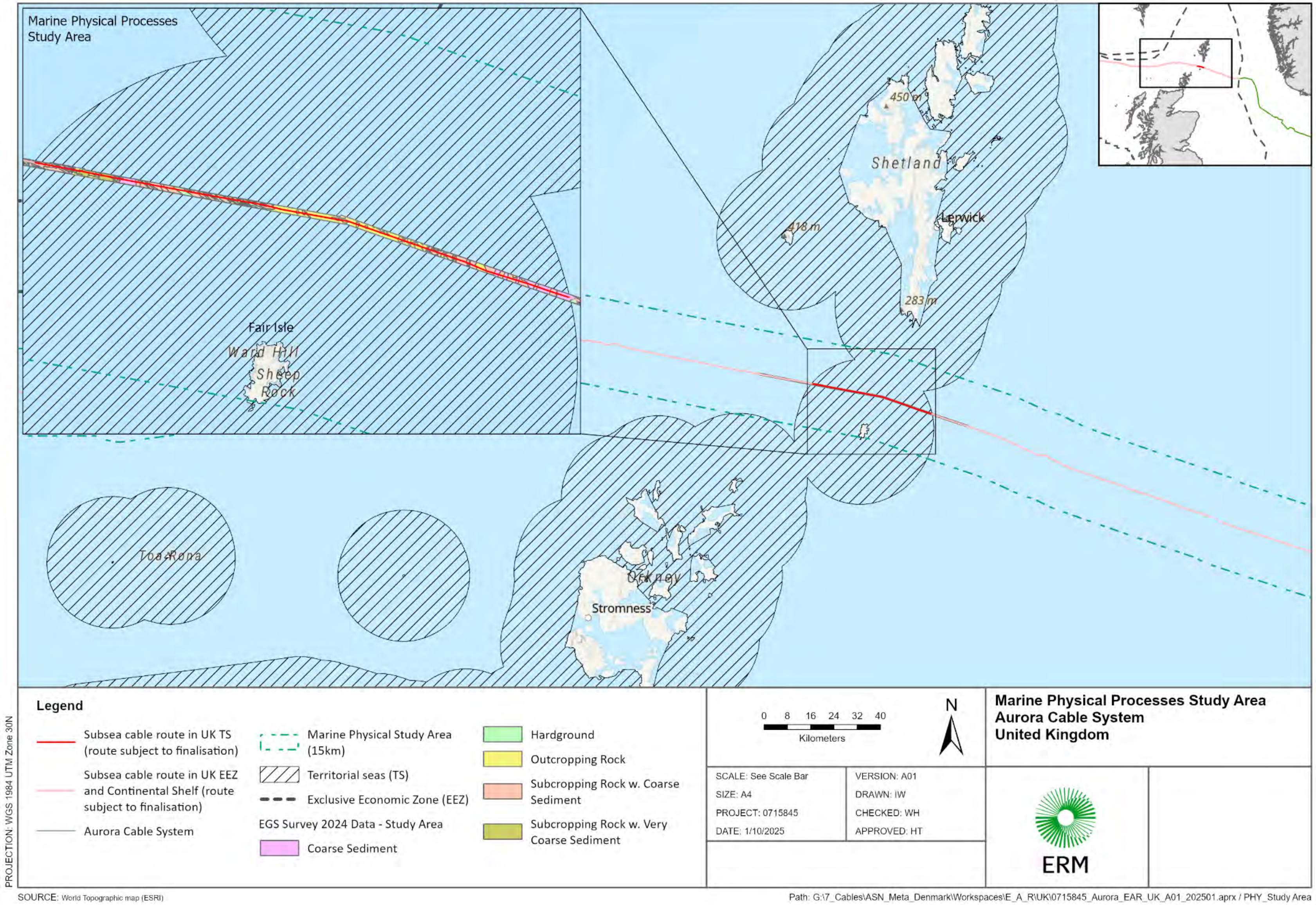
Marine physical processes includes bathymetry, seabed geology, waves and tidal processes, and sediment transport processes. Therefore, potential effects from Aurora Project activities (**Section 4.3**) on marine physical processes may include:

- An increase in suspended sediment concentration;
- 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 the marine physical processes are pathways, and any changes may result in effects to other sensitive receptors, such as: Water and Sediment Quality (**Section 6.2**), Benthic Ecology (**Section 6.3**), Fish and Shellfish Ecology (**Section 6.5**), and Marine Archaeology (**Section 6.8**). These potential effects are discussed in their respective subsections.

The marine physical processes Study Area (hereafter referred to as 'The Study Area'), shown in **Figure 6-1** consists of the proposed subsea cable route, along with a buffer extending 15 km either side of the route itself, thus providing a designated area of interest (AoI) which will be the focus for the following section. 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.

FIGURE 6-1 MARINE PHYSICAL PROCESSES STUDY AREA, UNITED KINGDOM TERRITORIAL SEAS



6.1.1 BASELINE ENVIRONMENT

Several key factors were investigated in order to establish an understanding of the baseline geological and oceanographic conditions found within the region. The factors below are described and outlined in the following sections:

- Bathymetry;
- Seabed geology - Including bedrock and overlying sediment;
- Waves and tidal processes; and
- Sediment transport in the Study Area.

The following marine physical processes baseline has been established based on a review of metocean data and academic publications, alongside CRS data from Aurora Project geophysical and geotechnical surveys completed in September 2024 (**Section 4.1**).

6.1.1.1 BATHYMETRY

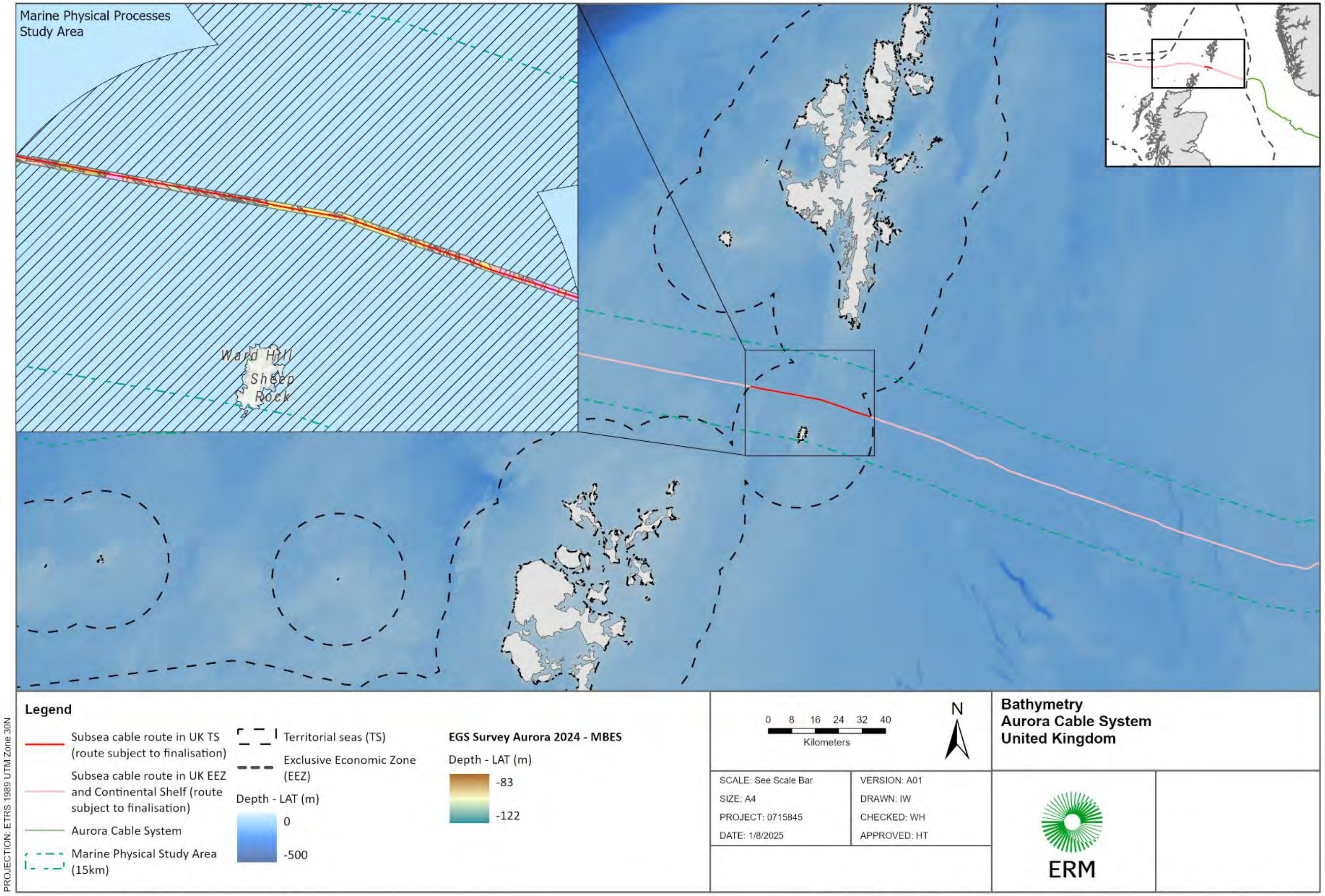
Scientific literature focusing on the region around the Fair Isle Channel, coupled with publicly available data, and geophysical data collected during the CRS (completed in September 2024), was used to investigate the bathymetry in the Study Area. Through the centre of the region, a bathymetric high runs north to south between Shetland and Fair Isle, with maximum depths ranging between approximately 87 m and 112 m.

To the east, the gradient of the seabed gradually increases, reaching depths greater than 121 m, and continues at approximately these depths as far as the North Sea Shelf, whereupon depths increase significantly.

To the west, water depths gradually increase and reach approximately 108 m and remain constant for approximately 12 km, where a second bathymetric highpoint is found. This high point, approximately 5 km wide, sits just inside the boundary of the Study Area and has maximum water depths of approximately 88 m. West of this highpoint, the seabed gradient once again gradually increases, reaching depths of over 100 m upon reaching the boundary of the Study Area, as shown in **Figure 6-2** (Bradwell *et al.*, 2019, EMODnet, 2022).

The baseline within the marine physical processes Study Area also encompasses coastal waters within the UK TS. The coastline along Fair Isle can be described as predominantly rocky, with steep coastal cliffs. There is a general absence of sandy coastline, with the exception of sporadic sandy beaches that are found in several coves throughout the island.

FIGURE 6-2 BATHYMETRY AND MARINE PHYSICAL PROCESSES STUDY AREA



SOURCE: Licensed under CC-BY 4.0 from the European Marine Observation and Data Network (EMODnet), funded by the European Commission.

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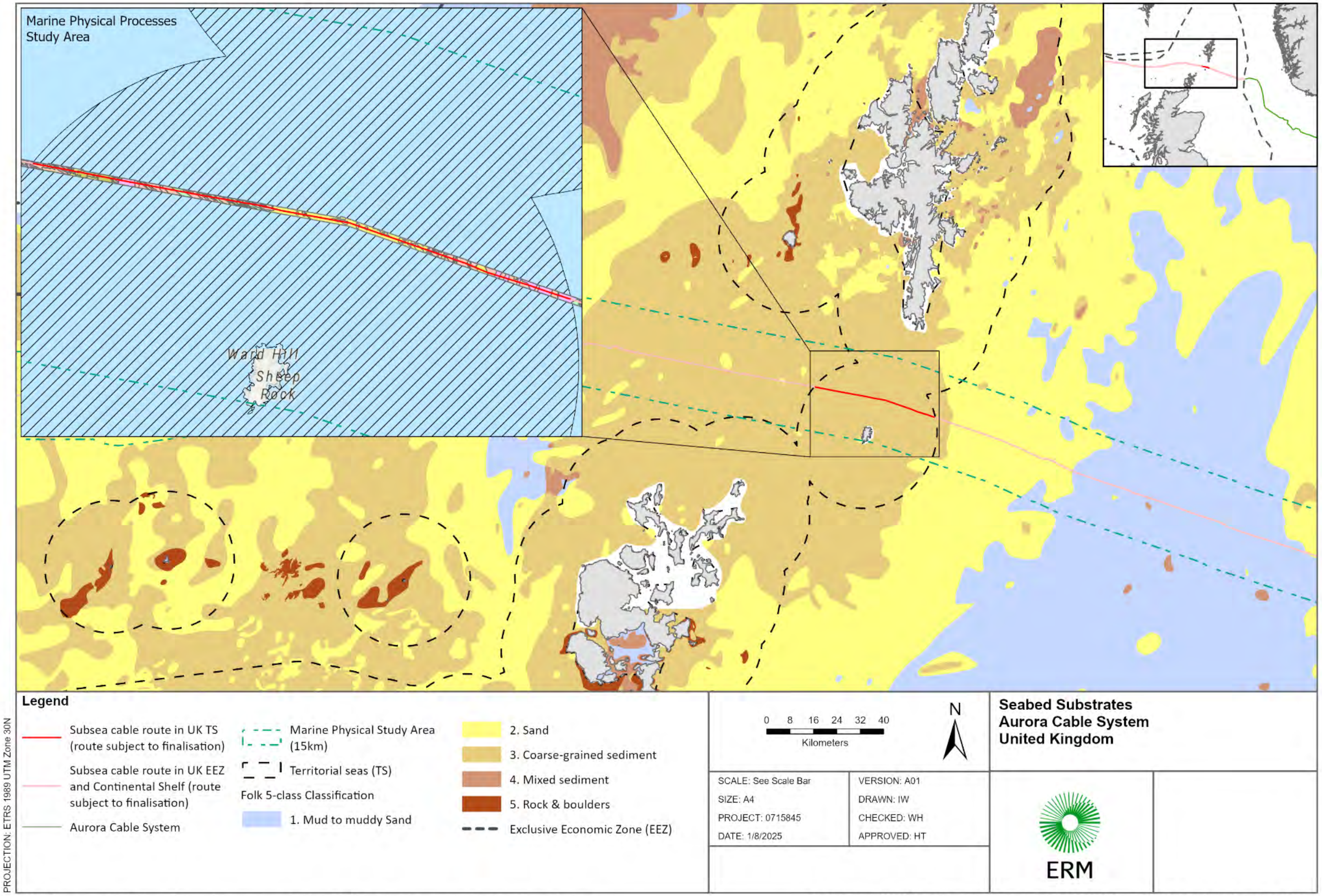
6.1.1.2 SEABED GEOLOGY

The seabed along the subsea cable burial route within the Study Area is predominantly composed of coarse grained undifferentiated Holocene sediments - the bulk of which are sandy gravels, with areas of muddy sands also being present, as shown in **Figure 6-3** (EMODnet, 2022; EGS, 2024). These seabed sediments vary in thickness from between 5 and 20 m thick along much of the route, to areas less than 5 m thick along the north to south orientated bathymetric high running between Shetland and Fair Isle (Holmes *et al.*, 2004), as mentioned in **Section 6.1.1.1**.

Mesozoic Interbedded Sandstone and Paleozoic Sedimentary deposits form the underlying bedrock (EMODnet, 2022). However, with the exception of the Fair Isle coastline, approximately 15 km south of the proposed route, newly collected geophysical and geotechnical data shows that the seabed along the subsea cable burial route lacks significant areas of outcropping, with sub-cropping bedrock below seabed sediments being more common. In areas where outcropping bedrock is encountered and cannot be avoided through micro-siting of the subsea cable route, burial of the subsea cable is unlikely to be feasible and surface laying will be considered. This study will focus primarily on the seabed (Holocene) sediments, and bedforms.

The seabed in the Study Area has a considerable number of relict, immobile glacial bedforms, the majority of which are geomorphological features that are identified as moraines. These features, which were formed by the movement of ice sheets during the last glacial maximum, sit along the path of the subsea cable burial route in both the east and western portions of the Study Area; and are oriented approximately north-north-east, to south-south-west (EMODnet,2022, Bradwell *et al.,* 2019). In the western region, seabed escarpments, also oriented approximately north-north-east, to south-south-west have also been identified (EMODnet, 2022), along with sediment banks to the east and west of Fair Isle.

FIGURE 6-3 SEABED SUBSTRATE AND MARINE PHYSICAL PROCESSES STUDY AREA, UNITED KINGDOM TERRITORIAL SEAS



SOURCE: Licensed under CC-BY 4.0 from the European Marine Observation and Data Network (EMODnet) Seabed Geology initiative, funded by the European Commission.

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6.1.1.3 WAVES AND TIDES

Long term hindcast records of wave and tidal data were analysed from ABPmer's SEASTATES model. Within the Study Area, the mean significant annual wave heights were between 2.26 m and 2.50 m, increasing marginally to between 2.51 m and 2.75 m in the west; with mean significant winter wave heights of approximately 3.5 m being common throughout the Study Area. The predominant westerly wave direction (> 60% of the time), coupled with maximum recorded wind speeds of over 16 m/s at 100 m throughout the Study Area, also result in maximum wave heights > 6 m also being recorded (ABPmer, 2018). Wind generated storm surge currents, and near bottom orbital currents that, when generated from wind-waves, can potentially produce significantly higher peak flow speeds than measured tidal currents (Pantin, 1991).

With its location straddling the North Atlantic and North Sea, the Study Area is also subject to strong tidal activity, which, coupled with non-tidal ocean currents that pass between Shetland and Fair Isle, make the region hydrodynamically quite active (Holmes *et al.,* 2003). In the centre of the Study Area, 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, with the exception of a stretch of water proximal to the north coast of Fair Isle, where mean spring peak flows in excess of 1.50 m/s are recorded (ABPmer, 2018). However, this location is approximately 8 km south of the subsea burial route, therefore this distance, coupled with a general east to south-easterly direction of current flow, suggests that these localised increases in flow speeds are likely to have no effect on works being carried out during subsea cable burial.

6.1.1.4 SEDIMENT TRANSPORT

The geological makeup of the Study Area is described in **Section 6.1.1.2** and shows that the seabed is predominantly composed of coarse-grained sediments e.g. sandy gravels, with sparse areas of muddy sands also being present. Modern sediment input to the Study Area is low, thus resulting in a lack of suitable *in situ* fine grained sediment that could be transported in abundance toward the subsea cable burial route. Consequently, the modern seabed here predominantly represents the reworking of coarse sediments deposited during the last glaciation (Holmes *et al.,* 2003).

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 6.1.1.3**). This combination determines the overall direction of sediment transport through the Study Area, which, broadly speaking, is toward the east and south-east – the general direction of the North Sea Shelf (Holmes *et al.,* 2003).

Both tidal and wave-generated currents can promote the mass movement of sediment and aid in maintaining sediment suspension. However, the existing bathymetry, general coarse grain nature of seafloor sediments, lack of suitable sediment sinks in the region, and low input of modern sediment, ensures that the bulk of the sea floor within the Study Area itself, remains undifferentiated and reworked, with modern finer grained mobile sediments being deposited to the periphery (Holmes *et al.,* 2003).

6.1.2 IMPACT ASSESSMENT

Geophysical and geological data, alongside metocean data and academic publications, were investigated to establish an understanding of the baseline environment in the Study Area (**Section 6.1.1**). These data were then used to assess the impacts and potential resultant effects that may occur on marine physical processes within the Study Area as a direct result of the installation, operational and decommissioning phases of the Aurora Project.

This assessment follows the Aurora Project's EA criteria and 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.

6.1.2.1 POTENTIAL IMPACTS

The assessment of potential impacts will not focus on the operational phase, or decommissioning phase of the Aurora Project, as any works that may be needed during these phases (e.g. cable repairs, cable removal etc.) will result in comparable but reduced effects compared with the effects resulting from the installation phases. A final decommissioning plan setting out the strategy for dealing with the subsea cable at the end of its operation life, will also only be produced towards the end of subsea cable operation, currently estimated to be in the region of 25 years. At this time the decommissioning options will be assessed and the preferred method, or combination of methods, selected in accordance with the prevailing legislation at that time and in consultation with the relevant authorities.

Potential effects on marine physical processes that may arise during the installation phase include those resulting from the PLGR and burial of the subsea cable to a target depth of 2 m; both of which are outlined in **Section 4.3**. Where it is not possible to bury the subsea cable, for example at subsea cable crossing points or in areas of outcropping bedrock, surface laying of the subsea cable will take place. The use of subsea cable protection in areas where burial is not feasible has therefore also been considered below.

During the installation phases of the Aurora Project, potential impacts on marine physical processes within the Study Area may include:

- Changes to seabed or coastal morphology due to subsea cable installation;
- Increased suspended sediment concentration due to RC (including PLGR) or ploughing;
- Changes to the sediment transport system due to ploughing; and
- Changes to the wave regime or oceanic currents due to the installation of subsea cable protection infrastructure.

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

6.1.2.2 IMPACT ASSESSMENT

Changes to seabed or coastal morphology

Project activities associated with the installation phases of the Aurora Project may act as the sources for potential changes to the morphology of the seabed or coastline within the marine physical processes study; specifically, RC (including PLGR), and the installation of the subsea cable into the seabed via a towed subsea cable burial plough.

As outlined in **Section 4.3.1**, RC (including PLGR)involves running a towed grapnel along the seabed to ensure that the subsea cable route is clear of debris and obstructions. The procedure is designed such that subsea penetration is typically in the region of approximately 40 to 80 cm depending on the stiffness of the seabed sediment, with a typical affected area being between 0.75 to 1.00 m, laterally. Should the first pass be unsuccessful, or encounter significant debris, a subsequent parallel pass would be needed, however, this pass would employ the same technique and would therefore affect an area that is dimensionally similar to the initial pass. Based on the procedure and equipment to be utilised, it is determined that any impact (morphological or otherwise relating to the RC [including PLGR]) will be superficial and localised and will likely be temporary due to the re-working of sediment by oceanic currents and subsequent subsea cable installation activities.

During the subsea cable installation, effective route engineering allows larger morphological features with significant slope to be avoided, while features deemed to be within the operational limits of the plough, e.g. the escarpments and moraines found within the Study Area (**Section 6.1.1.2**), will be crossed perpendicularly, thus minimising exposure of the bedforms to the trenching activities. During subsea cable burial, the movement of the plough across the seabed will typically result in back trenching, therefore ensuring that the newly buried subsea cable is not exposed, and that there are minimal lasting changes to the seabed morphology. As with RC (including PLGR), the subsea cable burial plough is unlikely to affect an area of the seabed much greater than the dimensions of the asset, therefore further mitigating long-lasting effects to the morphology of the seabed. In the case of the Aurora Project in the UK TS, the impact footprint on the seabed from the burial asset to be used is limited to four (4) plough skids in contact with the seabed, and the plough share (approximately 0.2 m wide; **Figure 4-10**). Once ploughing is complete, the seabed will be left nearly undisturbed, apart from temporary track marks that are likely to remain visible for a short period. However, normal seabed morphology will be reinstated shortly thereafter due to reworking associated with bottom currents.

Although the Study Area includes a stretch of cliffs and rocky coastline at Fair Isle (**Section 6.1.1.1**), it is important to note firstly, that it sits approximately 10 km south of the proposed subsea cable burial route, and secondly, that the subsea cable does not make landfall. No infrastructure (temporary or otherwise), relating to the Aurora Project will be installed along the coastal section of the Study Area, and therefore issues associated with such infrastructure will not occur, and no changes to the morphology of the coastline are expected.

Based on the installation methodology and subsea cable design specifications, any changes to the morphology of the seabed will be negligible and very short term, and in the case of the coastline, non-existent, therefore, **no significant or lasting effects** are expected.

TABLE 6-1 SUMMARY OF IMPACT ASSESSMENT FOR SUBSEA CABLE INSTALLATION ON CHANGES TO SEABED OR COASTAL MORPHOLOGY

Impact: Changes to Seabed or Coastal Morphology	**Sensitivity**	**Magnitude**	**Risk**	**Significance**	**Additional Mitigation**
Seabed morphology	Low	Low	Negligible	Not Significant	None Required

Impact: Changes to Seabed or Coastal Morphology	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Coastal morphology	Low	Low	Negligible	Not Significant	None Required

Increase in suspended sediment concentration

Project activities associated with the installation phases of the Aurora Project may act as the sources for potential increases in the Suspended Sediment Concentration (SSC) within the Study Area.

During each phase of the Aurora Project, an increase in SSC is probable, however, this is likely to be short term and spatially constrained, with most of the sediment deposited immediately adjacent to the subsea cable route. Once disturbed, coarse material settles to the seabed relatively quickly, whereas fine sediment may produce a more persistent plume. However, even with fine sediments, suspended sediment concentrations typically return to background levels within a hundred few meters of the subsea cable route (OSPAR, 2009; BERR, 2008), after being carried by natural processes e.g. by tidal flows and oceanic currents (BERR, 2008).

The extent of a sediment plume generated during subsea cable burial typically depends on the geological and geomorphological characteristics of the seabed, with fine grained substrate creating larger sediment plumes than coarse grained. As outlined in **Section 6.1.1.2**, the seabed along the subsea cable route is predominantly composed of coarse-grained sediments - namely sandy gravels and gravelly sands (**Figure 6-2**), therefore suspended sediment is expected to travel substantially less distance than would be seen in areas where finer grained sediments are abundant – e.g. fine sands or silts; which, with the exception of infrequent concentrations of muddy sand, are limited within the Study Area.

During subsea cable burial, seabed sediments will be temporarily suspended and reworked during ploughing, however, much of the coarse-grained sediment will naturally infill the trench or be deposited within a few meters of the subsea cable route, thus leaving only the finer sediment in suspension, which will fall to the seabed after a short period of time, likely within a few hundred metres of the subsea cable route (BERR, 2008).

A case study on the Sheringham Shoal Offshore Windfarm, which has similar seabed characteristics to that observed within the Study Area (BERR, 2008), saw that during trenching, most coarse-grained sediments were re-deposited back into the trench, leaving only a plume consisting of sands and fine-grained sediments. Furthermore, this study saw that fine sediments suspended during burial operations had settled within 30 minutes, leaving no sediment in suspension – apart from that being mobilised during natural sediment transport, further than 100 m from the burial site.

Studies show that the use of a cable plough results in significantly lower levels of sediment disturbance when compared to other trenching assets e.g. jetting, rock wheel etc. (BERR, 2008).

Based on the geological properties of the seabed, coupled with the trenching techniques and assets being utilised during the installation phase of the Aurora Project, any increases in suspended sediment concentrations are likely to be spatially restricted and short term, thus implying that **No Significant Lasting Effects** are expected.

It should be noted that the suspended sediment concentration is a pathway which has the potential to affect other (non-physical processes) receptors such as benthic ecology, fish and shellfish ecology, marine mammals, and marine archaeology; these are considered in their respective subsections in **Section 6**.

TABLE 6-2 SUMMARY OF IMPACT ASSESSMENT FOR SUBSEA CABLE INSTALLATION ON INCREASED SUSPENDED SEDIMENT CONCENTRATIONS RECEPTORS

Impact: Increased suspended sediment concentration	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Increased suspended sediment concentration	Low	Low	Negligible	Not Significant	None Required

Changes to the sediment transport system

Project activities associated with the installation phases of the Aurora Project may act as the sources for potential changes to the sediment transport system within the marine physical processes Study Area.

As outlined in **Section 6.1.1.4**, a sediment transport system is determined by factors including the availability of mobile sediments (e.g. sand), 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, such as offshore wind farm installations, can result in unfavourable changes to one or more of the above factors, such as increased sediment suspension, higher rates of sediment loss, or new areas of sediment deposition (Cai *et al.,* 2023). These changes are not limited to large scale projects however, as the alteration of a sediment transport system may also occur during subsea cable burial. The installation of subsea cable protection infrastructure can result in a minor or localised re-routing of oceanic currents, which can result in increased sediment scour, the unplanned accumulation of sediment, or in some cases, a change in the overall concentration of sediment being transported.

With the Aurora Project in UK TS, and along the proposed subsea cable burial route, the topography, geological constitution of the seabed, and general absence of large areas of outcropping bedrock, suggests that there is currently no requirement to install rock berm or other subsea cable protection measures. Instead, in locations where burial is not achievable, for example areas where bedrock is outcropping, or shallowly sub-cropping, surface laying of the subsea cable will take place. Should a case arise that would necessitate the installation of such measures, the low availability of mobile sediments, and coarse nature of *in situ* sediment in the Study Area (see **Section 6.1.1.4**), suggests that the sediment transport system should remain largely unaffected - even if subsea cable protection measures are required for discrete sections of the subsea cable.

Therefore, there will likely be no lasting or substantial changes to the sediment transport system in the region, and therefore, **No Significant or Lasting Effects** are expected to occur.

It should be noted that the sediment transport system is a pathway which has the potential to affect other (non-physical processes) receptors; these are considered in their respective chapters.

TABLE 6-3 SUMMARY OF IMPACT ASSESSMENT FOR SUBSEA CABLE INSTALLATION ON CHANGES TO THE SEDIMENT TRANSPORT SYSTEM

Impact: Changes to the sediment transport system.	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Increased Scouring	Low	Low	Negligible	Not Significant	None Required
Increased Deposition	Low	Low	Negligible	Not Significant	None Required
Changes to concentration of sediment transported.	Low	Low	Negligible	Not Significant	None Required

Changes to the wave regime or oceanic currents

Project activities associated with the installation phases of the Aurora Project may act as the sources for potential changes to the wave regime or oceanic currents within the marine physical processes Study Area.

Although an area of coastline is identified within the Study Area (**Section 6.1.1.1**), it is located far enough away from the subsea cable burial route (approximately 10 km), that no works associated with the Aurora Project during the installation or operational phases will be carried out proximal to this area. Furthermore, due to the subsea cable not making landfall within the Study Area, no permanent or temporary infrastructure will be installed at this location, therefore no changes to either the wave regime or oceanic currents in the nearshore are expected as a result of the works carried out during the Aurora Project in UK TS.

Subsea cable installation works in shallow water have the potential to temporarily affect tidal or oceanic currents; however within the offshore region of the marine physical processes Study Area, water depths are such that any temporary localised changes to the morphology of the seabed, for example associated with plough burial of the subsea cable, will not be sufficient to alter either the wave regime or oceanic currents. Furthermore, as described above, the absence of outcropping bedrock, and abundance of sandy gravels along the subsea cable route, means that the installation of subsea cable protection measures on the seabed which may have increased the potential for localised alterations to wave/currents regimes, are not planned.

Based on the above, no changes – short or long term, to the wave regime or oceanic currents due to works carried out for the Aurora Project are expected in the marine physical processes Study Area either nearshore or offshore, and therefore **No Significant Lasting Effects** are likely to occur.

TABLE 6-4 SUMMARY OF IMPACT ASSESSMENT FOR SUBSEA CABLE INSTALLATION ON CHANGES TO THE WAVE REGIME, OR OCEANIC CURRENTS

Impact: IMPACT 3	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Changes to the Wave Regime	Low	Low	Negligible	Not Significant	None Required
Changes to Oceanic Currents	Low	Low	Negligible	Not Significant	None Required

6.1.2.3 ASSESSMENT CONCLUSIONS

Within the Study Area, the potential effects on marine physical processes were assessed for the installation phases of the Aurora Project. Potential effects that are considered include: the morphology of the seabed or coastline, an increase in suspended sediment concentration, changes to the sediment transport system itself, and changes to the wave regime or oceanic currents. Given the inert nature of the subsea cable and the planned burial wherever feasible, potential effects on marine physical processes during the operational phase are considered to be **Negligible**.

It is determined that any potential direct effects on the marine physical processes would be localised to an area not much larger than the footprint of the asset being used for RC (including PLGR) and subsea cable burial, which in this case, would be approximately 3.0 m either side of the buried subsea cable. It has also been determined that potential indirect effects from suspension of sediments would likely be contained within the subsea cable route, and that, with the aid of natural processes, baseline conditions would be restored within a very short period of time. Thus, any impacts on the offshore region will be of **Low** magnitude, and potential effects to the coastline are expected to be **Negligible**.

In conclusion, based on the findings of the above, **No Significant or Lasting Effects** are expected as a result of the Aurora Project in UK TS, on the marine physical processes within the Study Area.

6.2 WATER AND SEDIMENT QUALITY

The Study Area for water and sediment quality is based on the marine physical processes offshore Study Area, as illustrated in **Section 6.1** (Marine Physical Processes) and **Figure 4-1**, which includes the subsea cable route. The secondary zone of interest (ZoI) provides a buffer around the subsea cable route, influenced by tidal advection, defined by the mean spring tidal excursion which represented the expected maximum distance that suspended sediments may be transported on a mean spring tide in a flood or ebb direction (refer to **Figure 6-7**).

6.2.1 BASELINE ENVIRONMENT

The baseline for marine water and sediment quality relates to the distribution of water and sediment physico-chemical properties in the Study Area. The water and sediment baseline considers the following receptors:

- Water quality; and
- Sediment quality.

Further information on the marine physical processes baseline is provided in **Section 6.1** (Marine Physical Processes).

Water and sediment quality in Scotland, particularly in the offshore regions near Shetland and Orkney, indicate minimal anthropogenic contamination (Baxter *et al.,* 2011). These regions have had lower historical and current hydrocarbon inputs compared to the mature oilfields in the east. Other contaminants found include heavy metals and persistent compounds such as Polychlorinated biphenyls (PCBs), which are also typically found at low levels, although certain areas may exhibit localised elevations due to historical inputs.

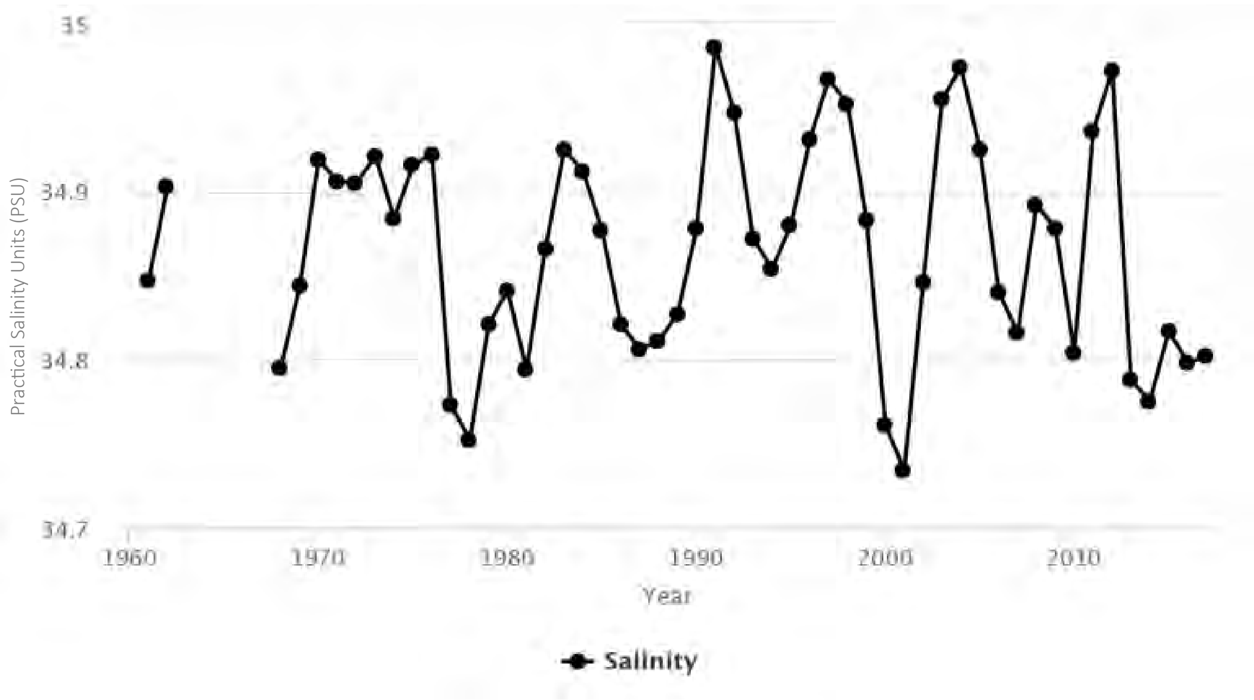
6.2.1.1 WATER QUALITY

The quality and composition of the water present throughout the Study Area is expected to be similar to that recorded for unpolluted coastal and offshore northern North Atlantic and northern North Sea waters.

Salinity and Temperature

In the northern North Sea, the salinity and temperature is heavily influenced by inflowing North Atlantic water which causes a variation in salinity and temperature, with no clear trend in salinity around the Fair Isle and a strong increase in temperature since the mid-1980s (Dye *et al.,* 2013; Cornes *et al.*, 2023). Between 2013 and 2017, the salinity is around 34.8 practical salinity units (PSU) in the Fair Isles, which is typically low for the area (**Figure 6-4**) (Dye *et al.*, 2020).

FIGURE 6-4 SALINITY IN THE FAIR ISLE CURRENT FOR THE PERIOD 1960 TO 2017.



Source: Marine Scotland Science, Aberdeen, UK and International Council for the Exploration of the Sea (ICES) Report on Ocean Climate. Image from IROC, 2017.

There is a strong variation in sea surface temperature (SST) between summer and winter months in UK TS. The warmest SST is in August, with an average of approximately 13.21 degrees Celsius (°C) and the coldest SST is in March with an average of 8.19 °C.

Suspended Sediment Concentration

SSC in the Scottish Continental shelf area and the Rockall Trough and Bank area remain generally low (little seasonal variation), due to the coarse nature of the sediment. Annual average of SSC is 0.7 mg/l (Cefas, 2018).

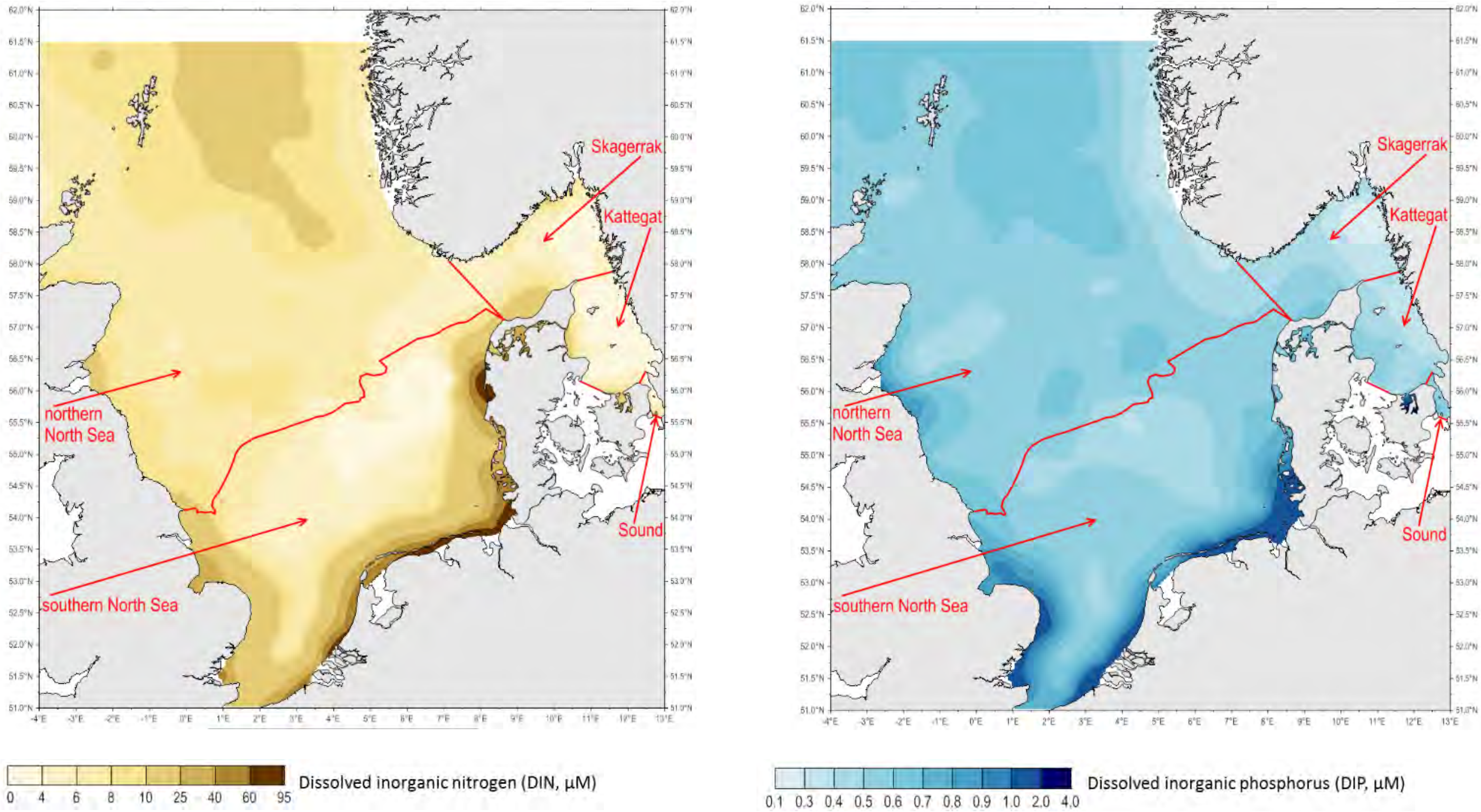
Nutrients and Primary Production

The northern North Sea offshore area is characterised by seasonally stratified waters affecting biogeochemical and primary productivity cycles (seasonally eutrophic waters). Nutrients reach the North Sea through land runoff, the atmosphere, weathering processes, rivers and direct discharges including nitrogen, phosphorous and silicate, which are discharged due to anthropogenic sources. Anthropogenic sources include agriculture, aquaculture, combustion and wastewater activities. The levels of dissolved inorganic nitrogen (DIN) and dissolved inorganic phosphorous (DIP), during the winter season, is indicative of the quantity of these discharges in the water column and consequently, water quality (OSPAR, 2017). Nitrogen levels in rivers which flow out into the North Sea typically originate from agricultural use of fertiliser, and the presence of phosphorous from erosion or wastewater (EEA, 2008).

Dissolved macronutrients enrichment can cause rapid primary producers' growth (phytoplankton bloom) leading to excess algal biomass and eutrophication events; these are characterised by high concentrations of chlorophyll-a (indicator parameter) (Song *et al.,* 2022). Primary production in relation to marine biodiversity and food webs is considered to ensure good environmental status by monitoring abundance and distribution. Excess abundance of primary producers can lead to eutrophication, which can decrease available oxygen concentration (hypoxia) due to bacteria-driven decomposition processes and algal respiration induced by light-limitation, subsequently affecting the growth of other living organisms in the area (EEA, 2008).

Average winter concentrations of DIN and DIP in the North Sea are shown in **Figure 6-5**.

FIGURE 6-5 DISSOLVED INORGANIC NITROGEN (LEFT) AND DISSOLVED INORGANIC PHOSPHOROUS (RIGHT) IN THE NORTH SEA (1990-2014)



Source: OSPAR, 2017

6.2.1.2 SEDIMENT QUALITY

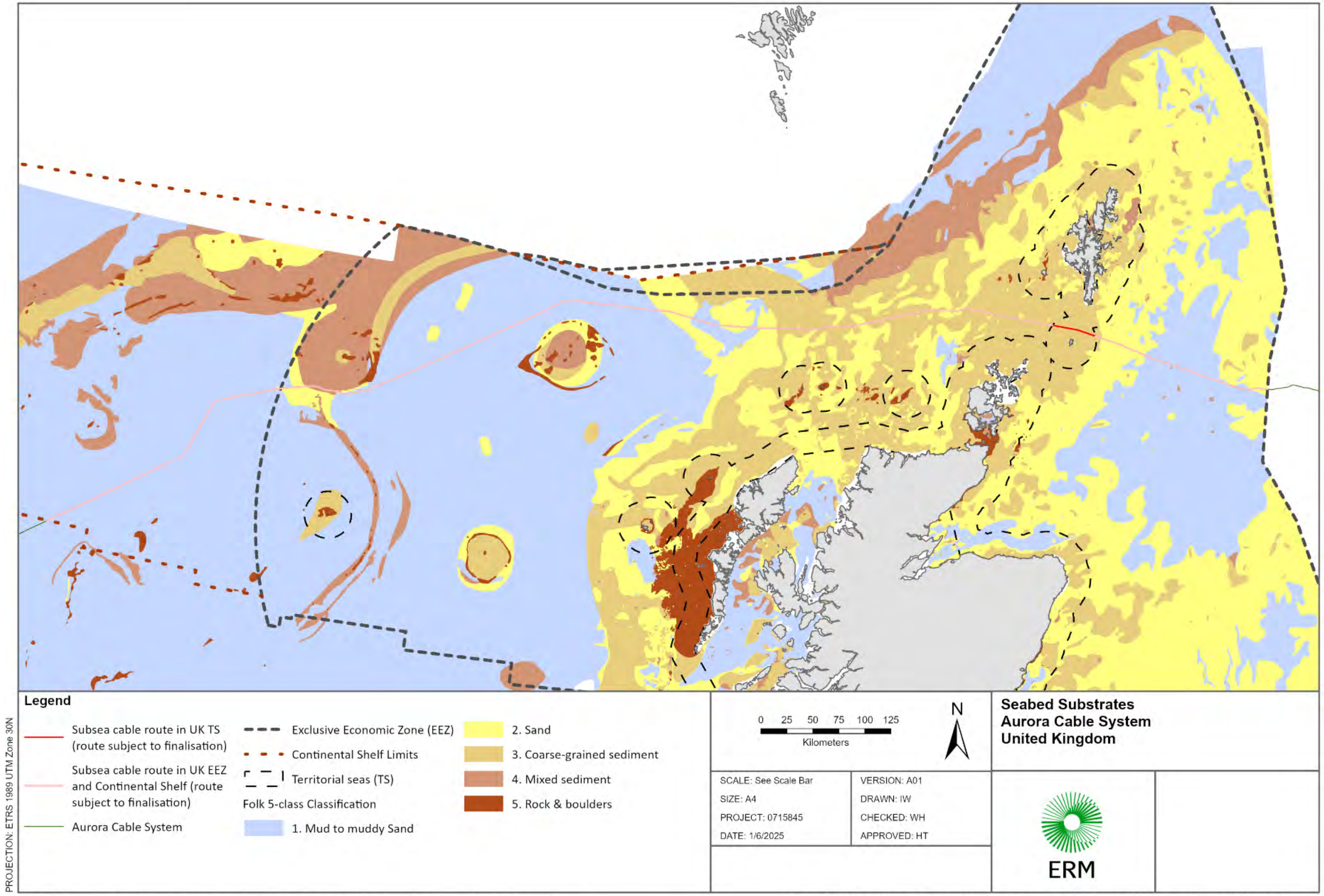
As there are no formal statutory quantitative Environmental Quality Standards (EQS) for sediments, unlike water quality, this assessment will consider the potential release of sediment bound contaminants and heavy metals through sediment disturbance.

Sediment Type

The sediment type in the Study Area between 0-200 m is composed of sandy gravel, with areas of muddy sandy gravel, gravelly sand, slightly gravelly sand, sand and sandy mud (BGS, 2020). In depths greater than 200 m to the west, the sediment changes from gravelly sand, to gravelly muddy sand and slightly gravelly sandy mud with smaller areas of gravelly mud, muddy sandy gravel, sandy mud and mud (BGS, 2020). **Figure 6-6** shows coarse grained sediment between the Orkney and Shetland Islands with smaller areas of sand present and sand to the east. To the west, the sediment type is characterised by coarse grained sediment and sand with sporadic small areas of rock and boulders, before the sediment type changes to mud to muddy sand in the deeper areas of the west coast of Scotland.

Survey data collected in September 2024 corroborates the BGS (2020) findings and Particle Size Analysis (PSA) showed that sediments along the subsea cable route comprised primarily of gravelly sand.

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



SOURCE: Licensed under CC-BY 4.0 from the European Marine Observation and Data Network (EMODnet) Seabed Geology initiative, funded by the European Commission.

Path: G:\7_Cables\ASN_Meta_Denmark\Workspaces\E_A_R\UK\0715845_Aurora_EAR_UK_A01_202501.aprx / Full_UK Substrate

The mean spring tidal excursion within the Study Area extends 10.68 km east to west direction, in the region north-west of the Fair Isles (tidal diamond F, Admiralty Chart 2182C-0) and 6.7 km south-east to north-west direction, in the region south-east of the Fair Isle (tidal diamond G, Admiralty Chart 2182C-0). This distance influences the Secondary ZoI buffer, as suspended sediments may be transported on a mean spring tide in a flood or ebb direction, although it is expected, due to the coarse nature of the sediment, that most suspended sediment will be deposited closer to the source of activity. It should be noted that the current between Fair Isles and Shetland Islands can reach up to 1 m/s (ABP, 2024).

Action Levels

Marine and coastal sediment quality is commonly affected by contaminants which enter the marine environment through sources such as freshwater runoff, rivers, sewage effluent, agricultural and industrial discharges or from other offshore locations, transported by currents.

Marine Scotland (2017) Action Levels (ALs) shown in **Table 6-5** are used to compare and characterise baseline sediment quality conditions to assess material suitable for sea disposal. Contaminant levels below Action Level 1 (AL1) are not of concern and are unlikely to impact the final licensing decision. If contaminant levels are above Action Level 2 (AL2), they are generally considered unsuitable for disposal at sea. The Action Levels provide an appropriate context for professional consideration for contaminant levels in sediment for activities which propose to disturb the seabed.

TABLE 6-5 MARINE SCOTLAND CONTAMINATION ACTION LEVELS

Contaminant	Action Level 1 mg/kg dry weight (ppm)	Action Level 2 mg/kg dry weight (ppm)
Arsenic (As)	20	70
Cadmium (Cd)	0.4	4
Chromium (Cr)	50	370
Copper (Cu)	30	300
Lead (Pb)	50	400
Mercury (Hg)	0.25	1.5
Nickel (Ni)	30	150
Zinc (Zn)	130	600
Organotins (i.e. Tributyltin [TBT])	0.1	0.5
PCBs	0.02	0.18

Source: Marine Scotland, 2017

Contaminants

Metallic contaminant concentrations recorded at the five (5) Clean Seas Environment Monitoring Programme (CSEMP) monitoring stations within the region of East Shetland, located 60 km from the Study Area at the closest point, are summarised in **Table 6-6**. The contamination of heavy mental concentration was relatively low within the area, with no exceedances of AL1 or AL2. Shucksmith (2017) shows that metal concentrations in sediments were lower in Shetland than in the rest of Scotland.

TABLE 6-6 SUMMARY OF METALLIC CONTAMINANT CONCENTRATIONS IN SEDIMENT FROM 2020 CLEAN SEAS ENVIRONMENT MONITORING PROGRAMME MONITORING POINTS OF RELEVANCE

Metal	Sediment Contaminant Concentration (mg/kg)				
	Intermediate SE01 (2006 to 2016)	Open Sea SE01 (2019)	Open Sea SE02 (2014 to 2019)	Open Sea SE03 (2019)	Open Sea SE04 (2019)
Approximate distance to closest Aurora Project boundary (km)	60 km	221 km	174 km	177 km	172 km
Cd	X=0.07 n=30 (0.05-0.12)	X=0.08 n=3 (0.08-0.08)	X=0.08 n=1	X=0.08 n=3 (0.08-0.08)	X=0.08 n=3 (0.08-0.08)
Cr	X=27.4 n=30 (15.9-53.6)	X=20.2 n=3 (18.6-23.1)	X=18.9 n=1	X= 17.83 n=3 (14.5-20.0)	X=20.73 n=3 (16.3-28)
Cu	X=4.09 n=30 (2.55-20.5)	X=3.53 n=3 (3.13-3.96)	X=3.32 n=1	X=2.966 n=3 (2.27-3.38)	X=3.49 n=3 (2.7-4.8)
Hg	X=0.014 n=25 (0.0074-0.03)	X=0.179 n=3 (0.149-0.261)	X=0.162 n=1	X=0.011 n=3 (0.093-0.12)	X=0.144 n=3 (0.185-0.126)
Ni	X=11.11 n=30 (5.79-60.5)	X=7.86 n=3 (7.07-9.03)	X=7.57 n=1	X=6.93 n=3 (5.29-7.79)	X=7.96 n=3 (6.17-11.1)
Pb	X=11.27 n=30 (9.07-17)	X=9.87 n=3 (9.2-10.6)	n/a	X=10.08 n=3 (9.14-10.7)	X=10.1 n=3 (9.25-11.1)
Zc	X=18.84 n=30 (13.9-42.3)	X=15.26 (14.1-17.1)	X=14 n=1	X=13.6 n=3 (11.3-14.9)	X=15.13 n=3 (11.5-20.4)

Note: X = mean concentration (minimum-maximum), n = number of samples.

Source: Marine Scotland, 2022; GoBe Consultants Ltd., 2024.

Metal and PCBs and Polycyclic aromatic hydrocarbons (PAHs) concentrations have been recorded in Scottish waters in 2013. At the survey station to the west of Shetland, approximately 40 km from the proposed subsea cable route, PCB levels were below the Environmental Assessment Criteria (EAC) (OSPAR, 2008). However, at the survey station to the west of Shetland, approximately 65 km from the proposed subsea cable route, PCB levels were above the EAC (NMPi, 2021).

PAH concentrations included Naphthalene (NAP), Penanthrene (PA) and Pyrene (PYR). Concentrations were below background assessment concentration, while PA and PYR were found to have a downward trend in concentration since 2013 (NMPi, 2021). However, the mean results for PAHs throughout the 2018 sample concluded a concentration of 1.23 mg/kg which is above AL1 (**Table 6-5**).

In situ data were collected in September 2024 and analysed by SOCOTEC UK Ltd. The data corroborate the findings of the CSEMP study as shown in **Table 6-7**.

TABLE 6-7 CONTAMINANT CONCENTRATIONS IN SEDIMENT FROM THE *IN SITU* SURVEY

Compound		Station 1	Station 2	Station 3	Station 4
Metals mg/kg dry weight	As	4.1	4.3	2.9	2.8
	Cd	0.12	0.16	0.18	0.21
	Cr	4.2	3.3	3.1	2.4
	Cu	2.1	1.7	1.6	1.8
	Hg	<0.01	<0.01	<0.01	<0.01
	Ni	4.8	5.1	5.2	5.8
	Pb	4	5.3	5.9	7.8
	Zn	7.5	5.1	4.9	5
Organotins[1] mg/kg dry weight	Dibutyltin (DBT)	<0.001	<0.001	<0.001	<0.001
	TBT	<0.001	<0.001	<0.001	<0.001
PCBs[1] µg/kg	ICES7	LoD[2]	LoD	LoD	LoD
PAHs[1] µg/kg		LoD	LoD	LoD	LoD
Total Hydrocarbons (THC)[1] µg/kg	THC	1990	1420	1340	1250

Notes:
[1] Results are classified as deviant due to improper storage of samples (plastic containers were used leading to potential contamination risks). Although the integrity of the data may be compromised, the data remains valuable and in line with expected concentrations.
[2] LoD= below Limit of Detection (LoD).

Overall, contaminant concentrations remained low. Metals concentrations (i.e. As, Cr, Cu, Ni, Pb, Zn, Cd and Hg) remained below AL1. Organitins, PCBs and PAH concentrations were very low and remained below LoD. THC was also low, not exceeding the Dutch RIVM thresholds of 5,000,000 µg/kg.

The published and *in situ* data on contaminants within the Study Area suggests that there are no known significant concentrations of sediment contaminant along the proposed subsea cable route and the chemical composition of the sediments appear similar to that recorded for typical unpolluted coastal / offshore Atlantic waters.

6.2.2 WATER FRAMEWORK DIRECTIVE ASSESSMENT

Designated Waters

Surface waters are designated under the River Basin Management Plan under the Water Environment and Water Services (Scotland) Act 2003. This act requires any projects which have the potential to interact with surface waters to consider the Water Framework Directive (WFD) to ensure that water bodies achieve or maintain a 'Good Ecological Status' (GES) or 'Good Ecological Potential' (GEP).

The assessment of the impacts from the Aurora Project installation activities on compliance with the WFD has utilised the generic environmental objectives outlined in Article 4.1 of the WFD. These objectives include:

- Prevent Deterioration: must implement measures to prevent the deterioration of the status of all surface water and groundwater bodies;
- Achieve GES: must protect, enhance, and restore all bodies of surface water and groundwater with the aim of achieving GES, or GEP by specified deadlines; and
- Ensure compliance with environmental objectives for water bodies and protected areas.

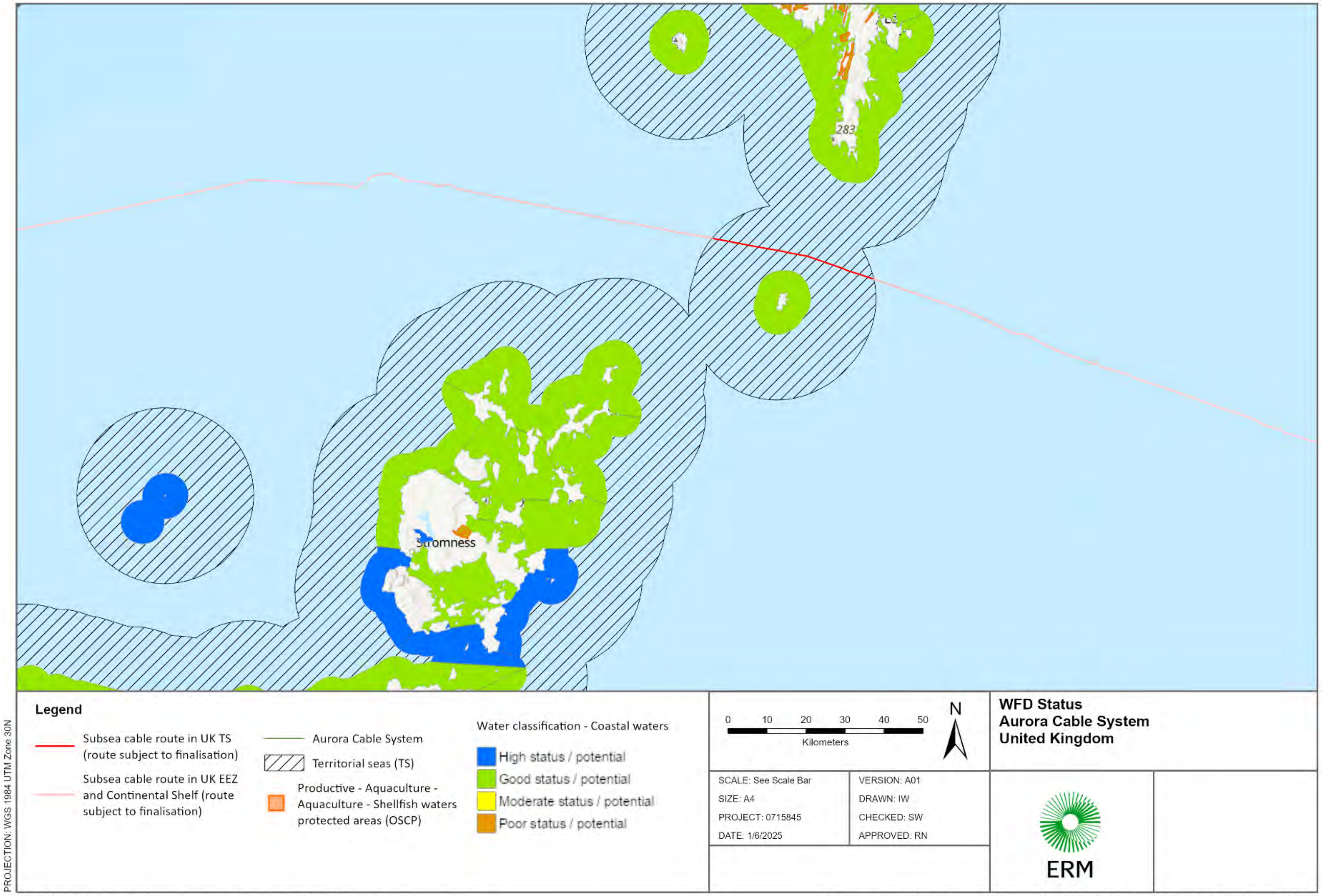
This evaluation has been conducted for the relevant water bodies to pinpoint potential alterations in hydromorphological aspects, and physical and biological quality elements attributable to the preferred option. The WFD Compliance Assessment methodology is completed in the following stages:

- Stage 1 Screening: identify activities associated with the Aurora Project (at each phase) that have the potential to have an effect, and identify the water bodies hydrologically connected to the Aurora Project activities;
- Stage 2 Scoping: identify the potential risks to each water body and each receptor; and
- Stage 3 Impact Assessment: assess the hydrological connectivity (pathway) of the site investigation activities (source) on the WFD water bodies and other statutory receptors.

Further considerations are then made in relation to additional mitigation measures required to prevent impact on the WFD water body status.

Water bodies within the effect range of the proposed Aurora Project activities have been considered in this assessment as shown in **Figure 6-7**. In this instance, the effect range is based on the potential extent of sediment transport (marine physical process impact pathways) and sediment plume net drift and dispersion, in turn affected by tidal advection. This AoI is determined by marine physical processes (**Section 6.1**) and a discretionary buffer of 10 km has been implemented for the purpose of water bodies consideration.

FIGURE 6-7 WATER FRAMEWORK DIRECTIVE WATER BODIES LOCATED WITHIN 3 NAUTICAL MILE BOUNDARY



SOURCE: World Topographic Map, ESRI. Contains public sector information from SEPA, licensed under the Open Government Licence v3.0.

Path: G:\7_Cables\ASN_Meta_Denmark\Workspaces\E_A_R\UK\0715845_Aurora_EAR_UK_A01_202501.aprx / UK WFD

The subsea cable route will not pass through any designated water bodies. The closest water body is Fair Isle (ID 200245) coastal water body, which is located >5 km from the proposed subsea cable route (GES). However, significant sediment plume and fine deposition is predicted to occur out to a maximum of 2 km (Gooding *et al.*, 2012) therefore, no potential significant effects are expected as a result of the Aurora Project. The Sumburgh Head to Kettla Ness (ID 200508) and the Isle of Noss to Sumburgh Head (ID 200256) coastal water bodies are located >20 km from the Aurora Project footprint.

It is important to note that no UK National Network sites are located <2 km from the Aurora Project footprint and the Aurora Project will not intersect any designated bathing waters. Dunnet is the closest designated coastal bathing water to the subsea cable route approximately 150 km to the south, on mainland Scotland. Therefore, as the Aurora Project is a significant distance away, the Aurora Project will not impact the bathing water quality.

The Aurora Project will also not intersect any designated shellfish waters. The closest shellfish water to the Aurora Project area is Clift Sound on Shetland Islands, which is approximately 40 km north of the subsea cable route.

Therefore, no WFD designated water body receptors will be carried forward for Stage 2 Scoping or Stage 3 Impact Assessment as all water bodies are screened out at Stage 1 Screening. It has been assessed that there are no feasible impacts due to the distance separating the designated water bodies from the proposed subsea cable route.

6.2.3 IMPACT ASSESSMENT

Following establishment of baseline conditions present within the Study Area and surrounding areas, and an understanding of the proposed Aurora Project activities throughout installation, operation and maintenance, and decommissioning phases, it is possible to assess the potential effects on water and sediment quality receptors by identifying possible impact pathways.

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

Designated WFD waterbodies have been screened out of the assessment for potential impacts below (**Section 6.2.3.2**) and will not be assessed further.

6.2.3.1 POTENTIAL IMPACTS

The operational phase has been scoped out of the assessment. No seabed disturbance, affecting the sediment and water quality receptors, has been predicted to occur during the subsea cable operational phase of the Aurora Project.

Potential impacts to water and sediment quality during Aurora Project activities 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; and
- Deterioration of water and sediment quality due to accidental events from unplanned fuel spills due to collisions or equipment.

Furthermore, once installed, the subsea cable requires no maintenance except in instances where a repair is required, where the repair works will be applied for under a separate licence. In such instances, the magnitude of the potential impacts caused by repairing the subsea cable are similar to those described for the installation activities, but will take place over a much smaller area and time period.

6.2.3.2 IMPACT ASSESSMENT

Resuspension of Sediment

The proposed activities associated with installation of the subsea cable (e.g. ploughing) have the potential to decrease the water and sediment quality receptors within the Study Area through resuspension of sediment, which will cause an increase in temporary SSC. The majority of the substrate in the area comprises coarser sediment such as sand, gravelly sand and sandy gravel and therefore, although SSC will be elevated immediately after installation, concentrations are predicted to fall to background levels within close proximity of the installation activity (66 m of ploughing activity in hard ground areas and 70 m in sandy areas), with fine deposition occurring out to a maximum of 2 km (Gooding *et al.,* 2012). Resuspension of finer material will be rapidly diluted and dispersed in the water with far field deposition predicted to be less than 1 mm, even during jetting operations (worst-case scenario for SSC impact magnitude) (Gooding *et al.,* 2012).

During installation, impacts on surrounding sediment type and geological features may occur due to the displacement and deposition of suspended sediment over the immediate area. However, it is not expected to substantially extend beyond the immediate footprint of the subsea cable plough.

It is expected that sediments in the dynamic environment along the subsea cable route will re-deposit over a short period of time and potential effects to the seabed conditions and water quality in the area will be limited and short-term. Therefore, due to the **Low** sensitivity of the receptors and the **Low** magnitude of the impact, the overall significance of the potential effects is assessed as **Negligible**, and therefore **Not Significant**. No additional mitigation measures are required.

TABLE 6-8 SUMMARY OF IMPACT ASSESSMENT FOR RESUSPENSION OF SEDIMENT ON WATER AND SEDIMENT QUALITY RECEPTORS

Impact: Resuspension of Sediment	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Water Quality	Low	Low	Negligible	**Not Significant**	None required
Sediment Quality	Low	Low	Negligible	**Not Significant**	None required

Resuspension of contaminants

The proposed activities associated with installation of the subsea cable (e.g. ploughing) have the potential to cause deterioration of the water and sediment quality receptors within the Study Area through resuspension of contaminants potentially present within sediments.

Water and sediment quality within the Study Area is generally good (**Section 6.2.1**). There were low metals concentrations in the area, with no exceedances of AL1 or AL2. Additionally, PCBs and PAHs were below background levels. Metals and hydrocarbons concentrations were all at background level, therefore mobilisation of contaminated sediments from seabed disturbance is not expected to occur.

In conclusion, due to the **Low** sensitivity of the receptors and the **Low** magnitude of impact, the overall significance of the potential effects is assessed as **Negligible**, and therefore **Not Significant**. No additional mitigation measures are required (**Table 6-9**).

TABLE 6-9 SUMMARY OF IMPACT ASSESSMENT FOR RESUSPENSION OF CONTAMINANTS ON WATER AND SEDIMENT QUALITY RECEPTORS

Impact: Resuspension of Contaminants	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Water Quality	Low	Low	Negligible	**Not Significant**	None required
Sediment Quality	Low	Low	Negligible	**Not Significant**	None required

Vessel Discharges

Discharges from Aurora Project vessel will be small and will not take place within 12 nm of land. Embedded mitigation measures will be in place such as implementation of an offshore WMP and waste management during the Aurora Project activities will comply with applicable legislation and MARPOL 73/78. The installation vessel 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 (refer to **Appendix 3** for the Embedded Mitigation Measures). Ballast water discharges from the installation vessel will be managed in accordance with the BWM Convention.

Given that vessel discharges will not take place within the UK TS, the overall significance of the potential effects is assessed as **Negligible**, and therefore **Not Significant**. No additional mitigation measures are required (**Table 6-10**).

TABLE 6-10 SUMMARY OF IMPACT ASSESSMENT FOR VESSEL DISCHARGES ON WATER AND SEDIMENT QUALITY RECEPTORS

Impact: Vessel Discharges	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Water Quality	Low	Low	Negligible	**Not Significant**	None required
Sediment Quality	Low	Low	Negligible	**Not Significant**	None required

Unplanned events – Accidental Spills

There is potential for accidental spills to occur in the event of a vessel-to-vessel collision or a loss of containment of contaminants such as diesel fuel. Any hydrocarbon discharge during subsea cable installation 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. Therefore, the environmental risk is considered minimal.

Embedded mitigation measures during Aurora Project activities such as the WMP and Emergency Plan will comply with applicable legislation and MARPOL 73/78. The installation vessel 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 (**Appendix 3**). A modern, appropriately equipped installation vessel will be used which complies with relevant MARPOL and IMO requirements for drainage systems, effluent treatment and materials storage to ensure the risk of impact to seawater quality is reduced and mitigated, should an unplanned event occur. Measures to avoid collisions will be in place in accordance with COLREGs and good industry practice, including notifications, lighting and signage. In the event of an accidental spill, spill response equipment will be located on board and the spill response will be executed in accordance with the vessel's Shipboard Oil Pollution Emergency Plan (SOPEP), as specified under MARPOL 73/78.

In conclusion, due to the **Low** sensitivity of the receptors, the size of the receiving environment and the **Low** magnitude of impact, the overall significance of the potential effects is assessed as **Negligible**, and therefore **Not Significant**. No additional mitigation measures are required (**Table 6-11**).

TABLE 6-11 SUMMARY OF IMPACT ASSESSMENT FOR UNPLANNED FUEL SPILLS DUE TO COLLISIONS OR EQUIPMENT ON WATER AND SEDIMENT QUALITY RECEPTORS

Impact: Unplanned Events	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Water Quality	Low	Low	Negligible	**Not Significant**	SOPEP and WMP
Sediment Quality	Low	Low	Negligible	**Not Significant**	SOPEP and WMP

6.2.3.3 ASSESSMENT CONCLUSIONS

The potential impacts associated with the installation, operation and maintenance, and decommissioning phases of this subsea cable are the deterioration of water and sediment quality due to resuspension of sediment, resuspension of contaminants, vessel discharges and accidental events from unplanned fuel spills due to collisions or equipment failures. Any impacts are expected to be localised to the Study Area, with installation activities encompassing a small area over a short duration.

WFD designated water body (and quality elements) receptors have been screened out as they are over 5 km from Aurora Project activities and since the area comprises primarily coarser sediments, is subject to strong tidal activity and hydrodynamically active, the risk of sediment plumes affecting the water bodies are very low (2 km maximum extension predicted). No non-temporary potential effects are predicted as a result of the subsea cable installation activities.

As such, **No Significant Effects** are expected from any of the potential impacts on water and sediment quality receptors.

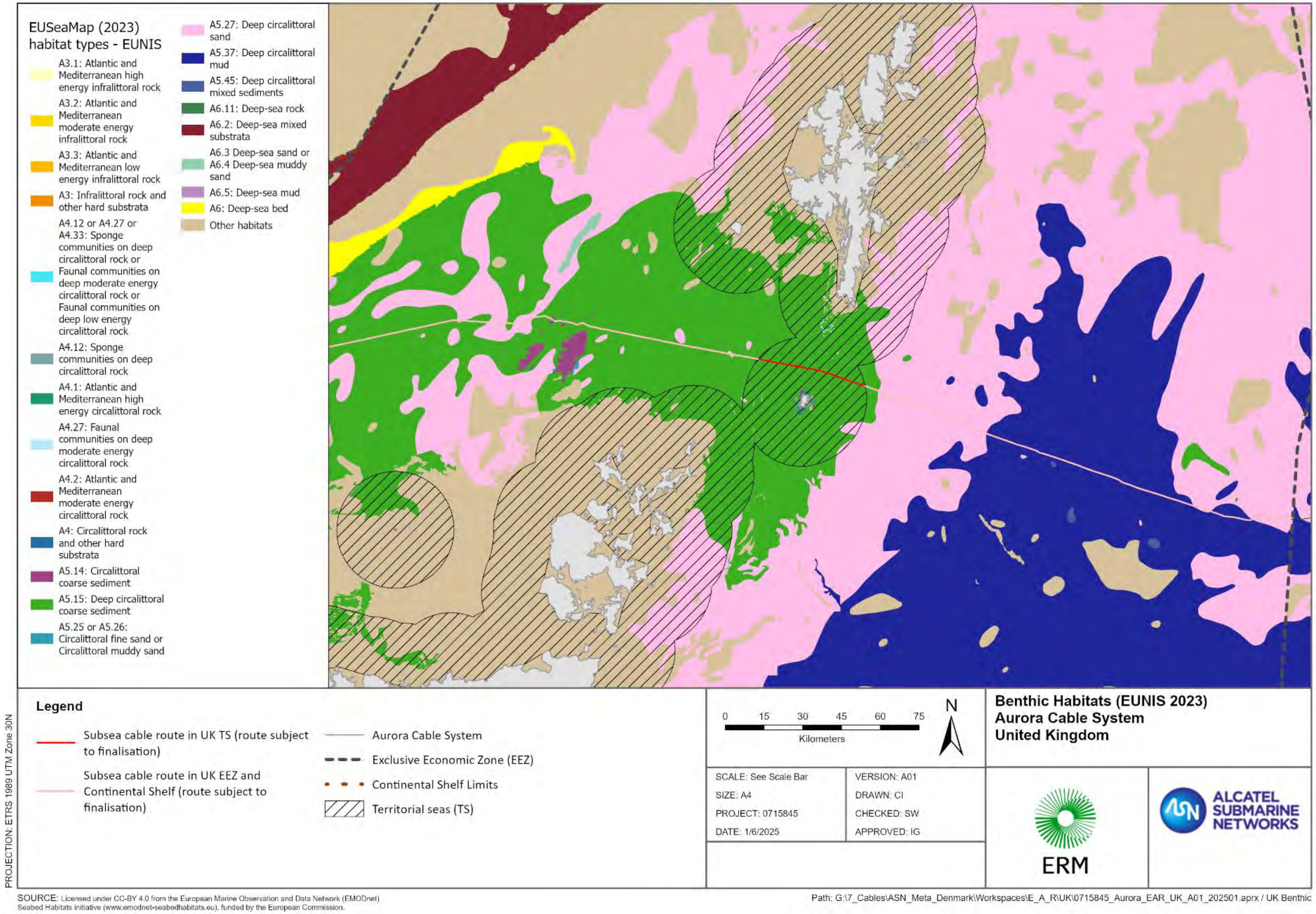
6.3 BENTHIC ECOLOGY

This section is focused on benthic ecology (species and habitats occurring on the seabed). The potential impacts and effect significance on benthic ecology receptors (biotopes and species/habitats of conservation interest) are identified.

6.3.1 BENTHIC ECOLOGY STUDY AREA

The benthic ecology Study Area (hereafter 'the Study Area') has been defined as the direct footprint of the proposed subsea cable route, to include the UK's inshore 12 nm TS. This is shown in **Figure 6-8** along with the spatial distribution of the broad scale habitats (BSH) present along the subsea cable.

FIGURE 6-8 BENTHIC ECOLOGY STUDY AREA INCLUDING EUNIS BIOTOPES PRESENT ALONG THE SUBSEA CABLE



6.3.2 BASELINE ENVIRONMENT

As shown in **Figure 6-8**, the subsea cable in the UK TS is between Fair Isle and the Shetland Islands and crosses a largely homogenous area characterised as deep circalittoral coarse sediment (A5.15), with small patches of faunal communities on deep moderate energy circalittoral rock (A4.27) (EMODnet, 2024). In the shallower waters surrounding the Shetland Islands, north and south of the subsea cable, there is a greater variety of biotopes present. These are as follows:

- Deep circalittoral sand (A5.27);
- Sublittoral biogenic reefs (A5.6); and
- Circalittoral coarse sediment (A5.14).

Two (2) surveys were conducted in the area. In 2011, Marine Scotland Science (MSS) conducted the IBTSQ3 Survey and in 2010 the MSS / JNCC Scottish MPA Drop Down Video Survey, were conducted in close proximity to the subsea cable, as shown in **Figure 6-9** (Goudge and Morris, 2014; JNCC, 2022). The results from these surveys mapped and identified a variety of filter feeding taxa. The most characteristic fauna inhabiting the area were: polychaete worms (*Flustra foliacea* and *Modiolus modiolus*), as well as scavenging species such as *Cancer pagurus, Munida rugosa,* and *Spatangus purpureus,* and predatory species such as *Asterias rubens, Neptunea antiqua,* and *Crossaster papposus*.

Table 6-12 provides an overview of the species recorded from both surveys.

FIGURE 6-9 THE 2011 MARINE SCOTLAND SCIENCE IBTSQ3 SURVEY AND THE 2010 MARINE SCOTLAND SCIENCE / JOINT NATURE CONSERVATION COMMITTEE SCOTTISH MARINE PROTECTED AREA DROP DOWN VIDEO SURVEY SAMPLES IN RELATION TO THE SUBSEA CABLE

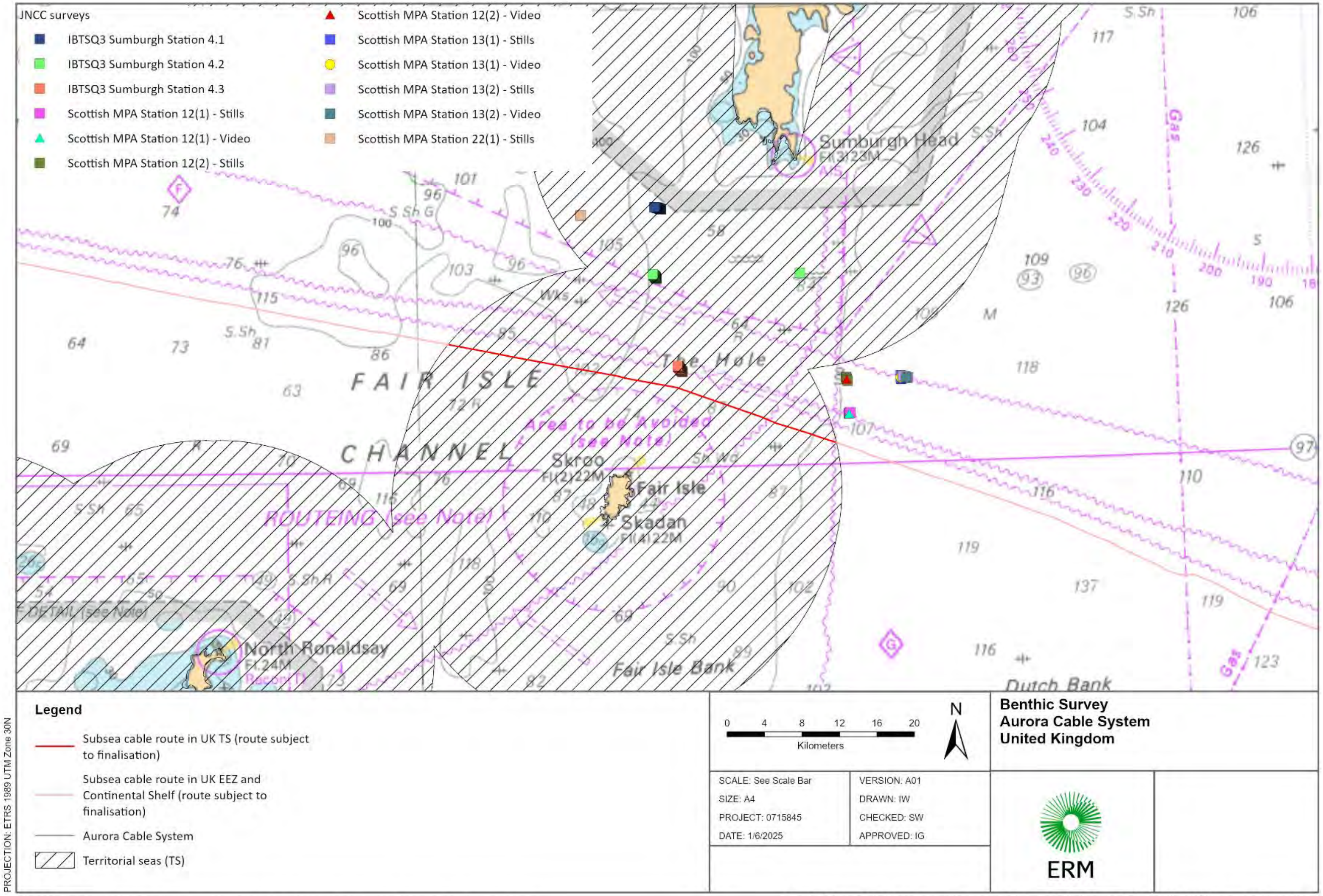


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TABLE 6-12 TAXA RECORDED IN THE 2010 AND 2011 JOINT NATURE CONSERVATION COMMITTEE AND MARINE SCOTLAND SCIENCE SURVEYS

Phylum	Recorded Taxa
Annelida	*Chaetopterus*
	Chaetopterus variopedatus
	Lanice
	Polychaeta
	Sabella
	Serpulidae
Arthropoda	Brachyura
	Cancer pagurus
	Caridea
	Ebalia
	Galatheoidea
	Majidae
	Munida rugosa
	Paguridae
Bryozoa	Celleporidae
	Indeterminate crusts
	Flustra foliacea
Chordata	Actinopterygii
	Pleuronectidae
	Tunicata
Cnidaria	*Abietinaria abietina*
	Actiniaria

Phylum	Recorded Taxa
	Alcyonium digitatum
	Bolocera tuediae
	Caryophyllia (Caryophyllia) smithii
	Halcampoides abyssorum
	Halecium
	Halecium muricatum
	Hydractinia
	Hydrallmania falcata
	Hydrozoa
	Nemertesia
	Nemertesia ramose
	Octocorallia
	Sertularia
	Sertularia cupressina
	Synarachnactis lloydii
	Thuiaria thuja
Echinodermata	*Asterias rubens*
	Asteroidea
	Crossaster papposus
	Echinidae
	Echinus
	Hippasteria phrygiana
	Holothuroidea
	Luidia ciliaris

Phylum	Recorded Taxa
	Ophiocomina nigra
	Ophiothrix fragilis
	Ophiuroidea
	Poraniidae
	Spatangus purpureus
	Valvatacea
Mollusca	Caenogastropoda
	Calliostoma zizyphinum
	Colus
	Gastropoda
	Modiolus modiolus
	Neogastropoda
	Neptunea
	Neptunea antiqua
	Pectinoidea
	Polyplacophora
	Steromphala cineraria
Porifera	Demospongiae
	Porifera

Source: Goudge and Morris, 2014; JNCC, 2022

Whilst surveying the site, a number of Priority Marine Features (PMFs) were identified in the vicinity of the subsea cable within the TS, as shown in **Figure 6-10**. These include:

- Fan mussel (*Atrina fragilis*);
- Northern feather star (*Leptometra celtica*);
- Ocean quahog (*Arctica islandica*); and

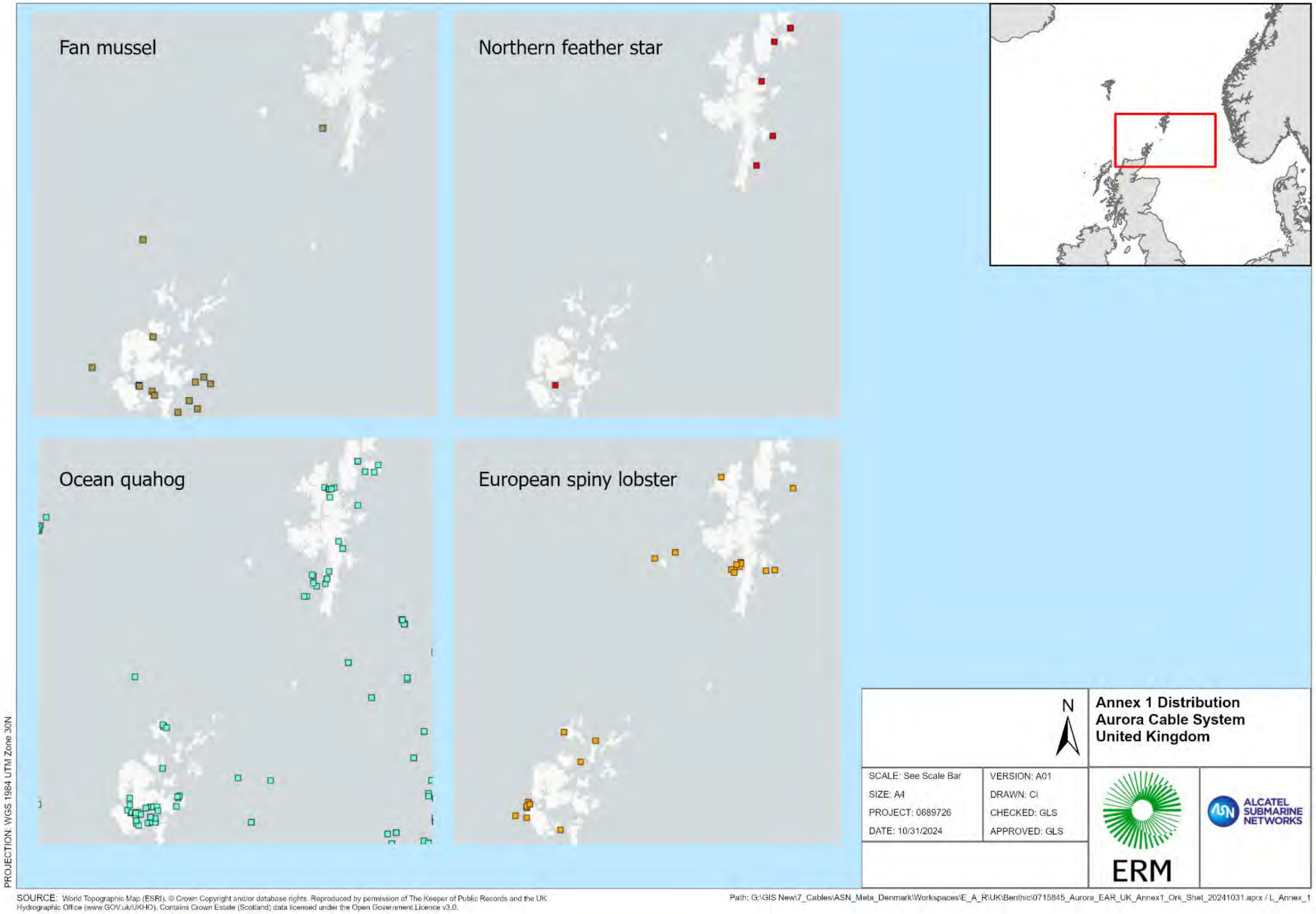
European spiny lobster (*Palinurus elephas*).

The ocean quahog is the PMF located in closest proximity to the subsea cable, approximately 7.5 km to the east, outside of the TS. Ocean quahog is also an OSPAR threatened and / or declining species.

There are no nature conservation sites relevant to benthic ecology receptors that overlap with the subsea cable route in the TS (**Figure 6-11**). The presence of kelp forests, an OSPAR threatened and / or declining habitat (OSPAR, 2024), was observed approximately 10 km south of the subsea cable at the Fair Isle DRMPA. There are potential Annex I Reefs located in close proximity to the subsea cable, with the subsea cable potentially crossing bedrock and / or stony reef (**Figure 6-12**).

Within the UK TS, the subsea cable does not cross any MPAs. However, in the UK EEZ, the Aurora Project is expected to overlap with three (3) NC MPAs: North-west Orkney NC MPA, West Shetland Shelf NC MPA, and West of Scotland NC MPA (See **Appendix 2**).

FIGURE 6-10 PRIORITY MARINE FEATURES IN THE VICINITY OF THE SUBSEA CABLE



Source: Marine Scotland, 2024

FIGURE 6-11 KNOWN PROPOSED AND EXISTING PROTECTED AREAS, AND SENSITIVE HABITATS IN THE UNITED KINGDOM TERRITORIAL SEAS

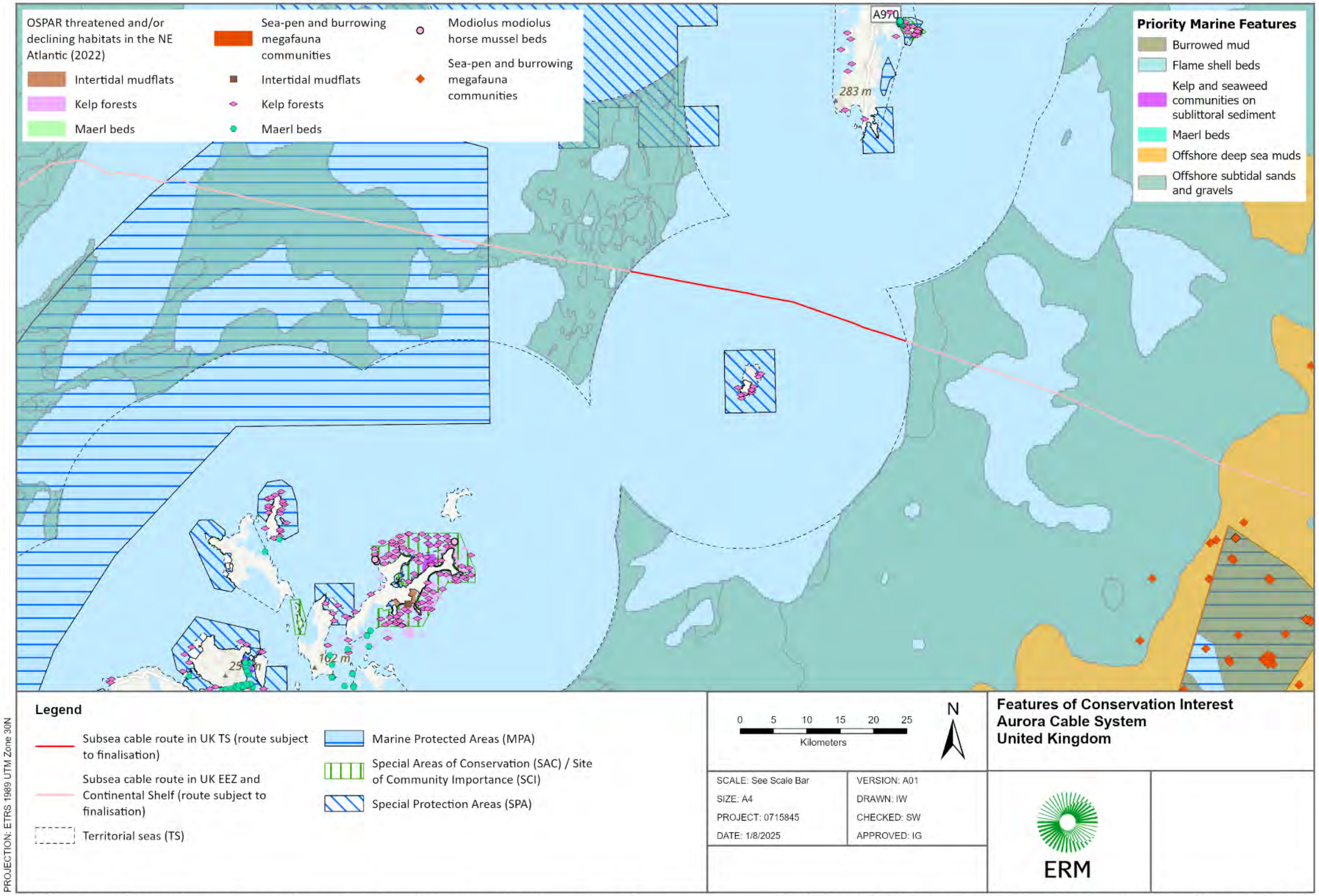


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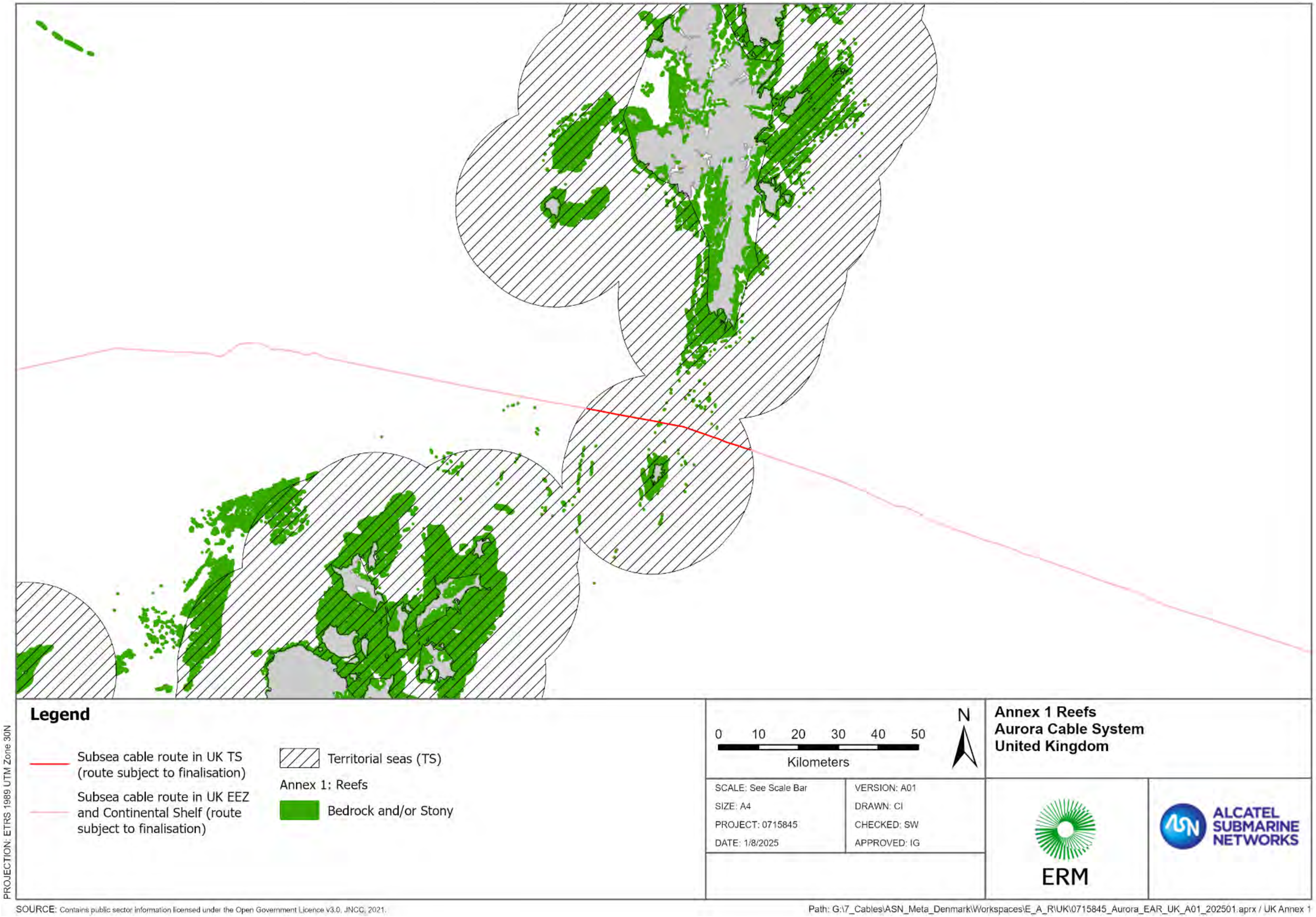
FIGURE 6-12 ANNEX I REEF IN CLOSE PROXIMITY TO THE SUBSEA CABLE



6.3.2.1 SENSITIVE RECEPTORS WITHIN TERRITORIAL SEAS

The biotopes A5.15 'deep circalittoral coarse sediment' and A4.27 'faunal communities on deep moderate energy circalittoral rock' characterised most of the seabed underlying the subsea cable within the UK TS. The biotope A5.15 is considered a representative habitat of the PMF 'Offshore Subtidal Sands and Gravels' (Tyler-Walters *et al*., 2016). This PMF is characterised by sand and gravel sediments, with offshore sands and gravels supporting communities of polychaetes and small bivalves while offshore fine to muddy sands support tube building polychaetes, burrowing brittlestars, bivalves and hooded shrimp, and medium sands support pea urchins. The habitat also supports mobile predators of flatfish, starfish, crabs and hermit crabs.

The potential Annex I Reefs (H1170) near the subsea cable, including Annex I Bedrock Reefs and Annex I Stony Reefs, would potentially be sensitive to disturbance due to the subsea cable installation activities.

The biotope A5.15 and the PMF Offshore Subtidal Sands and Gravels have been combined into one receptor group, Offshore Circalittoral Coarse Sediment, as A5.15 is a component biotope representative of the PMF. Furthermore, A4.27 and Annex I Reefs have been combined into the receptor group Circalittoral Rock, as their similar biotopes suggest comparable sensitivities.

6.3.3 IMPACT ASSESSMENT

6.3.3.1 POTENTIAL IMPACTS

The installation activities described in **Section 4.3** may potentially impact benthic ecology receptors in the following ways:

- Temporary habitat loss or disturbance; and
- Temporary disturbance via increase in SSC and associated deposition.

6.3.3.2 IMPACT ASSESSMENT

Temporary Habitat Loss or Disturbance

The Aurora Project activities involve the laying and burial of the subsea cable within the seabed substrate, thereby resulting in temporary disturbance to benthic habitats and species. Temporary habitat disturbance will occur from installation of the subsea cable as well as the pre-clearance of any obstructions. Subsea cable burial activities will be limited to soft sediments and will not occur over hard substrata including any areas identified as Annex I (H1170) Reefs.

The sensitivity of the biotopes has been assessed using the Marine Evidence Based Sensitivity Assessment (MarESA) (Tyler-Walters *et al*., 2023). The sensitivity of Offshore Circalittoral Coarse Sediment has been based on the biotope that is the best representation of the taxa recorded in the area, namely '*Glycera lapidum,* Thyasira spp. and *Amythasides macroglossus* in offshore gravelly sand' (Tillin and Watson, 2023). The key species in this biotope are shallow burrowers, found close to the sediment surface and, as such, are subject to removal / damage from subsea cable laying activities. Polychaetes are opportunistic species and can rapidly recover in disturbed habitats, while bivalves such as Thyasira spp. may take longer to recover due to a low dispersal ability (Thorson, 1950). As such, recoverability is considered medium, while adaptability and tolerance are considered medium to low. Therefore, Offshore

Circalittoral Coarse Sediment is considered to have **Medium** sensitivity to temporary habitat loss or disturbance.

The sensitivity of Circalittoral Rock has been based on the biotope that is the best representation of the taxa recorded in the area, namely '*Caryophyllia (Caryophyllia) smithii* and *Swiftia pallida* on circalittoral rock' (Readman *et al.,* 2023). The key species in this biotope are sessile and, as such, are subject to removal/damage from subsea cable laying activities. Sessile cnidarians typically exhibit slow growth rates, and recovery can take up to five (5) years for species such as *Alcyonium digitatum* (Hiscock *et al.,* 2010; Whomersley and Picken, 2003). However, despite their slow growth, species such as *Caryophyllia smithii* possess strong dispersal capabilities, as their pelagic larvae can remain in the water column for up to ten weeks (Tranter *et al.,* 1982). As such, recoverability is considered medium, while adaptability and tolerance are considered medium to low. Therefore, Circalittoral Rock is considered to have **Medium** sensitivity to temporary habitat loss or disturbance.

The magnitude of temporary habitat loss or disturbance is determined using the maximum extent of seabed impact associated with plough burial of the subsea cable that directly interacts on and/or within the seabed. As such, the total footprint extent of temporary habitat loss or disturbance is calculated as:

Total subsea cable length (43 km) x width of trench (0.0002 km) = 0.0086 km^2.

This area represents an extremely small proportion of the total habitat present in the area, and as such, magnitude has been considered **Low** for all receptors.

Therefore, **No Significant Effects** are expected on any benthic ecology receptors from the potential impact of temporary habitat loss or disturbance.

TABLE 6-13 SUMMARY OF IMPACT ASSESSMENT FOR TEMPORARY HABITAT LOSS OR DISTURBANCE ON BENTHIC ECOLOGY RECEPTORS

Impact: Temporary Habitat Loss or Disturbance	**Sensitivity**	**Magnitude**	**Risk**	**Significance**	**Additional Mitigation**
Offshore Circalittoral Coarse Sediment	Medium	Low	Minor	**Not Significant**	None required
Circalittoral Rock	Medium	Low	Minor	**Not Significant**	None required

Temporary disturbance via increase in SSC and associated deposition

Temporary increase in SSC is expected to arise from installation activities (including RC during pre-installation and plough burial). Disturbance of the seabed from these activities could result in sediment release into the water column as a plume, increasing SSC and water turbidity. The sediment plume will settle downwards at a rate depending upon its grain size. During settling, the sediment plume will be advected away from the point of release by currents and will disperse laterally through turbulent diffusion. Deposition of sediment may cause indirect impacts on marine organisms via smothering.

The sensitivity of Offshore Circalittoral Coarse Sediment is assessed by MarESA as having **Medium** sensitivity to temporary disturbance via increase in SSC and associated deposition (Tillin and Watson, 2023). The majority of species within this biotope are shallow burrowers living in the sediment and, therefore, are likely to be less tolerant to smothering by heavy deposition. An increase in SSC may affect the feeding efficiency of suspension feeders, such as venerid bivalves. Subsea cable laying activities are expected to be short term, and the characterising taxa are expected to survive short-term burial. As such recoverability is considered high, while adaptability and tolerance are considered medium to low, depending on currents and time of the year with an overall sensitivity of **Medium**.

The sensitivity of Circalittoral Rock is assessed by MarESA as having **Medium** sensitivity to temporary disturbance via increase in SSC and associated deposition (Readman *et al.,* 2023). The majority of species within this biotope are sessile living in the sediment and, therefore, are likely to be less tolerant to smothering by heavy deposition. An increase in SSC may affect the feeding efficiency of suspension feeders, such as *C. smithii*, and the majority of the characterising species would likely be smothered with only those on boulders or vertical surfaces escaping burial. Subsea cable laying activities are expected to be short term, and the characterising taxa are expected to survive short-term burial. As such recoverability is considered high, while adaptability and tolerance are considered medium to low, depending on currents and time of the year with an overall sensitivity of **Medium**.

The impact of increased SSC and associated deposition is expected to be short-term, intermittent and of localised extent. However, this will be dependent on the hydrodynamic regime at the time of operations. As such magnitude has been considered **Low** for all receptors.

Therefore, **No Significant Effects** are expected on any benthic ecology receptors as a result of temporary disturbance via increase in SSC and associated deposition.

TABLE 6-14 SUMMARY OF IMPACT ASSESSMENT FOR TEMPORARY DISTURBANCE VIA INCREASE IN SSC AND ASSOCIATED DEPOSITION ON BENTHIC ECOLOGY RECEPTORS

Impact: Temporary Disturbance via Increase in SSC and Associated Deposition	**Sensitivity**	**Magnitude**	**Risk**	**Significance**	**Additional Mitigation**
Offshore Circalittoral Coarse Sediment	Medium	Low	Minor	**Not Significant**	None required
Circalittoral Rock	Medium	Low	Minor	**Not Significant**	None required

6.3.3.3 ASSESSMENT CONCLUSIONS

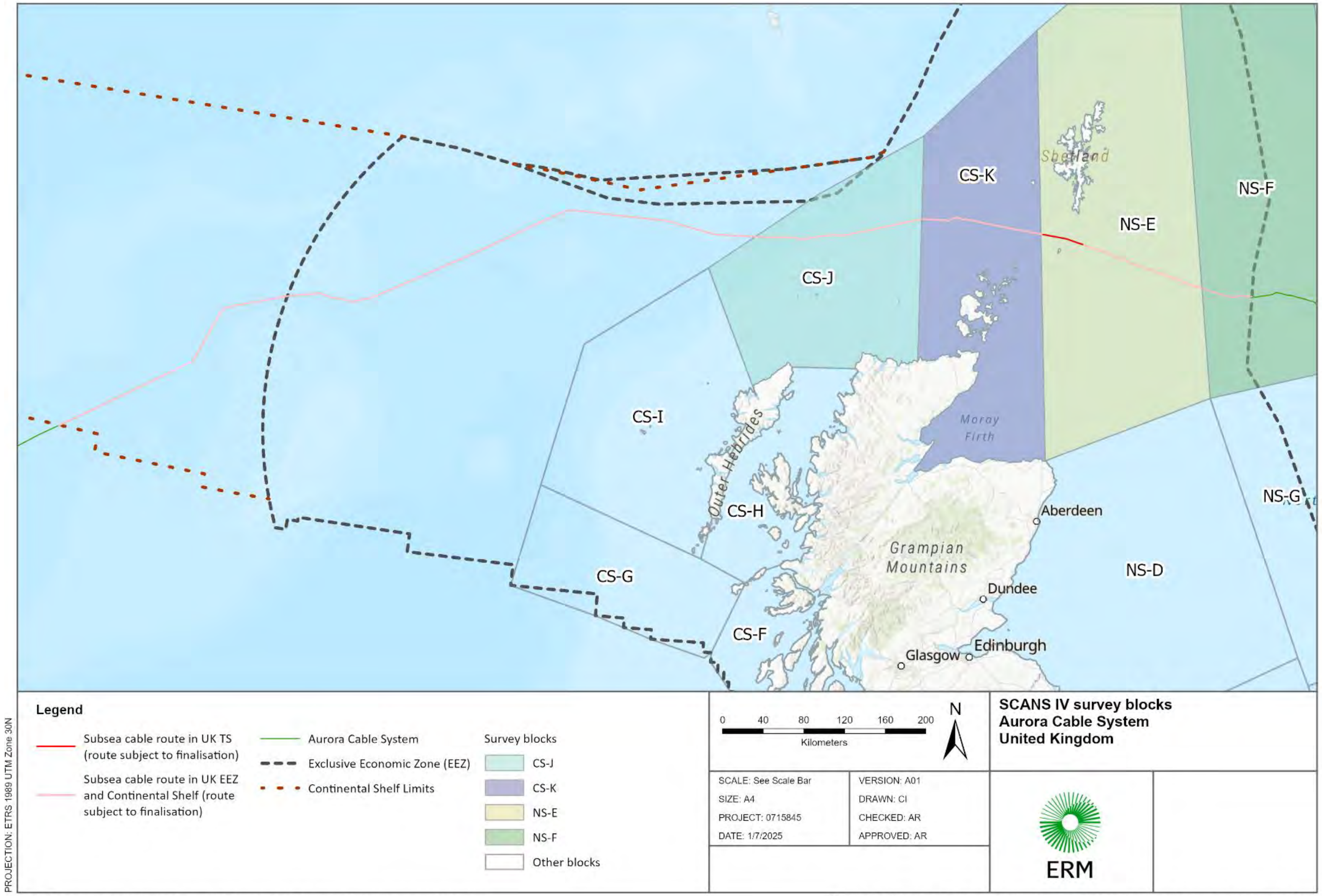
The potential impacts associated with the installation, operation and maintenance, and decommissioning of this subsea cable are temporary habitat loss and temporary disturbance via increase in SSC and associated deposition. The impacts are considered to be localised to the Study Area over a short period of occurrence.

As such, **No Significant Effects** are expected from any of the potential impacts on any of the benthic ecology receptor groups.

6.4 MARINE MAMMALS

Figure 6-13 illustrates the Aurora Project's marine mammals AoI, as the subsea cable traverses northwards of the coast of Lewis (Outer Hebrides) in Scotland and will continue between Orkney and the Shetland Islands.

FIGURE 6-13 MARINE MAMMAL AREA OF IMPACT



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6.4.1 BASELINE ENVIRONMENT

6.4.1.1 CETACEA

The most common cetacean species in Scottish TS 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*). There have also been sightings of fin whale (*Balaenoptera physalus*). Further information on these species is presented in **Table 6-15**.

TABLE 6-15 SUMMARY OF CETACEAN SPECIES INFORMATION

Species	Occurrence	Prey	Distribution
Harbour Porpoise	Resident	Small fish, such as whiting *Merlangius merlangus*, Atlantic herring *Clupea harengus* and sandeel Ammodytidae (Read, 1999)	Throughout shallow waters of the Scottish coast.
Atlantic White-sided Dolphin	Rare	Herring, silver pout *Gadiculus argenteus*, blue whiting *Micromesistius poutassou*, scad, lantern fish *Myctophidae*, argentine *Argentina sphyraena*, and mackerel *Scomber scombrus* as well as some squid and shrimps (Sea Watch Foundation, 2020a).	Occasionally in North Sea around continental shelf.
White-beaked Dolphin	Resident but seasonal	Cod *Gadus morhua*, whiting, hake *Merluccius merluccius*, haddock *Melanogrammus aeglefinus*, mackerel, and herring, various species of sandeels, gobies, flatfishes, and scaldfishes; cephalopods, and sometimes crustacean (CMG, 2023).	Widely distributed through the North Sea.
Risso's Dolphin	Seasonal	Cod, cephalopods; particularly octopus, cuttlefish *Sepiida*, and various small squid (Sea Watch Foundation, 2020b)	Sporadically around western coast of Orkney and Shetland.
Common bottlenose dolphin	Seasonal	Benthic and pelagic fish, such as Atlantic cod, saithe *Pollachius virens*, whiting, hake, haddock, Atlantic salmon *Salmo salar*, sandeel species, and sea bass *Dicentrarchus labrax*, along with cephalopods and shellfish (Shirihai and Jarrett, 2006).	Residents in Moray firth.
Common dolphin	Seasonal	They take a range of prey including small fish, shellfish and cephalopods (Brophy *et al.,* 2009)	Sporadically spotted towards the Outer Hebrides in shallow waters or continental shelf.
Killer whale	Seasonal	Fish such as herring, mackerel, salmon, cod, halibut *Hippoglossus hippoglossus*; also, squid, rays, marine mammals, and occasionally turtles and birds (Sea Watch Foundation, 2020c)	Sporadically spotted off the Scottish coast but can range throughout UK waters.
Minke Whale	Seasonal	The filter feeders' diet mainly comprises teleost fish, such as Atlantic herring, Atlantic cod, capelin *Mallotus villosus*, sandeel, haddock, whiting and saithe, as well as plankton and	Sporadically in the North Sea in summer and migratory season.

Species	Occurrence	Prey	Distribution
		pelagic crustaceans such as krill (Sea Watch Foundation, 2012)	
Fin whale	Seasonal	Consists mainly of planktonic crustaceans (particularly euphausiids) but it will also take small schooling fish including herring, capelin, sandeel, blue whiting, mackerel, and squid (Sea Watch Foundation, 2020d)	Sporadically in the North Sea in summer and migratory season.

Source (Distribution column): JNCC, 2019, SCANS-IV; Gilles *et al.*, 2023.

Abundance and density estimates for the Offshore potential area of impact can be extracted from the 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 subsea cable route overlaps Block CS-J, CS-K, NS-E, and NS-F of the most recent SCANS surveys (see **Figure 6-13**) (SCANS-IV; Gilles *et al.*, 2023). Abundances and densities of the species observed within those survey blocks are presented in **Table 6-16**.

TABLE 6-16 CETACEAN DISTRIBUTION FROM SCANS IV REPORT

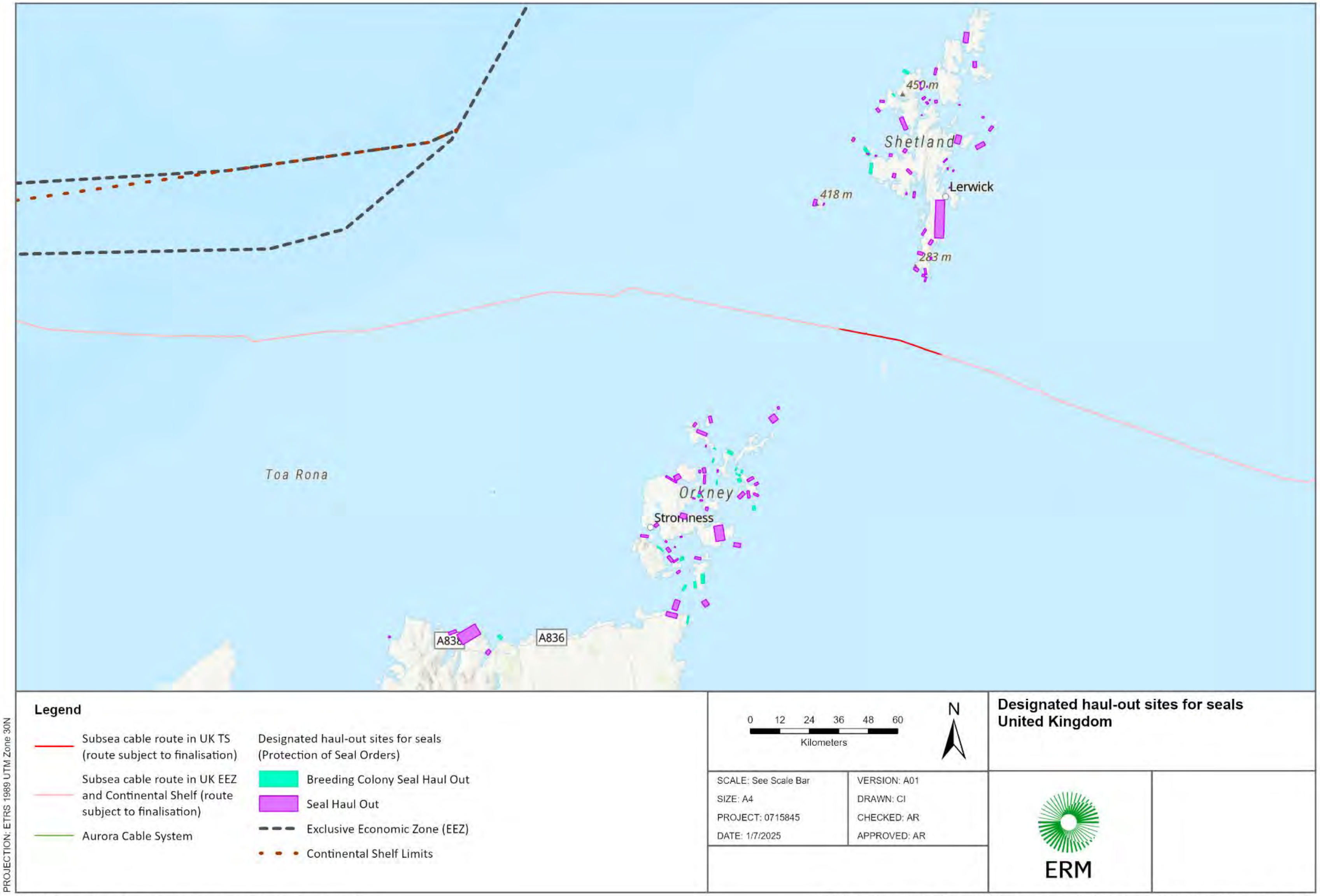
Species	Abundance (n) in SCANS Block				Species Density (animals/km^2) in SCANS Block				Abundance (n) by UK portion of Management Unit (MU)[a]
	CS-J	**CS-K**	**NS-E**	**NS-F**	**CS-J**	**CS-K**	**NS-E**	**NS-F**	
Harbour Porpoise	3,231	11,357	33,735	26,383	0.099	0.281	0.516	0.439	159,632 (NS) 24,305 (WS)
Atlantic White-sided Dolphin	756	NR	958	NR	0.023	NR	0.015	NR	12,293 (CGNS)
White-beaked Dolphin	8,335	5,460	11,611	18,350	0.257	0.135	0.178	0.306	34,025 (CGNS)
Risso's Dolphin	936	1,519	4,589	NR	0.029	0.038	0.070	NR	8,687 (CGNS)
Minke Whale	718	467	795	1,630	0.022	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

6.4.1.2 PINNIPEDS

There are two (2) pinniped species residents to the UK: harbour seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*). The subsea cable route, and area of potential impact, passes through several Seal Management Units (SMUs) as defined by the Special Committee on Seals (SCOS) in 2022: Western Isles SMU, North Coast and Orkney SMU, and Shetland SMU. The 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, but also an increase in the western isles (SCOS, 2022). Populations of grey seal in the North Sea continue to increase rapidly, although this is not echoed in Outer Hebrides and Orkney (SCOS, 2022). Although there are designated haul out zones for both grey and harbour seal on Orkney and Shetland (**Figure 6-14**), the closest haul out site is 25 km north of the subsea cable. (SCOS, 2022).

FIGURE 6-14 BREEDING AND NON-BREEDING SEAL HAUL OUT ZONES



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6.4.1.3 SENSITIVE RECEPTORS WITHIN TERRITORIAL SEAS

The receptors that will be potentially impacted in the TS include the cetacean species found in the NS-E and CS-K, 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 are designated haul out zones for both grey and harbour seal distributed across Orkney and Shetland (**Figure 6-14**), the closest haul out site is 25 km north of the subsea cable. (SCOS, 2022).

6.4.2 IMPACT ASSESSMENT

6.4.2.1 POTENTIAL IMPACTS

The installation activities of the subsea cable described in **Section 4.3** can potentially impact the ecology of marine mammals in the following ways:

Primary Impacts

- Installation vessel displacement and collision
- Noise and vibration

Secondary Impacts

- Temporary loss of habitat and foraging opportunities

6.4.2.2 IMPACTS ASSESSMENT

Vessel Displacement and Collision

Pinnipedia

There is potential that harbour and grey seal individuals may collide with the installation vessel deployed for the Aurora Project potentially prompting a behavioural or stress related response, injury or mortality. There is also potential that individuals may be displaced from the area due to the presence of vessels, causing similar responses. Seals are inquisitive animals, known to approach vessels, and are considered to have a high tolerance to vessel presence (Carter *et al*., 2022). However, seals being a low frequency hearing group, they often avoid high vessel traffic areas which reduces the likelihood of a collision (Anderwald *et al*., 2013). As such, in terms of vessel displacement, it is considered unlikely that stress or behavioural related responses would result in impacts to individual animals or would result in ecological impacts on the wider population suggesting that there is a low sensitivity. In terms of collision, Wilson *et al*., 1997 identified a significant reduction in the number of seal collisions for vessels travelling at <4 knots. As the installation vessel will be travelling at 0.3 knots (14.4 km per day), the collision risk would be very low.

Pinnipeds exposed to vessel presence are highly tolerant, adaptable and able to recover within a short timescale with minor impacts to the wider population. Therefore, their sensitivity to vessel displacement and collision is **Low**.

The subsea cable installation activities will result in an increase in vessel traffic. However, as the majority of the subsea cable installation works area falls within the Northern North Sea and Fair Isle Channel, which has some of the busiest shipping lanes in Scottish waters (Marine Management Organisation [MMO], 2014), impacts are unlikely to be measurable above natural variability. Impacts are likely to be of limited spatial extent, as density of individuals will be concentrated in coastal areas and as most of the subsea cable route is at a distance from any seal haul-out site, and collisions only have the potential to take place directly within the path of the subsea cable-laying vessel. Displacement is also considered to be of limited spatial and temporal extent, as the vessel will be mobile and will follow a transect offshore once it is through the Fair Isle Channel (where closest to land). Furthermore, disturbance is likely to be reversible and limited to a single event. Thus, magnitude of impacts from vessel displacement is **Negligible.**

Due to a **Low** sensitivity and **Negligible** magnitude, vessel displacement and collision is considered to have a **Negligible** effect on pinnipeds, which is **Not Significant**.

Cetacea

There is potential that an individual cetacean may collide with the installation vessel deployed for the Aurora Project or may be displaced from the area, potentially prompting a behavioural or stress related response, injury or mortality.

A common response to vessel activities by harbour porpoise, which is considered the most sensitive species to vessel displacement and used as the worst-case scenario, is avoidance. For example, harbour porpoise may exhibit displacement of up to 7 km to avoid a vessel (Benhemma-Le Gall *et al*., 2021). However, displacement may not necessarily equate to utilisation of poor-quality habitat, and recovery following displacement is likely to be rapid (e.g. several hours) (Thompson *et al.*,2013). Displacement reactions are also not uniform across all vessel types, for example vessel type and speed (e.g. high-speed planning-hulled vessels) were found to be more relevant than vessel presence when eliciting negative reactions of harbour porpoise in coastal Welsh waters (Oakley *et al.*, 2017). In some cases, vessel displacement may even reduce impacts of other pressures, such as that of anthropogenic underwater sound (Benhemma-Le Gall *et al.*, 2023). As vessel presence and risk of collision will cease following subsea cable laying, the impacts will be limited in duration, and as displacement or foraging disruption are predicted to be short-term and temporary (Thompson *et al.*, 2013; Pirotta *et al.*, 2015), sensitivity to vessel displacement is considered as **Low**.

Risk of collision between vessels and marine mammals is considered to be very low when vessels are travelling at speeds of less than 14 knots (Laist *et al*., 2001). As the installation vessel will be travelling at 0.3 knots (14.4 km per day), the collision risk would be very low. The impact is also likely to only affect small numbers of individuals (single collisions) even in the highly unlikely event that a collision was to occur, therefore any impact is likely to be negligible at the scale of the greater population. Therefore, cetacean sensitivity to vessel collision is **Low**.

The operations will represent an increase in vessel traffic during the subsea cable installation. However, as much of the subsea cable installation works area falls within the Northern North Sea and Fair Isle Channel, which has some of the busiest shipping lanes in Scottish waters (MMO, 2014), impacts are unlikely to be measurable above natural variability. Impacts are likely to be of limited temporal extent, as disturbance pathways will only be present as the vessel is passing, and collisions only have the potential to take place directly within the path of the cable-laying vessel. Furthermore, disturbance is likely to be reversible and limited to a single event. Neither vessel displacement or vessel collisions are predicted to have an impact on the population above 1% of the MU. Thus, magnitude of impacts from vessel displacement is **Negligible.**

Due to a **Low** sensitivity and **Negligible** magnitude, vessel displacement and collision is considered to have a **Negligible** effect on cetaceans, which is **Not Significant**.

TABLE 6-17 SUMMARY OF IMPACT ASSESSMENT FOR VESSEL DISPLACEMENT AND COLLISION ON MARINE MAMMAL RECEPTORS

Receptor	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Cetaceans	Low	Negligible	Negligible	**Not Significant**	None required
Pinnipeds	Low	Negligible	Negligible	**Not Significant**	None required

Noise and Vibration

Underwater noise produced by the installation vessel and subsea cable burial equipment has the potential to impact marine mammal species, leading to varied direct effects on marine mammals, including mortality, physiological injury, auditory injury, masking of communication signals and displacement (Todd *et al*., 2015). The auditory range and peak frequency of peak sensitivity varies with species and has resulted in the categorisation of marine mammals into functional hearing groups, four of which are summarised in **Table 6-18**.

TABLE 6-18 FUNCTIONAL MARINE MAMMAL HEARING GROUPS POTENTIALLY PRESENT IN THE IMPACT AREA AND ASSOCIATED AUDITORY RANGES

Functional Hearing Group	**Species**	**Generalised Auditory Range**
Very high-frequency cetaceans (VHF)	Harbour Porpoise	275 Hz – 160 khz
High-frequency cetaceans (HF)	Common Bottlenose Dolphin	150 Hz – 160 kHz
Low-frequency cetaceans (LF)	Minke Whale	7 Hz – 35 kHz
Phocid pinnipeds	Harbour Seal	50 Hz – 86 kHz

Source: Southall *et al.*, 2019.

Increases in underwater sound have the potential to cause permanent auditory injury in marine animals, defined as Permanent Threshold Shift (PTS). Recoverable auditory injury is referred to as Temporary Threshold Shift (TTS). The sound levels at which these impacts may occur differs across species and across different cetacean hearing groups. In cetaceans, the onset thresholds for PTS and TTS have been summarised by Southall *et al*., (2007) and have been subsequently updated in Southall *et al*., (2019). These thresholds are summarised in **Table 6-19**, and are categorised dependent on whether sound is impulsive or non-impulsive (Southall *et al*., 2019). All source level reference units are at 1 m distance from the source.

TABLE 6-19 TEMPORARY THRESHOLD SHIFT- AND PERMANENT THRESHOLD SHIFT-ONSET THRESHOLDS FOR MARINE MAMMALS EXPOSED TO NON-IMPULSIVE NOISE

Marine Mammal Hearing Group	**TTS onset**	**PTS onset**
	Weighted SEL_{cum} (dB re 1 μPa^2s)	Weighted SEL_{cum} (dB re 1 μPa^2s)
LF cetaceans	179	199
HF cetaceans	178	198
VHF cetaceans	153	173
Phocid pinnipeds in water	181	201

Source: Southall *et al.*, 2019.

Subsea cable trenching elsewhere in the UK (North Hoyle Offshore Windfarm) has been recorded as producing noise up to between 10 to 15 decibels (dB) above the ambient sound level, with an estimated source level of 178 dB re 1 μPa @ 1 m (Nedwell *et al.*, 2004). In underwater noise modelling at this location, injury from subsea cable ploughing was limited to <1 m from the source for a fleeing receptor for both cetaceans and pinnipeds. Therefore, the risk of injury for these receptors is likely to be extremely low.

Vessel noise is related to vessel size, speed, load, condition, age and engine, and can range from <150 dB re. 1 μPa, to >190 dB re 1 μPa (Hawkins *et al*., 2014) which is within the hearing range of all cetacean species. However, cetaceans are more likely to be displaced than attracted to the sound source (Southall *et al*., 2019). Therefore, the area of potential auditory injury is considered extremely small with respect to the wider habitat available to the receptor populations.

Considering the high baseline level of underwater noise associated with vessel activity in the Northern Isles, it is likely that marine mammal receptors will be somewhat desensitised to noise produced by the installation vessel. Furthermore, as marine mammals are highly mobile, they are likely to move away from areas of elevated underwater noise levels prior to injury. They are also able to return to the area within a short time scale once installation has been completed, and so are considered adaptable to, and tolerant of, the impact (Evans and Hammond, 2004).

Cetaceans and pinnipeds are considered to be adaptable, tolerant, and able to recover within a short period of time. Therefore, their sensitivity to noise and vibration is **Low**.

There will be an increase in noise and vibration created by the installation vessel and subsea cable burial equipment. However, these will be localised and temporary to the impact area. The Northern North Sea and Fair Isle Channel have some of the busiest shipping lanes in Scottish waters which applies to the majority of the subsea cable area (MMO, 2014). Based on modelling of subsea cable trenching at other sites (Nedwell *et al*., 2004) receptors would need to be within proximity (<500 m) of the source continuously (e.g. static) to obtain an injury. For fleeing receptors (considered representative of the true behaviour of pinnipeds and cetaceans), the spatial impact area for injury from trenching is predicted to be in the range of several meters, if exceeded at all. Furthermore, the area of elevated noise represents a very small portion of the total area utilised by the receptors in the region Neither noise nor vibration are predicted to have an impact on the population above 1% of the MU. Thus, magnitude of impacts from noise and vibration is **Negligible.**

Due to a **Low** sensitivity and **Negligible** magnitude, noise and vibration are considered to represent a **Negligible** effect, which is **Not Significant**.

TABLE 6-20 SUMMARY OF NOISE AND VIBRATION IMPACTS FOR MARINE MAMMAL RECEPTORS

Receptor	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Cetaceans	Low	Negligible	Negligible	**Not Significant**	None required
Pinnipeds	Low	Negligible	Negligible	**Not Significant**	None required

Secondary Impacts

Temporary loss of habitat and foraging opportunities

The process of subsea cable laying involves disturbing the seabed, and then burying the subsea cable. While this will be localised to a small area at any one time, the subsea cable laying area may overlap with feeding grounds and spawning sites for prey of marine mammals.

Cetaceans within the Northern North Sea and Fair Isle Channel have a wide, varied diet (**Table 6-15**). Key prey species are all pelagic fish and **No Significant Effect** has been determined for any of these species (Refer to **Section 6.5** [Fish and Shellfish]). As such, it is likely that these activities will result in no significant impacts on prey abundance. Considering the transient nature of cetaceans and pinnipeds, and the small impact area, any species within the proximity is considered likely to utilise alternative foraging areas.

Cetaceans and pinnipeds are therefore considered to be highly tolerant, and adaptable to temporary loss of habitat and foraging opportunities. There is also likely to be no significant impact on prey species (Refer to **Section 6.5** [Fish and Shellfish]) to reduce foraging opportunities. The sensitivity to temporary loss of habitat and foraging opportunities is therefore **Low**.

The magnitude of temporary habitat loss and foraging opportunities is determined due to the loss and reduction of prey availability from the maximum extent of seabed footprint associated with the burial of the subsea cable that directly interacts on and / or within the seabed. As such, the total footprint extent of temporary habitat loss is calculated as:

Total subsea cable length (43 km) x width of trench (0.0002 km) = 0.0086 km^2.

This area represents an extremely small proportion of the total habitat present in the area still allowing ample alternative foraging habitat outside of the impact area and the transient nature of cetaceans and pinnipeds, and as such, the magnitude has been considered **Negligible** for all receptors.

Due to **Low** sensitivity and **Negligible** magnitude, temporary habitat loss and foraging opportunities are considered to represent **Negligible** effects for pinnipeds and cetaceans, which is **Not Significant**.

TABLE 6-21 SUMMARY OF TEMPORARY HABITAT LOSS AND FORAGING OPPORTUNTIES FOR MARINE MAMMAL RECEPTORS

Receptor	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Cetaceans	Low	Negligible	Negligible	**Not Significant**	None required
Pinnipeds	Low	Negligible	Negligible	**Not Significant**	None required

6.4.2.3 ASSESSMENT CONCLUSIONS

The potential impacts associated with the installation of this subsea cable are installation vessel collision and displacement, noise and vibration, and temporary loss of habitat and foraging opportunities. The impacts are localised to the area of potential impact and have only a short period of occurrence.

As such, **No Significant Effects** are expected from any of the potential impacts on any of the marine mammal receptor groups.

6.5 FISH AND SHELLFISH ECOLOGY

The fish and shellfish ecology Study Area has been defined as an area of 10 m width centred on the subsea cable route within the UK TS. This report identifies the potential impacts to the fish and shellfish receptors within the Study Area.

6.5.1 BASELINE ENVIRONMENT

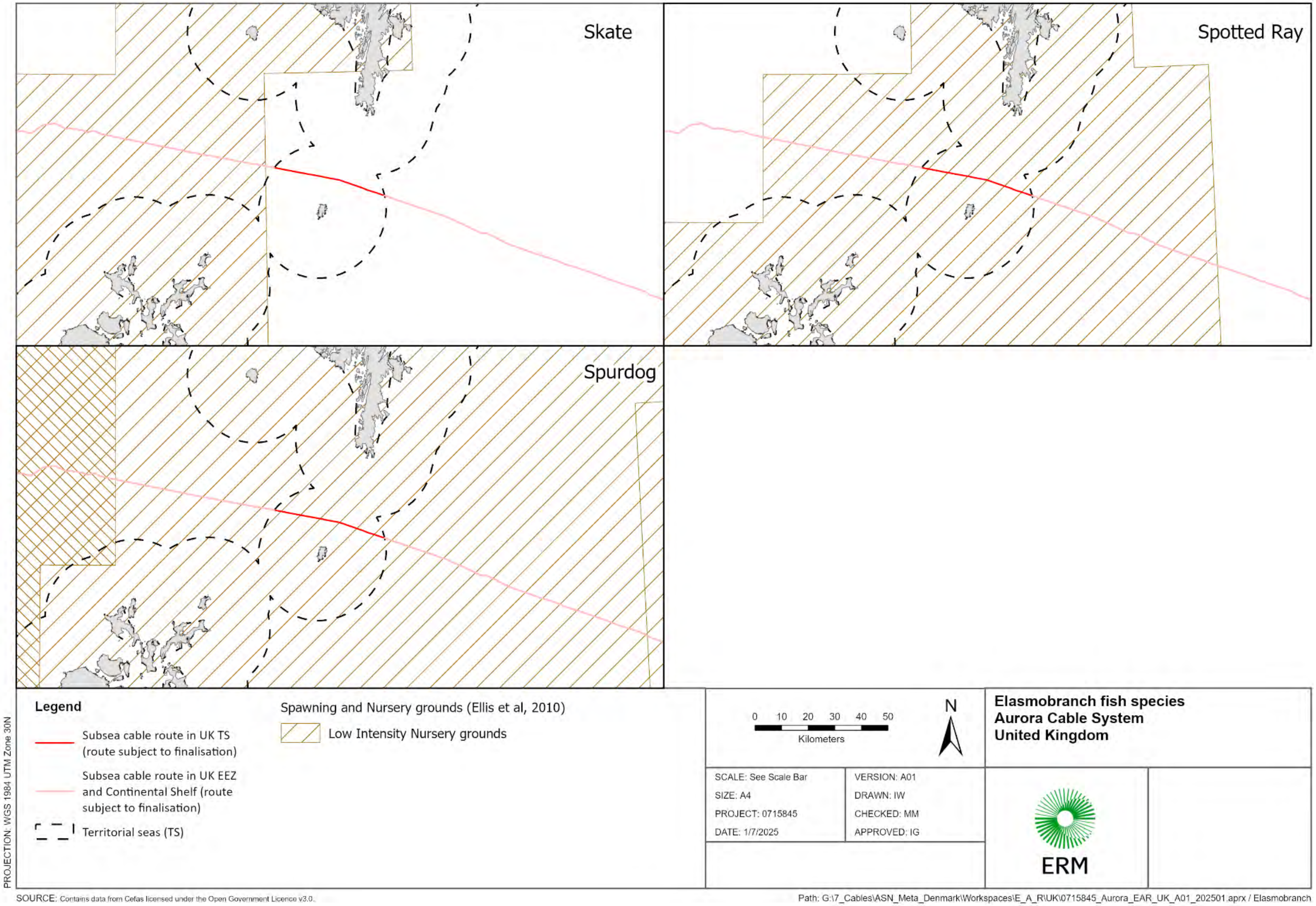
In order to determine the fish and shellfish ecology baseline of the Study Area, the Coasts and Seas of the United Kingdom reports for regions 1 (Shetland), 2 (Orkney), 3 (North-east Scotland: Cape Wrath to St Cyrus), and 15 and 16 (North-west Scotland: the Western Isles and west Highland) (JNCC, 1998) 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; and
- Migratory fish.

Elasmobranch species found to have nursery grounds along or within close proximity to the subsea cable route were common skate (*Dipturus batis*), spotted ray (*Raja montagui*) and spurdog (*Squalus acanthias*) (Coull *et al*., 1998, Ellis *et al*., 2012) (**Figure 6-15**). 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 Study Area. However, these species are only likely to be found within the deep-sea portion of the Study Area (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. Additional elasmobranch ecology and conservation information can be found in **Appendix 4 (A and B)**.

FIGURE 6-15 ELASMOBRANCH NURSERY GROUNDS

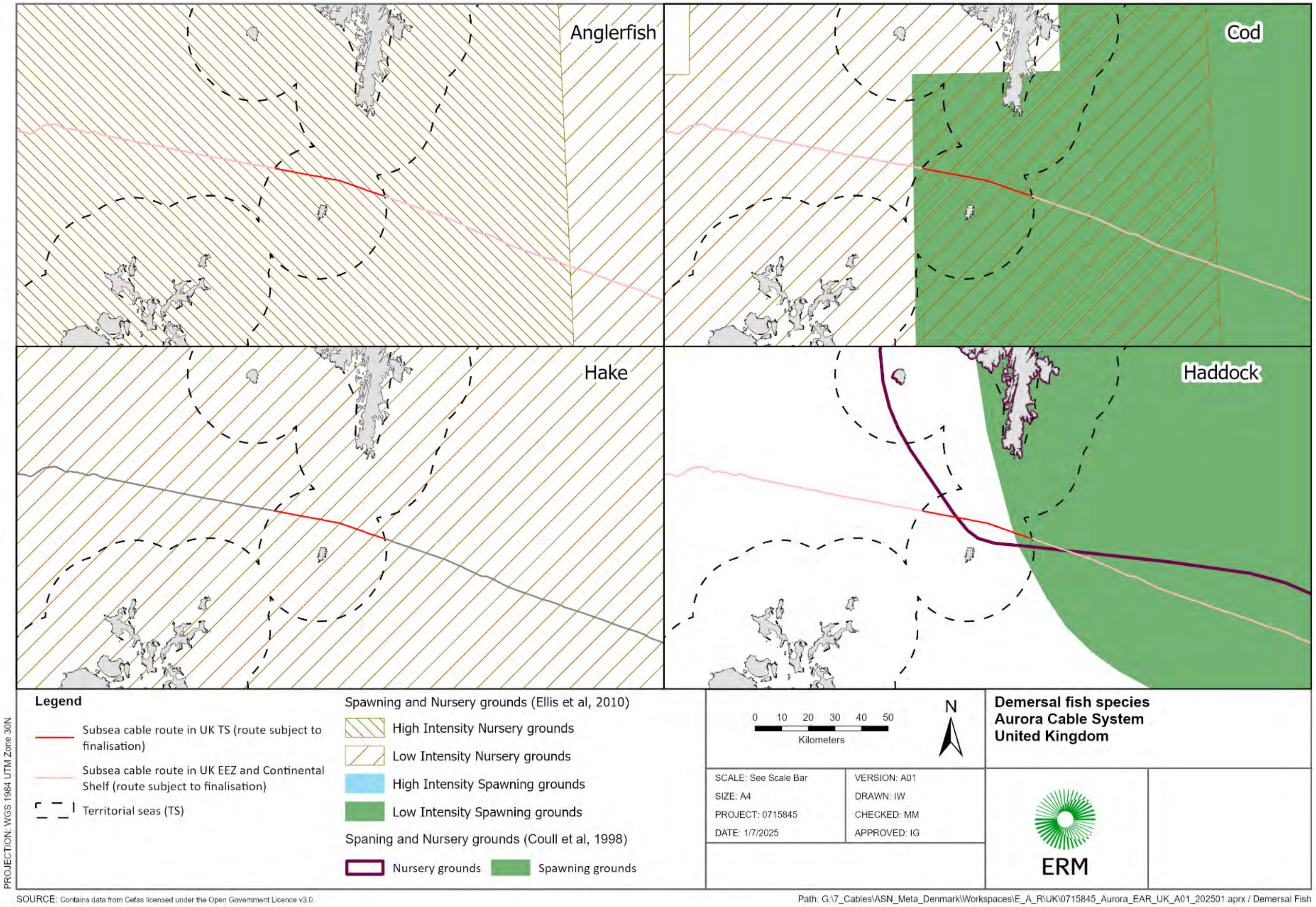


Source: Ellis *et al*., 2010

Demersal fish found to have spawning and / or nursery grounds along or within close proximity to the subsea cable route were anglerfish (*Lophius piscatorius*), Atlantic cod (*Gadus morhua*), European hake (*Merluccius merluccius*), haddock *(Melanogrammus aeglefinus*) (**Figure 6-16**), ling (*Molva molva*), sandeel Ammodytidae spp., whiting (*Merlangius merlangus*) and blue whiting (*Micromesistius poutassou*) (Coull *et al*., 1998, Ellis *et al*., 2012) (**Figure 6-17**). Furthermore, lemon sole (*Microstomus kitt*), Norway pout (*Trisopterus esmarki*), saithe (*Pollachius virens*), pollack (*Pollachius pollachius*), plaice (*Pleuronectes platessa*), 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*), halibut (*Hippoglossus hippoglossus*), flounder (*Platichthys flesus*), conger eel (*Conger conger*) and gurnards Triglidae spp. are also likely to be present in the Study Area (JNCC, 1998).

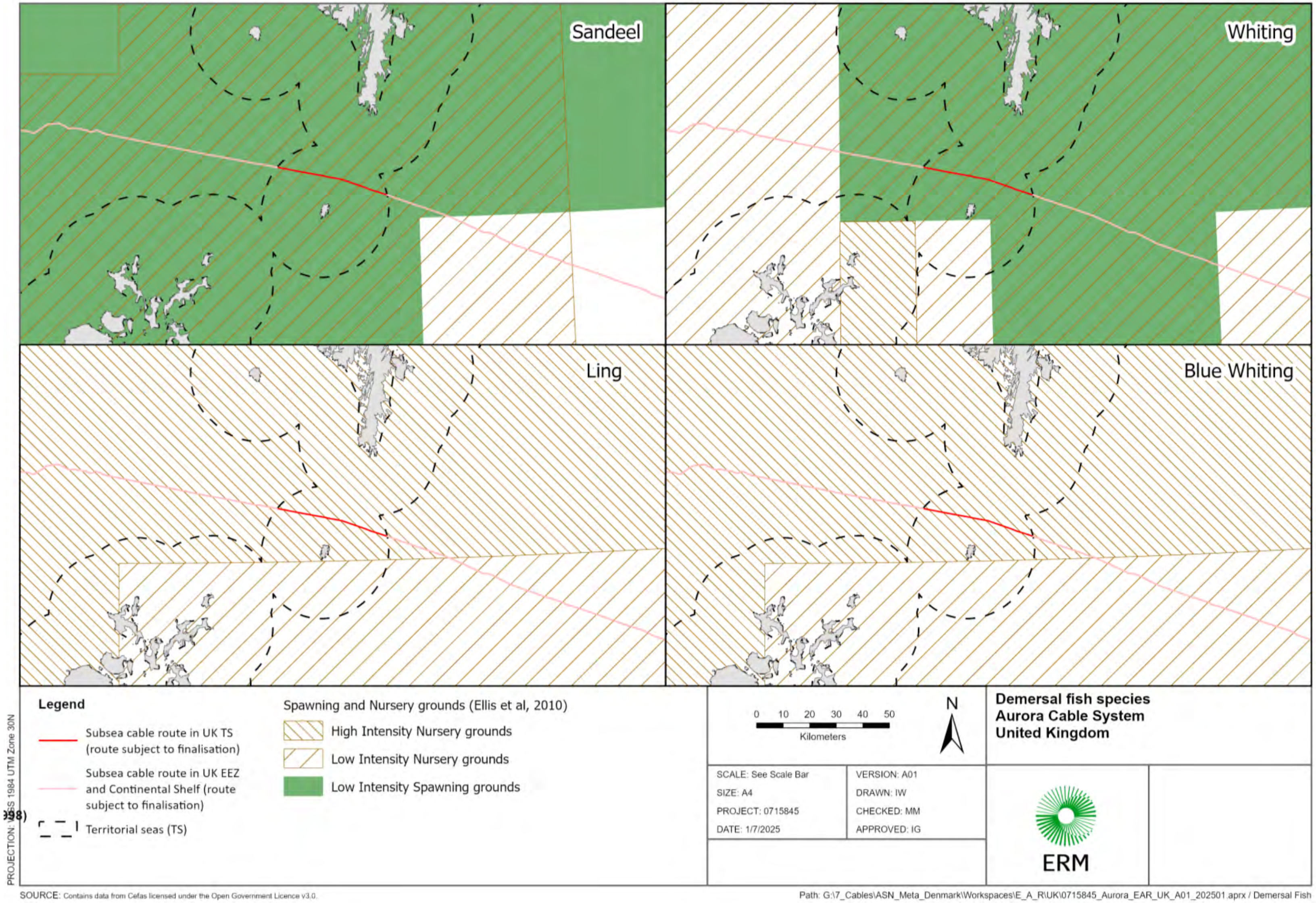
Blue ling (*Molva dypterygia*), orange roughy (*Hoplostethus atlanticus*) and round-nose grenadier (*Coryphaenoides rupestris*) are also known to be present in the Study Area. However, these fish species are only likely to be found within the deep-sea portion of the Study Area (JNCC, 1998). Demersal 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. Additional demersal fish ecology and conservation information can be found in **Appendix 4 (C and D)**.

FIGURE 6-16 ANGLERFISH, COD, HAKE AND HADDOCK SPAWNING/NURSERY GROUNDS



Source: Coull *et al*., 1998, Ellis *et al*., 2010

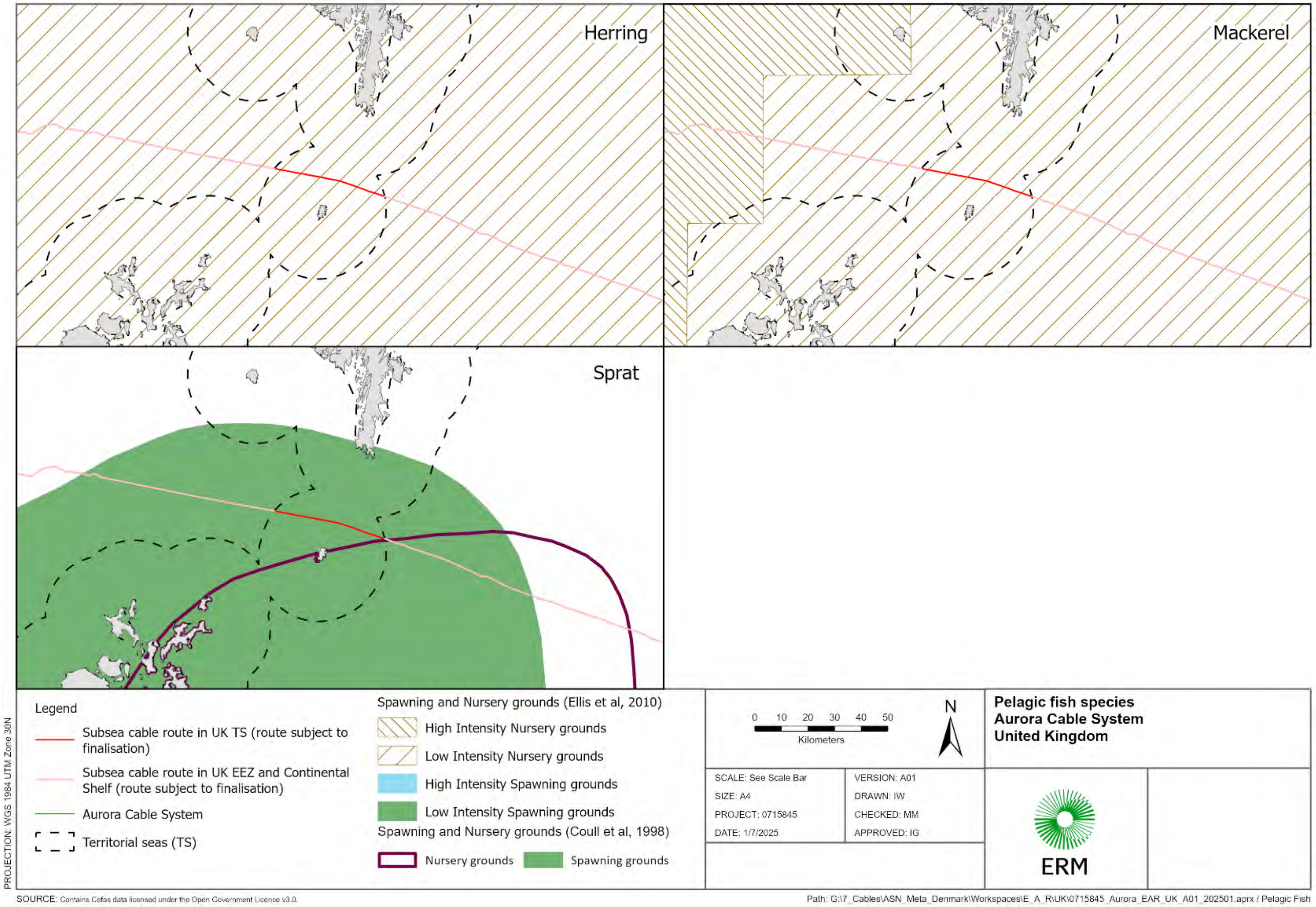
FIGURE 6-17 SANDEEL, WHITING, LING AND BLUE WHITING SPAWNING AND/OR NURSERY GROUNDS



Source: Ellis *et al*., 2010

Pelagic fish found to have spawning or nursery grounds along or within close proximity to the subsea cable route were Atlantic herring (*Clupea harengus*), mackerel (*Scomber scombrus*) and sprat (*Sprattus sprattus*) (Coull *et al*., 1998, Ellis *et al*., 2012) (**Figure 6-18**). Furthermore, horse mackerel may be present along the subsea cable route. Additional pelagic fish ecology and conservation information can be found in **Appendix 4 (E and F)**.

FIGURE 6-18 HERRING, MACKEREL AND SPRAT SPAWNING AND/OR NURSERY GROUNDS



Source: Coull *et al*., 1998, Ellis *et al*., 2010

No spawning and / or nursery grounds of shellfish species were identified along or within proximity to the subsea cable route. However, 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, 48E8 (MarineScotland, 2024). 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). Additional shellfish ecology and conservation information can be found in **Appendix 4 (G and H)**.

Migratory fish which may enter the Study Area during their migration routes are Atlantic salmon (*Salmo salar*), sea trout *(Salmo 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). Additional migratory fish ecology and conservation information can be found in **Appendix 4 (I and J)**.

For the assessment of potential impacts related to underwater noise and vibrations, receptors were classified into the following categories:

Fishes where the swim bladder is involved in hearing;

Fishes where the swim bladder is not involved in hearing

Fishes without a swim bladder;

Fish eggs and larvae; and

Shellfish.

The above list indicates the physiological features resulting in highest levels of sensitivity to underwater noise first, with sensitivity decreasing down the list, as indicated within Popper *et al.,* (2014). The species most sensitive to underwater noise (those with a swim bladder used in hearing) include herring and shad, and will, therefore, be used to determine the worst-case scenario. **Table 6-22** shows that fish with a swim bladder can tolerate exposure to 170 dB for 48 hours before recoverable injuries occur (Popper *et al*., 2014). The above receptor groups, with the exception of fish eggs, demonstrate a level of mobility, allowing for a reduction of prolonged exposure should fleeing behaviours take place. Additional information relating to the hearing groups of specific species can be found in **Appendix 4 (A, C, E, G and I)**.

TABLE 6-22 SHIPPING AND CONTINUOUS SOUNDS FISH GROUP SENSITIVITIES

Type of Animal	Mortality and potential mortal injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
Fish: No swim bladder (particle motion detector)	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: swim bladder is not involved in hearing (particle	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low

Type of Animal	Mortality and potential mortal injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
motion detection)					
Fish: swim bladder involved in hearing (primarily pressure detection)	(N) Low (I) Low (F) Low	170 dB rms for 48 h	158 dB rms for 12 h	(N) High (I) High (F) High	(N) High (I) Moderate (F) Low
Eggs and Larvae	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) Moderate (I) Moderate (F) Low

Source: Popper *et al.*, 2014

6.5.1.1 DESIGNATED SITES WITH FISH AND SHELLFISH DESIGNATED FEATURES

In addition to the fish and shellfish species outlined in the previous section, the subsea cable route is expected to overlap with the West of Scotland MPA which is designated for several deep-sea fish species (JNCC, 2020). These species and their respective receptor groups are presented in **Table 6-23**.

TABLE 6-23 WEST OF SCOTLAND MPA DESIGNATED FISH SPECIES

Name	Scientific Name	Receptor Group
Blue Ling	*Molya dypterygia*	Demersal fish
Leafscale gulper shark	*Centrophorus squamosus*	Elasmobranchs
Gulper shark	*Centrophorus granulosus*	Elasmobranchs
Orange roughy	*Hoplostethus atlanticus*	Demersal fish
Portuguese dogfish	*Centroscymnus coelolepis*	Elasmobranchs
Round-nose grenadier	*Coryphaenoides rupestris*	Demersal fish

Source: JNCC, 2020

6.5.1.2 SENSITIVE RECEPTORS WITHIN TERRITORIAL SEAS

A total of 159 species of exploited and unexploited fish species are present in the waters surrounding Shetland (JNCC, 1997).

This includes notable elasmobranchs such as spurdog, lesser spotted dogfish, thornback ray and cuckoo 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 6.5.1**, 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 6-19** to **Figure 6-22**). For species specific spawning information, refer to **Appendix 4 (A, C, E, G and I)**. Also, fish species with a swim bladder used in hearing are particularly sensitive to underwater noise.

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 and noise disturbance.

6.5.2 IMPACT ASSESSMENT

6.5.2.1 POTENTIAL IMPACTS

The installation activities of the subsea cable described in **Section 4.3** may potentially impact the ecology of fish and shellfish in the following ways:

- Direct damage;
- Habitat disturbance;
- Smothering due to suspended sediments; and
- Underwater noise.

Once installed, the subsea cable requires no maintenance except in instances where a repair is required, where the repair works will be applied for under a separate licence. In such instances, the potential impacts caused by repairing the subsea cable are similar in nature to those described for the installation activities, but will take place over a much smaller area and time period.

6.5.2.2 IMPACT ASSESSMENT

Direct Damage

The activities associated with installation of the subsea cable have the potential to directly damage fish and shellfish receptors, or potentially cause mortality. Direct damage to fish and shellfish receptors will be restricted to individuals present along the subsea cable route during the placement of the subsea cable. Damage will be associated directly with the footprint of the subsea cable-lay equipment and the displacement of any sediments along the subsea cable route, with recovery expected to be rapid and seabed disturbance likely within the scale of natural variability within the region. This impact is therefore determined to be of **Low** magnitude.

Most elasmobranch, demersal, pelagic and migratory fish receptors are mobile and can potentially avoid direct damage associated with the installation activities. As such, these receptors are determined to have a **Negligible** to **Low** sensitivity to direct damage associated with the installation of the subsea cable. Although shellfish species are usually sessile and are therefore prone to direct damage, they have high rates of fecundity and fast growth rates with direct damage 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 damage associated with the installation of the subsea cable.

Based on the determination of **Low** magnitude and **Negligible** to **Low** sensitivity, direct damage is considered to have a **Negligible** effect on fish and shellfish receptors, which is **Not Significant**.

TABLE 6-24 SUMMARY OF IMPACT ASSESSMENT FOR DIRECT DAMAGE ON FISH AND SHELLFISH RECEPTORS

Impact: Direct Damage	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Elasmobranchs	Low	Low	Negligible	**Not Significant**	None required
Demersal fish	Low	Low	Negligible	**Not Significant**	None required
Pelagic fish	Low	Low	Negligible	**Not Significant**	None required
Shellfish	Low	Low	Negligible	**Not Significant**	None required
Migratory fish	Negligible	Low	Negligible	**Not Significant**	None required

Habitat disturbance

The laying and burial of the subsea cable within the seabed will result in disturbance to the habitat available to fish and shellfish species. The area of habitat disturbed by the placement of the subsea cable will be proportional to the length of the subsea cable route together with the footprint of the plough used for installation, taken to be approximately 6 m wide. The amount of habitat being disturbed will be small when compared to the rest of the available habitat in the region. As such the magnitude of habitat disturbance is determined to be **Low.**

Most elasmobranch, pelagic, and migratory fish species are not sensitive to the temporary disturbance of seabed habitat due to their ability to relocate or avoid disturbance events, and their lack of association with the seabed. As such, the sensitivity of elasmobranchs, pelagic, and migratory fish species to habitat disturbance is determined to be **Negligible** to **Low**. However, demersal fish and shellfish species are considered to have a lower tolerance of disturbance than elasmobranch, pelagic and migratory fish species due to their greater dependence on the seabed. However, due to the large amount of habitat available to demersal and shellfish species in UK waters when compared to the narrow (6 m wide) and linear (43 km in length along the subsea cable route within the UK TS) amount of habitat which will be disturbed by the installation works, habitat disturbance may potentially impact individuals but it is not likely to result in impact at a population level.

Despite the subsea cable route passing through 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 *et al*., 1998, Ellis *et al*., 2012). Furthermore, most fish species are associated with the water column 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 disturbance is determined to be **Low.**

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. However, as the amount of benthic habitat being disturbed will be very small when compared the amount of available habitat elsewhere, the sensitivity of herring and sandeel to habitat disturbance was also determined to be **Low**.

Based on the determination of **Low** magnitude and **Negligible to Low** sensitivity, habitat disturbance is considered to have a **Negligible** effect on fish and shellfish receptors, which is **Not Significant**.

TABLE 6-25 SUMMARY OF IMPACT ASSESSMENT FOR HABITAT DISTURBANCE ON FISH AND SHELLFISH RECEPTORS

Impact: Habitat Disturbance	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Elasmobranchs	Negligible	Low	Negligible	**Not Significant**	None required
Demersal fish	Negligible	Low	Negligible	**Not Significant**	None required
Pelagic fish	Low	Low	Negligible	**Not Significant**	None required
Shellfish	Low	Low	Negligible	**Not Significant**	None required
Migratory fish	Low	Low	Negligible	**Not Significant**	None required

Smothering due to suspended sediments

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. The sediment types within the Study Area are predominantly coarse-grained sediments e.g. sandy gravels, with areas of muddy sands. However, coarse-grained sediments will be rapidly re-deposited within the plough footprint leaving only a plume of sands and fine-grained sediments. Fine suspended sediments will settle on the seabed within a short period or may become mobilised as a result of sediment transportation. Given the predominantly coarse-grained nature of the sediments within the Study Area, the magnitude of smothering due to suspended sediments is determined to be **Low**.

Suspended sediment can impact on fish and shellfish receptors as it has the potential to reduce visibility, which can impair hunting behaviours and can also cause smothering via the clogging of gills and breathing organs as well as the smothering 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 avoid suspended sediments. Additionally, some demersal fish such as sandeel are well adapted to tolerate smothering. However, the eggs of these species are vulnerable to smothering from suspended sediments, although, the subsea cable route is unlikely to overlap with large portions of spawning areas and the spawning areas it will overlap with are considered to be of low intensity (Coull *et al*., 1998, Ellis *et al*., 2012). Shellfish species are also at increased risk of impact from smothering due to suspended sediments, particularly during spawning season. However, buried crustaceans have the ability to move out of areas with high sediment deposition rates. Additionally, no shellfish spawning and / or nursery areas were identified along the subsea cable route. As such, the sensitivity of all receptor groups to smothering due to suspended sediments has been determined to be **Low**.

Therefore, based on the determination of **Low** magnitude and **Low** sensitivity, smothering due to suspended sediments is considered to have a **Negligible** effect on fish and shellfish receptors, which is **Not Significant**.

TABLE 6-26 SUMMARY OF IMPACT ASSESSMENT FOR SMOTHERING DUE TO SUSPENDED SEDIMENTS ON FISH AND SHELLFISH RECEPTORS

Impact: Smothering due to Suspended Sediments	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Elasmobranchs	Low	Low	Negligible	**Not Significant**	None required
Demersal fish	Low	Low	Negligible	**Not Significant**	None required
Pelagic fish	Low	Low	Negligible	**Not Significant**	None required
Shellfish	Low	Low	Negligible	**Not Significant**	None required
Migratory fish	Low	Low	Negligible	**Not Significant**	None required

Underwater noise

Underwater noise produced by the installation activities associated with the subsea cable has the potential to disturb fish and shellfish species. However the extent of noise will be attributable to installation vessel and subsea cable burial equipment only. These sources of noise are non-impulsive, and are expected to be consistent with other vessel-related noise within the region. They therefore represent a short term and localised increase in existing background levels. As such, the magnitude of underwater noise is determined to be **Low**.

The underwater noise produced by installation activities will not be loud enough or prolonged enough to cause mortality or potential mortal injury to even the most sensitive fish and shellfish receptors (**Table 6-22**). Fish with a swim bladder used in hearing, the most sensitive receptor group to underwater noise impacts, would need to be exposed to 170 dB of vessel related noise for a continuous 48 hour period before potential for recoverable injury occurs (Popper *et al*., 2014). Mobility of these species, and the mobile nature of subsea cable installation activities mean that this period of exposure is not realistic. As such the sensitivity of all receptor groups to underwater noise is determined to be **Low**.

Based on the determination of **Low** magnitude and **Low** sensitivity, underwater noise is considered to have a **Negligible** effect on fish and shellfish receptors, which is **Not Significant**.

TABLE 6-27 SUMMARY OF IMPACT ASSESSMENT FOR UNDERWATER NOISE ON FISH AND SHELLFISH RECEPTORS

Impact: Underwater Noise	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Elasmobranchs	Low	Low	Negligible	**Not Significant**	None required
Demersal fish	Low	Low	Negligible	**Not Significant**	None required
Pelagic fish	Low	Low	Negligible	**Not Significant**	None required
Shellfish	Low	Low	Negligible	**Not Significant**	None required
Migratory fish	Low	Low	Negligible	**Not Significant**	None required

6.5.2.3 ASSESSMENT CONCLUSIONS

The potential impacts associated with the installation and operation of this subsea cable are direct damage, habitat disturbance, smothering due to suspended sediments and underwater noise. The impacts are localised to the Study Area, are short term and not substantial enough to detrimentally impact fish and shellfish receptors.

As such, **No Significant Effects** are expected from all of the potential impacts on any of the fish and shellfish receptor groups.

6.6 COMMERCIAL FISHERIES

This section describes the commercial fisheries baseline and assesses the potential for significant effects of the Aurora Project in UK TS on commercial fisheries receptors.

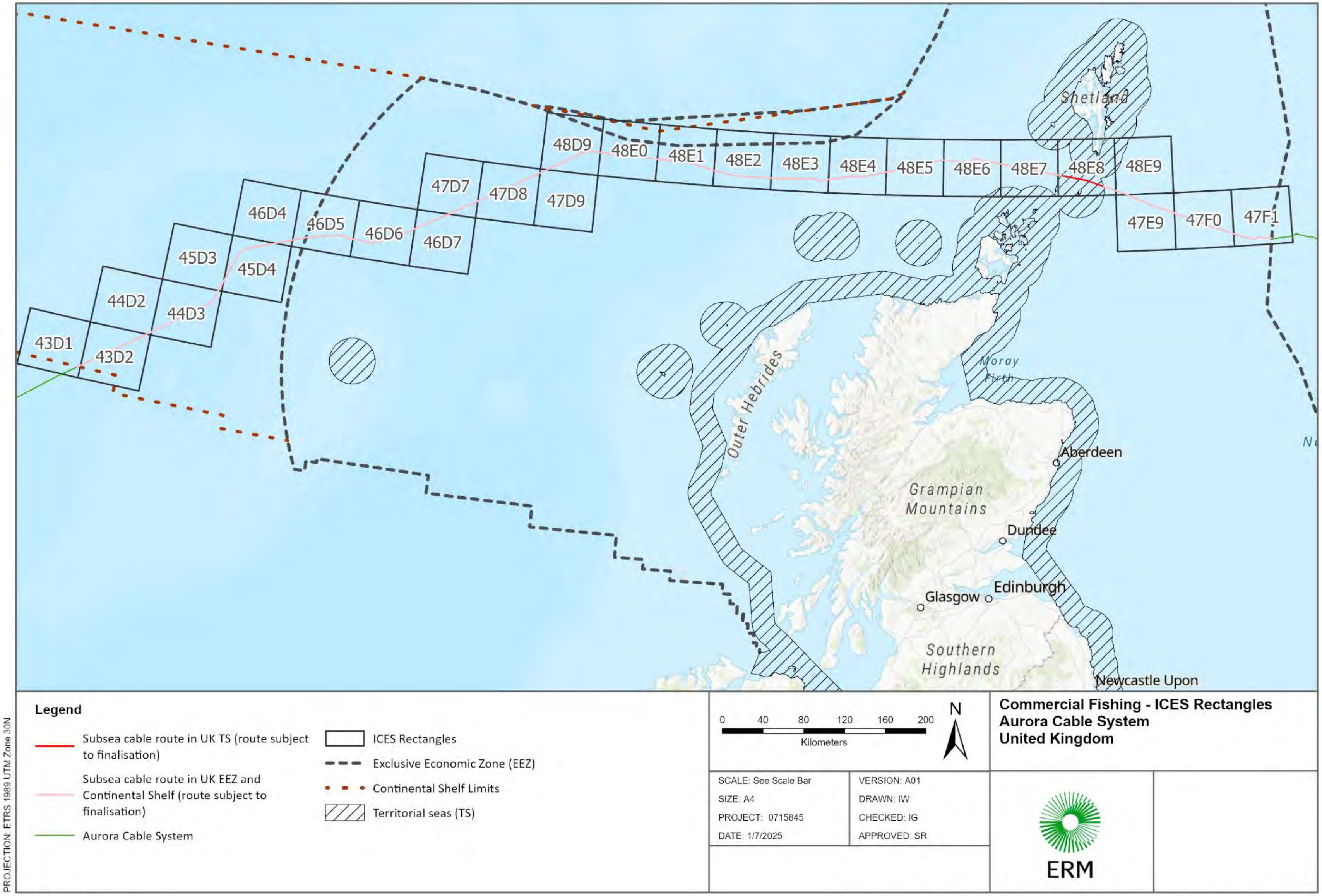
6.6.1 BASELINE ENVIRONMENT

6.6.1.1 COMMERCIAL FISHERIES STUDY AREA

The Aurora Project is located within the ICES Division IVa (Northern North Sea) and Division VIa (Northwest Coast of Scotland and North Ireland) statistical areas, which are divided into rectangles for the purpose of statistical analysis. The point in which the Aurora Project traverses through TS is within ICES Division IVa (specifically rectangles 48E6, 48E7, 48E8, 48E9) (**Figure 6-19**), which along with Region 1 and 2 (JNCC, 1997a; JNCC, 199b) of coasts and seas of the UK will be the focus of this baseline.

A broad 'Commercial Fisheries Study Area' has been defined to provide a wider regional context to current fisheries activity and to ensure that potential impacts (e.g. displacement of fishing vessels) from the Aurora Project on commercial fisheries have been fully assessed. The 'Commercial Fisheries Study Area' has, therefore, been defined by the 20 ICES rectangles the subsea cable traverses through: 46D5, 46D6, 46D7, 47D7, 47D8, 47D9, 48D9, 48E0, 48E1, 48E2, 48E3, 48E4, 48E5, 48E6, 48E7, 48E8, 48E9, 47E9, 47F0 and 47F1 (**Figure 6-19**). However, the primary focus of this study is the activity within ICES rectangles 48E6, 48E7, 48E8 and 48E9 which overlap with the TS, which is referred to as the 'TS Study Area' hereafter.

FIGURE 6-19 COMMERCIAL FISHERIES TS STUDY AREA



SOURCE: World Topographic map, ESRI. © ICES 2023.

Path: G:\7_Cables\ASN_Meta_Denmark\Workspaces\E_A_R\UK\0715845_Aurora_EAR_UK_A01_202501.aprx / ICES

6.6.1.2 BASELINE METHODOLOGY

To determine the baseline environment within the TS Study Area and inform the Impact Assessment (**Section 6.6.2**), fishing activity has been characterised using a range of latest available existing studies and datasets. Landings statistics have been analysed using Microsoft Excel, while Vessel Monitoring Systems (VMS) data have been analysed through ArcMap Geographic Information System (GIS) software. The primary evidence sources used to provide an overview of commercial fishing activity within the TS Study Area are summarised below in **Table 6-28**.

Where available, datasets covering a period of 10 years have been used, although it should be noted that, due to fluctuations in commercial fishing activity, this data cannot be used to extrapolate trends as commercial fisheries are impacted by several variables including varying quotas, the cyclical nature of some fisheries, and additional pressures from Brexit or the COVID-19 pandemic.

There is a range of different limitations and assumptions associated with the data, as summarised in **Table 6-28**. A confidence level has been assigned to each dataset, informed by the assessment teams expert judgment and based on the various data limitations (e.g. age of dataset, spatial resolution and size of vessels included). Care has been taken when interpreting the data, particularly those with lower confidence levels.

TABLE 6-28 SUMMARY OF KEY OFFICIAL DATA SOURCES

Title	Year	Source	Confidence level and limitations
Landing statistics by ICES Rectangle for UK vessels (all vessel sizes).	2013 to 2022	MMO, 2018; MMO, 2023.	• High confidence. • Finest available level of spatial resolution is by ICES rectangle. • Vessels ≤10 m are not required to complete logbooks, so may be under-represented within the data. • Duplication of species under different common names and grouping at higher taxonomic levels.
VMS data for UK vessels (≥15 m)	2020	MMO, 2020.	• Medium confidence • Finest available level of spatial resolution is by ICES sub-rectangle • Uncertainty in exact position of fishing footprint due to resolution • Processing of the VMS data obtains a proxy of effort based on time, position, and a certain speed. However, vessel speed is not 100% accurate as an indicator of fishing activity, since it does not identify whether fishing is occurring or not • Vessels <15 m are not included within the dataset.
OSPAR VMS data for European[4] mobile bottom towed gear vessels (>12 m)	2018 to 2020	ICES, 2021.	• Medium confidence. • Finest available level of spatial resolution is by ICES sub-rectangle. • Uncertainty in exact position of fishing footprint. • Processing of the VMS data obtains a proxy of effort based on time, position, and a certain speed. However, vessel speed is not 100% accurate as an indicator of fishing activity since

[4] This dataset was collated prior to the UK's withdrawal from the EU, so includes data from UK vessels.

Title	Year	Source	Confidence level and limitations
			it does not identify whether fishing is occurring or not. • Vessels <12 m are not included within the dataset. • Data only for mobile bottom contacting gears. • Data is provided by Member States – variable levels of confidence.

6.6.1.3 SUMMARY OF FISHERIES WITHIN TERRITORIAL SEAS

The Aurora Project passes through Scotland's TS, traversing through ICES Rectangles 48E6, 48E7, 48E8, 48E9, which are located within Region 1 (Shetland) and Region 2 (Orkney) of coasts and seas of the UK (JNCC, 1997a; JNCC, 199b).

Region 1, situated to the North-East of mainland Scotland, is renowned for its rich and diverse marine environment. Fishing remains a pivotal part of Shetland's economy providing livelihoods and contributing significantly to local gross domestic product. Over recent years landings have generally increased with the industry targeting species such as cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), whiting (*Merlangius merlangius*), herring (*Clupeaharengus linnaeus*), mackerel (*Scomber scombrus*), brown crab (*Cancer pagurus*) and lobster (*Homarus americanus*).

Region 2, located to the North of mainland Scotland, has a long history of commercial fishing. Landings have been relatively stable over the years. Commercial fishermen here target cod, haddock, brown crab and lobster. Similarly to Region 1, whitefish landings are crucial to the local area in Region 2, though lower than volumes taken in Region 1, they still present a significant part of commercial landings.

The primary gear types used within the TS Study Area between 2013 and 2022 are demersal trawl/seines (246,275 tonnes), pelagic trawls (219,070 tonnes), demersal trawls (40,064 tonnes), pelagic seines (17,639 tonnes) and pots and traps (7,200 tonnes) (MMO, 2018; MMO, 2023). Vessels over 10 m in length are responsible for over 99% of landings (533,520 tonnes) within the TS Study Area, with vessels 10 m and under landing a total of 1,688 tonnes of catch between 2013 and 2022. The tonnage and value of catch landed by gear type and vessel length is detailed in **Table 6-29**.

TABLE 6-29 SUM OF LANDED WEIGHT AND VALUES INTO THE UNITED KINGDOM FROM THE TERRITORIAL SEAS COMMERCIAL FISHERIES TS STUDY AREA BY GEAR TYPE AND VESSEL LENGTH (2013 TO 2022)

Gear Category	Gear Type	Sum of Landed Weight (tonnes)		Sum of Value (GBP£)	
		≤10 m	>10 m	**≤10** m	>10 m
Demersal seine	Mobile	-	5,819.4	-	12,301,251.70
Demersal trawl/seine	Mobile	3.8	363,712.6	6,918.57	318,241,140.60

Gear Category	Gear Type	Sum of Landed Weight (tonnes)		Sum of Value (GBP£)	
		≤10 m	>10 m	**≤10** m	>10 m
Demersal trawls	Mobile	13.2	88,204.3	35,687.11	183,010,363.90
Pelagic trawls	Mobile	-	403,298.5	-	367,191,361.20
Pelagic seine	Mobile	367.6	26,013.3	404,106.07	28,312,948.32
Beam trawl	Mobile	9.6	29.2	19,073.62	57,609.47
Dredge	Mobile	123.7	1,771.9	253,015.00	2,239,977.04
Pots and traps	Static	330.8	9,485.9	714,120.89	16,871,765.12
Longlines	Mobile	0.8	4,489.9	1,688.30	8,703,885.35
Handlines	Mobile	733.2	13.7	1,391,998.38	34,411.81
Gears using hooks	Mobile	168.7	4,289.1	292,018.20	11,448,190.04
Drift and fixed nets	Mobile/ Static	3.0	1,242.1	7,793.79	3,113,409.79
Other mobile gears	Mobile	-	33.3	-	62,839.19
Unknown	N/A	-	506.9	-	609,900.57

Source: MMO, 2018; MMO, 2023

As indicated in **Table 6-30**, the primary fisheries landed in the TS area are pelagic species, mackerel and herring and demersal species, cod and haddock (MMO, 2018; MMO, 2023). Herring and mackerel show significant seasonal variability, with herring landings highest in August and September and Mackerel landings highest in October and November (**Figure 6-20**; MMO, 2018; MMO, 2023). The majority of the fishing activity within the TS Study Area is undertaken by fishing vessels from Scotland, England, and Northern Ireland (MMO, 2018; MMO, 2023).

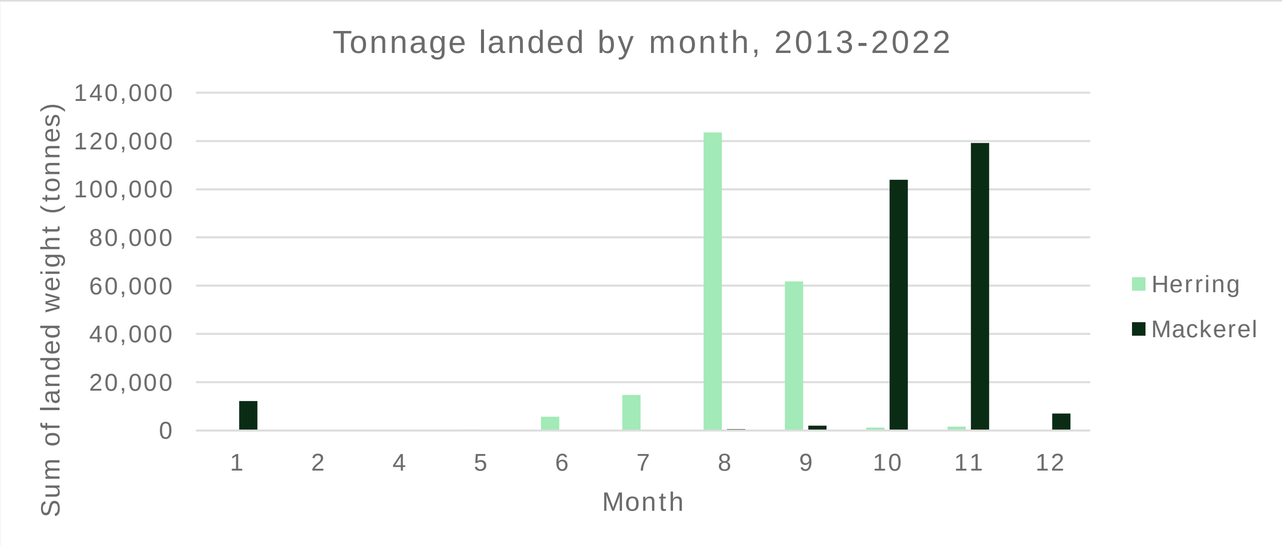
TABLE 6-30 TOTAL TONNAGE AND VALUE OF TOP 10 SPECIES LANDED FROM TS STUDY AREA BETWEEN 2013 AND 2022

Row Labels	Sum of Landed Weight (tonnes)	Sum of Value (GBP£)
Mackerel	245,265.6	233,743,314.40
Herring	209,252.3	102,812,269.80

Row Labels	Sum of Landed Weight (tonnes)	Sum of Value (GBP£)
Cod	18,514.2	53,304,491.44
Haddock	18,642.3	32,758,374.93
Monks or Anglers	8,449.1	30,631,311.83
Whiting	9,616.4	12,857,601.83
Crabs (C.P.Mixed Sexes)	6,873.6	12,505,175.41
Saithe	6,359.3	7,501,322.40
Lemon Sole	1,276.2	5,782,514.19
Megrim	1,477.8	4,448,026.25

Source: MMO, 2018; MMO, 2023

FIGURE 6-20 TOTAL TONNAGE OF HERRING AND MACKEREL LANDED BY MONTH (2013-2022)



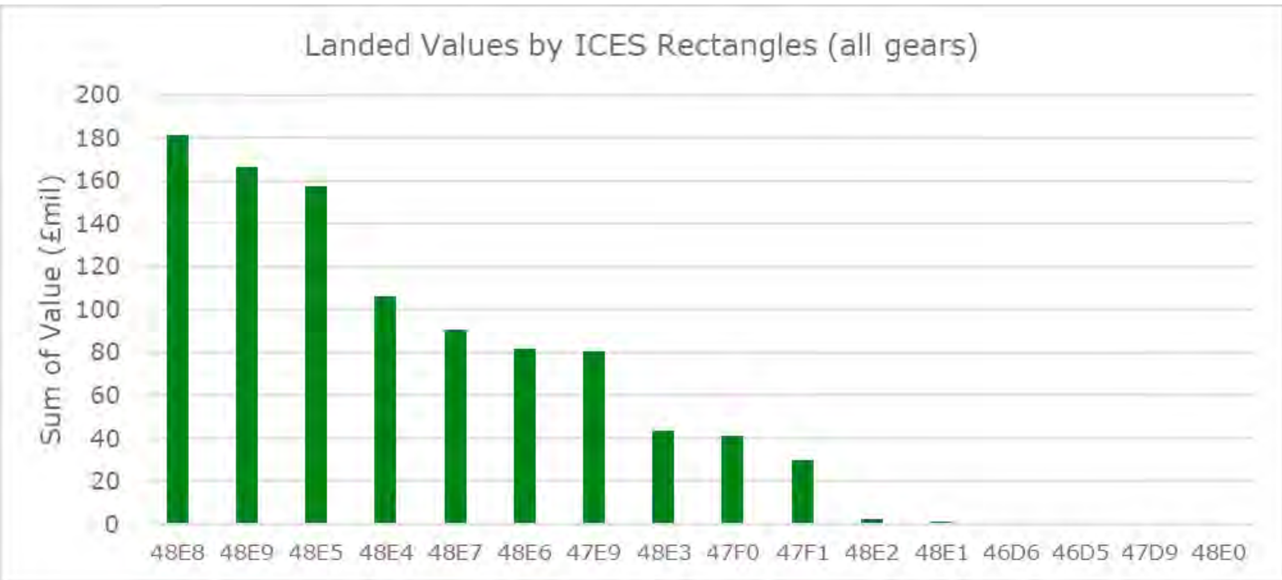
Source: MMO, 2018; MMO, 2023

6.6.1.4 SPATIAL DISTRIBUTION OF FISHING ACTIVITY

Landings data from 2013 to 2022 indicates that the majority of fishing activity is carried out by mobile gear vessels, however, static gear fishing activities especially pot and traps are also undertaken in Region 1 and Region 2 of Scotland's TS.

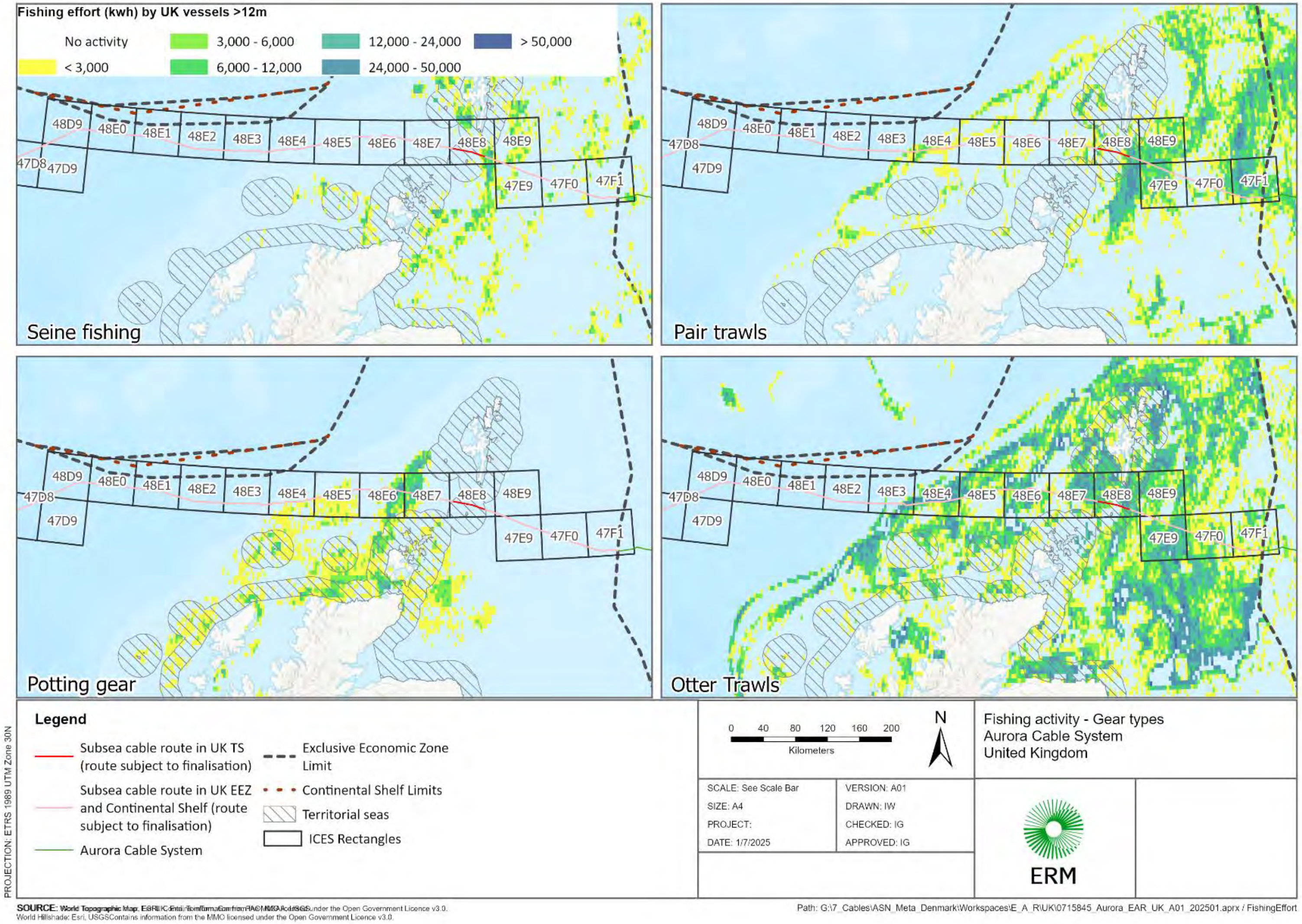
Figure 6-21, Figure 6-22 and **Figure 6-23,** show the primary ICES rectangles in which fishing activity is undertaken across the Commercial Fisheries Study Area. 53% of landings within the broader Commercial Fisheries Study Area are caught within the TS Study Area (48E6, 48E7, 48E8 and 48E9) alone (MMO, 2018; MMO, 2023). According to VMS data across the Commercial Fisheries Study Area, the highest densities of fishing activity are otter trawls, pair trawls and seine fishing, undertaken in the TS and Eastern EEZ (MMO, 2020; ICES 2021).

FIGURE 6-21 TOTAL LANDED VALUES of ALL gear types BY ICES RECTANGLES (2013-2022)



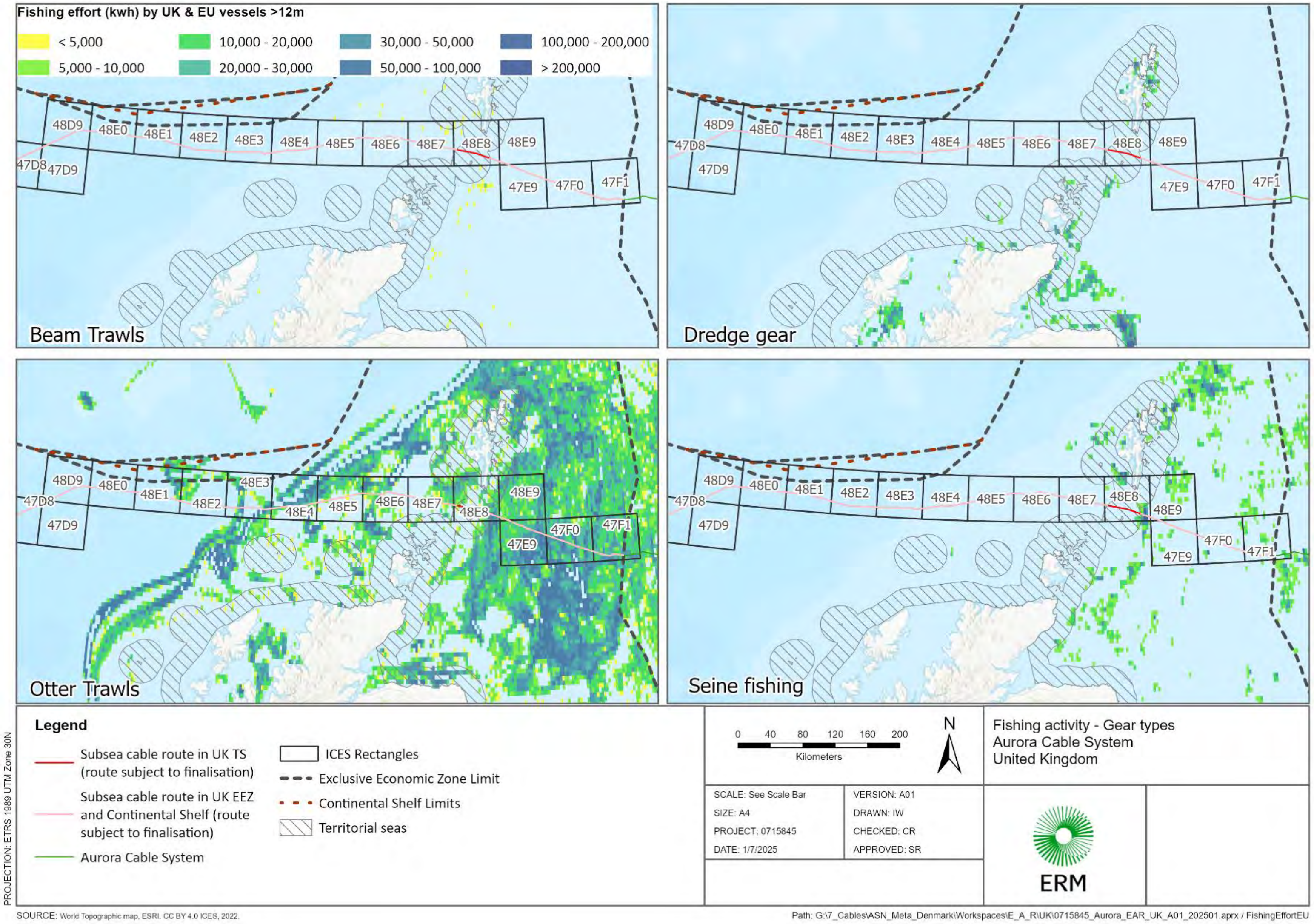
Source: MMO, 2018; MMO, 2023

FIGURE 6-22 UNITED KINGDOM VESSEL MONITORING SYSTEMS DATA FOR >15 METRES FISHING VESSELS BY GEAR TYPE (2020)



Source: MMO, 2020

FIGURE 6-23 UK AND NON-UK FISHING VESSEL EFFORT BY GEAR TYPE, 2017-2020



Source: ICES, 2021

6.6.1.5 SENSITIVE RECEPTORS

As a result of the baseline characterisation undertaken in **Section 6.6.1**, the following commercial fisheries receptor groups have been identified for consideration in the impact assessment (**Section 6.6.2**):

- Inshore pelagic mobile gear fisheries;
- Inshore demersal mobile gear fisheries; and
- Inshore static gear fisheries.

6.6.2 IMPACT ASSESSMENT

6.6.2.1 POTENTIAL IMPACTS

The installation, operation and maintenance, and decommissioning activities of the Aurora Project, described in **Section 4.3**, can potentially impact commercial fisheries in the following way:

- Direct impacts to the commercial fishing industry, such as:
  - Loss or restricted access to fishing grounds;
  - Displacement of fishing activity into other areas.
  - Interference with fishing activity; and
  - Loss or damage to fishing gear due to snagging.
- Indirect impacts to commercial fisheries resources, such as:
  - Direct damage, habitat disturbance, underwater noise and the impact of suspended sediments on commercially important fish and shellfish receptors. The impact has been assessed in **Section 6.5** (Fish and Shellfish Ecology); and
  - Increased collision and allision risk to commercial fishing vessels. The impact has been assessed in **Section 6.7** (Shipping and Navigation).

The effects of each potential direct impact on the identified commercial fisheries receptor groups are assessed in the following section.

6.6.2.2 IMPACT ASSESSMENT

Loss or Restricted Access to Fishing Grounds

There is the potential for temporary loss or restricted access to fishing grounds as a result of activities relating to the installation phase of the proposed subsea cable (i.e. temporary loss or restricted access to fishing grounds due to presence of the installation vessel and associated exclusion zones). However, due to the Aurora Project's relatively short timeframe for temporary installation activities and the relatively large spatial extent of fishing effort exhibited by the receptor groups (**Figure 6-22** and **Figure 6-23**), the magnitude of impact on demersal mobile gear and pelagic mobile gear commercial fisheries receptor groups during the installation phase is considered to be **Low**.

Limited spatial activity data is available for the inshore static gear receptor group (≤10 m); however, MMO landings data indicate inshore static gear activity occurs across the inshore segment (i.e. within the 12 nm limit), between Orkney and the Shetland Islands, and gears using hooks and static gears such as pots and traps are the most important fisheries for the under 10 m inshore fleet (**Figure 6-22** and **Figure 6-23**). However, due to the temporary nature and relatively short timeframe of installation activities, the magnitude of impact on the inshore static gear receptor group during the installation phase is considered to be **Low**.

The inshore pelagic mobile gear and demersal mobile gear receptor groups exhibit relatively large operational ranges and are able to mitigate loss or restricted access to fishing grounds through their spatial tolerance and ability to fish multiple grounds within local area. The pelagic mobile gear receptor group also possess an ability to target other pelagic species through deployment of alternative gear allowing them to diversify. The sensitivity of the receptor is, therefore, considered to be **Low** for inshore pelagic mobile gear and demersal mobile gear.

The inshore static gear receptor group generally constitutes smaller vessels (≤12 m) and although these vessels have some ability to deploy alternative gear, this is relatively limited, as is their spatial adaptability. The sensitivity of the receptor is, therefore, considered to be **Low** for inshore static gear.

Outputs of publicly available bathymetry data and data from the Aurora Project's CRS (completed in September 2024) indicate that the UK's TS where the Aurora Project is to be located, has maximum depths ranging between 87 m and 112 m in the centre of the region, depths greater than 121 m in the east, and depths reaching 108 m in the west (EMODnet, 2022). Furthermore, the seabed sediment along the proposed subsea cable route is predominantly made up of coarse-grained sediments e.g. sandy gravels, with no indication of hard, rocky substrates (as described in **Sections 6.1** and **6.2**). It can, therefore, be assumed that the subsea cable will be predominantly buried to target depth (as described in **Section 4.3**, excluding areas of cable crossings) and due to the nature of the fishing gear of the pelagic mobile fishery and static gear fishery (i.e. limited bottom contact), fishing is expected to continue without any significant loss of area or restricted access due to presence of the subsea cable for these receptor groups. The magnitude of impact is, therefore, considered to be **Negligible** for inshore pelagic mobile gear, and static gear.

Due to the nature of the fishing gear deployed by demersal mobile vessels (i.e. fishing gear that makes contact with the seabed), this receptor group would actively avoid operating over grounds where exposed subsea cable and cable crossings exist. While fishing is not expected to continue within such areas, this will be limited to discreet spatial areas. The magnitude of impact is, therefore, considered to be **Low** for inshore demersal mobile gear.

The sensitivity of the receptor groups during operation and maintenance activity is not anticipated to exceed what has been described for the installation phase of this impact

Considering the above, it is concluded that there is low potential for significant effects on commercial fisheries receptors with regard to loss or restricted access to fishing grounds as a result of the proposed Aurora Project, as any potential impacts will be minimal and temporary.

A summary of the sensitivity of receptors, impact magnitude and overall effect significance is provided in **Table 6-31**.

TABLE 6-31 SUMMARY OF IMPACT ASSESSMENT FOR LOSS OR RESTRICTED ACCESS TO FISHING GROUNDS ON COMMERCIAL FISHERIES RECEPTORS

Receptor	**Sensitivity**	**Magnitude**	**Risk**	**Significance**	**Additional Mitigation**
Inshore Demersal	Low	Low	Negligible	**Not Significant**	None required

Receptor	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
mobile gear fisheries					
Inshore Pelagic mobile gear fisheries	Low	Low	Negligible	**Not Significant**	None required
Inshore static gear fisheries	Low	Low	Negligible	**Not Significant**	None required

Displacement of Fishing Activity into Other Areas

As described above for "loss or restricted access to fishing grounds", any displacement of fishing activity into other areas during the installation phase of the subsea cable will be minimal and temporary, due to the Aurora Project's relatively short timeframe for installation activities. The mobile fleet (i.e. pelagic and demersal gear vessels) target a relatively large spatial extent and are not limited only to fishing grounds inshore (**Figure 6-22** and **Figure 6-23**). The magnitude of impact is considered to be **Low** for all receptor groups.

As described above for "loss or restricted access to fishing grounds", the inshore pelagic mobile gear, demersal mobile gear and static gear receptor groups exhibit relatively large operational ranges and are able to mitigate potential displacement of fishing activity into other areas through their spatial tolerance and ability to fish numerous grounds within the wider North Sea and beyond. The pelagic mobile gear receptor group also possesses an ability to target numerous pelagic species through deployment of alternative gear. The inshore static gear receptor group generally constitutes smaller vessels, which are limited in their ability to deploy alternative gear and spatial adaptability. The sensitivity of the receptor is considered to be **Low** for demersal mobile gear, pelagic mobile gear, and static gear.

Any displacement of fishing activity into other areas during operation and maintenance activities is expected to be limited to discreet spatial areas, due to the small scale and short duration of any maintenance activities. Due to the nature of the fishing gear active in the region (i.e. limited bottom contact, excluding demersal gear), fishing is expected to continue without any significant loss of area or restricted access, limiting any displacement of fishing activity into other areas due to the presence of the subsea cable. The magnitude of impact is, therefore, considered to be **Low** for demersal mobile gear and static gear and **Negligible** for the other receptor groups.

The sensitivity of the receptor groups is not anticipated to exceed what has been described for the installation phase of this impact. The sensitivity of the receptors for the Aurora Project for loss or restricted access to fishing grounds is summarised in **Table 6-32**.

TABLE 6-32 SUMMARY OF IMPACT ASSESSMENT FOR DISPLACEMENT OF FISHING ACTIVITY INTO OTHER AREAS ON COMMERCIAL FISHERIES RECEPTORS

Receptor	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Demersal mobile gear fisheries	Low	Low	Negligible	**Not Significant**	None required
Pelagic mobile gear fisheries	Low	Low	Negligible	**Not Significant**	None required

Receptor	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Inshore static gear fisheries	Low	Low	Negligible	**Not Significant**	None required

Interference with Fishing Activities

There is potential for interference with fishing activity during installation, operation and maintenance, and decommissioning, where the presence and activity of Aurora Project vessels may occur in areas of commercial fishing. Although installation, maintenance, and / or decommissioning vessel activity will add to the existing level of shipping activity in the area, there are already moderate levels of vessel traffic that exist in the area and there is co-existence of fishing vessels with other marine traffic. Therefore, installation, operation and maintenance, and decommissioning activities are not anticipated to result in permanent interference with commercial fishing activity, and through the use of adequate marking and navigational safety procedures, potential impacts are considered to be infrequent and temporary. The sensitivity is **Low** and the magnitude of impact considered to be **Negligible** for all receptor groups during all phases of the Aurora Project (**Table 6-33**).

TABLE 6-33 SUMMARY OF IMPACT ASSESSMENT FOR INTERFERENCE TO FISHING ACTIVITIES ON COMMERCIAL FISHERIES RECEPTORS

Receptor	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Inshore Demersal mobile gear fisheries	Low	Negligible	Negligible	**Not Significant**	None required
Inshore Pelagic mobile gear fisheries	Low	Negligible	Negligible	**Not Significant**	None required
Inshore static gear fisheries	Low	Negligible	Negligible	**Not Significant**	None required

Potential Loss or Damage to Fishing Gear due to Snagging

The presence of the subsea cable may lead to loss or damage to fishing gear due to snagging. Snagging risks may occur as a result of exposed infrastructure on the seabed, such as surface laid subsea cable which may occur where cable crossings are required, and / or plough burial is not possible. The Aurora Project, including the 'as-laid' coordinates, shall be recorded and submitted to the relevant authorities and Kingfisher for inclusion on charts. The commercial fishing industry will be fully informed of any potential snagging risks through Notices to Mariners. Use of advisory clearance distances and safety zones during any maintenance will minimise the risk of interaction between fishing vessels and Aurora Project infrastructure, therefore reducing the risk of snagging. Where it is deemed necessary, snagging risks will be marked by a guard vessel or navigational marker. The magnitude of impact is, therefore, considered to be **Negligible** for all commercial fisheries receptor groups during all phases of the Aurora Project (**Table 6-34**).

For this impact, the sensitivity has been defined by the vulnerability of the receptor group associated with snagging risks:

The nature of static gear fishing, where gear is not towed and does not penetrate the seabed, means the vulnerability of these inshore and offshore receptor groups is Low.

The nature of the pelagic gear deployed means that the vulnerability of this receptor group is Low, as these vessels are mostly using pelagic trawls and seines which have no, or minimal, contact with the seabed.

The nature and penetration depth of the demersal gear deployed means that the vulnerability of this receptor group is Medium. The predominant demersal gear deployed in the Commercial Fisheries Study Area is the otter trawl, where vessels are required to tow nets/trawls under significant power, and at defined speeds.

TABLE 6-34 SUMMARY OF IMPACT ASSESSMENT FOR LOSS OR DAMAGE TO FISHING GEAR DUE TO SNAGGING ON COMMERCIAL FISHERIES RECEPTORS

Receptor	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Demersal mobile gear fisheries	Medium	Negligible	Negligible	**Not Significant**	None required
Pelagic mobile gear fisheries	Low	Negligible	Negligible	**Not Significant**	None required
Inshore static gear fisheries	Low	Negligible	Negligible	**Not Significant**	None required
Offshore static gear fisheries	Low	Negligible	Negligible	**Not Significant**	None required

6.6.2.3 ASSESSMENT CONCLUSIONS

The impacts associated with the subsea cable are determined to be at most **Low** magnitude, due to the impacts being localised to the small area of restrictions along the subsea cable installation. The projected impacts indicate a temporary loss of access to fishing grounds; however any impact should be limited due to the temporary nature of the installation phase and the extensive operational ranges of the fishing vessels.

The assessment of the Aurora Project highlights the potential impacts on commercial fisheries. Whilst there is the potential for direct impacts such as loss or restricted access to fishing grounds, displacement of fishing activities, the overall risk is assessed to be **Negligible** across all receptor groups.

Additionally, the use of adequate mitigation reduces these impacts further. Once installed, subsea cables require no maintenance except in instances where a repair is required. In such instances, the magnitude of the impacts caused by repairing the subsea cable are similar to those described for the installation activities, but will take place over a much smaller area and time period.

In conclusion, whilst the Aurora Project poses certain risks to commercial fisheries, the anticipated impacts are assessed to be manageable and limited in duration and significance. Should the results of the CRS and any Cable Burial Assessment indicate that the degree of subsea cable burial will be far less than currently anticipated, potential impacts to fisheries should be reassessed to account for any significant lengths of exposed subsea cable which may result in a permanent removal of fishing grounds.

As such, **No Significant Effects** are expected from any of the potential impacts on any of the commercial fisheries receptor groups.

6.7 SHIPPING AND NAVIGATION

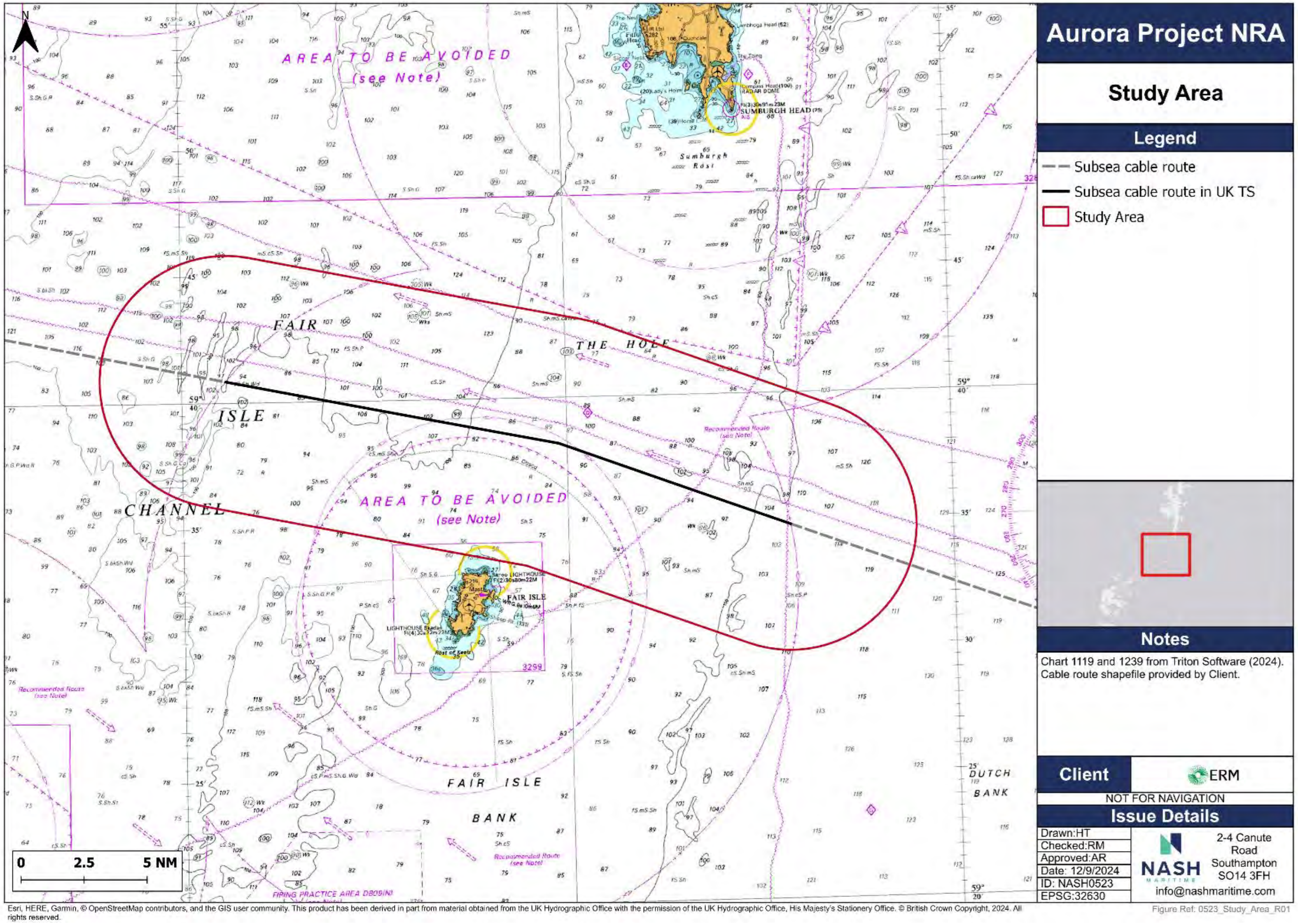
This section describes the baseline environment and impact assessment for shipping and Navigation, within a defined shipping and navigation Study Area, on the portion of Aurora Project subsea cable passing through the UK TS between Orkney and the Shetland Isles, which measures approximately 43 km in length. This has been informed by a desk-based NRA commissioned by ERM and undertaken by NASH Maritime in October 2024 (**Appendix 5**). The NRA utilises a range of data sources, including vessel traffic datasets (AIS), consultation with key shipping and navigation stakeholders, incident data and admiralty charts. The Shipping and Navigation section of this EA should be read alongside:

- Appendix 5 (NRA);
- Section 6.6 (Commercial Fisheries); and
- Section 6.9 (Other Users).

6.7.1 SHIPPING AND NAVIGATION STUDY AREA

The shipping and navigation Study Area, as presented in **Figure 6-24**, comprises an area of 5 nm surrounding the Aurora Project within the UK TS (NASH, 2024). The shipping and navigation Study Area is designed to assess shipping patterns in proximity to the Aurora Project. The proposed shipping and navigation Study Area has been agreed by NASH Maritime with consultees and is consistent with industry best practice for NRAs (NASH, 2024).

FIGURE 6-24 SHIPPING AND NAVIGATION STUDY AREA



Source: NASH, 2024

6.7.2 BASELINE ENVIRONMENT

A full assessment of the baseline environment for shipping and navigation is provided in the NRA (**Appendix 5**), which include details of:

- Navigational features and existing infrastructure;
- Emergency response resources;
- Existing maritime activities including vessel traffic; and
- Future vessel traffic.

This section provides a summary of the key findings from the assessment of the baseline environment in the NRA and therefore both documents should be read in parallel. This section is intended to provide an overview of the baseline environment relevant to shipping and navigation and does not provide any additional information over that presented in the NRA. Key features relevant to the portion of Aurora Project passing through the UK TS and features relating to the management of vessels and safety of navigation are described in this section.

6.7.2.1 METHODOLOGY TO INFORM THE BASELINE ENVIRONMENT

To inform the baseline environment for the shipping and navigation Study Area (see **Section 6.7.1**) a range of data sources have been collated and reviewed, which include vessel traffic datasets, incident data and other data sources and feedback from Aurora Project-specific consultation. Further information on the methodology to inform the baseline environment is included within the NRA (**Appendix 5**).

6.7.2.2 NAVIGATIONAL FEATURES AND EXISTING INFRASTRUCTURE

As presented in **Figure 6-25**, a number of key navigational features have been identified in the vicinity of the shipping and navigation Study Area, forming part of the baseline environment for navigational features and existing infrastructure.

Nearby Ports and Harbours

North Haven, the primary harbour on Fair Isle, is located just outside of the shipping and navigation Study Area, and comprises of the main harbour within proximity to the Shipping and Navigation Study Area. North Haven is located 7.3 nm south of the Aurora Project within the UK TS and is used predominantly by fishing vessels and ferries (NASH, 2024).

Anchorages

No anchorages are located within the shipping and navigation Study Area. However, outside of the Study Area in the closest proximity, vessels may anchor at North Haven Pier of Fair Isle, however, this anchorage is only suitable for small vessels (NASH, 2024).

Subsea Infrastructure

Within the UK TS, five (5) subsea cables are located within the shipping and navigation Study Area, the closest of which passes 0.6 nm north of the segment of the subsea cable route (NASH, 2024). Although nautical charts have not yet been updated to reflect the presence of the subsea cable, the Shetland HVDC link was fully commissioned in August 2024; this subsea cable infrastructure crosses with the Aurora Project (NASH, 2024).

Military Practice and Exercise Areas

Within the UK TS, one firing practice area is located 16 nm south of the Aurora Project (NASH, 2024).

IMO Features, Routing Measures and Reporting Schemes

Three (3) areas should be avoided in proximity to the segment of the Aurora Project located within the UK TS, one of which is located around the Shetland Islands, and the others located around Fair Isle and the Orkney Islands (see **Appendix 5** for further information on the areas to be avoided) (NASH, 2024). Either side of Fair Isle, IMO adopted routes are present and are recommended for use by all vessels passing through the Fair Isle Channel (see **Appendix 5** for further information for the recommended routes) (NASH, 2024).

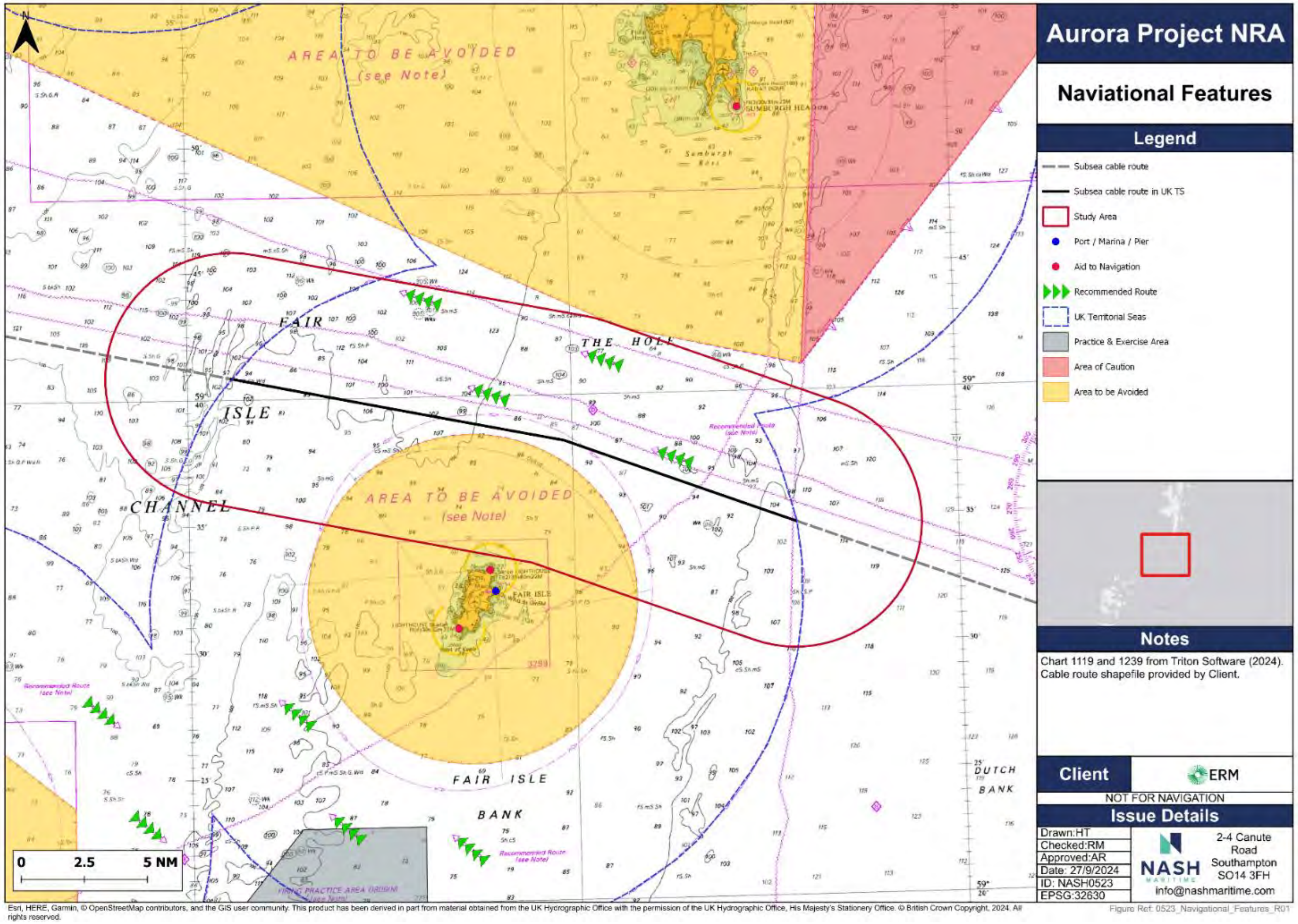
Aids to Navigation

Two lighthouses are located on Fair Isle, to the north and south of the islands; a lighthouse is also located at Sumburgh Head, to the southern point of the Shetland Islands (NASH, 2024).

Other Navigational Features

An area of caution is located 6 nm north of the Aurora Project within the UK TS, related to shipping movements; 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 (NASH, 2024). Additionally, in the south-eastern approach to Yell Sound, large deep-draught vessels may also be encountered anchored close to the coast (NASH, 2024).

FIGURE 6-25 NAVIGATIONAL FEATURES



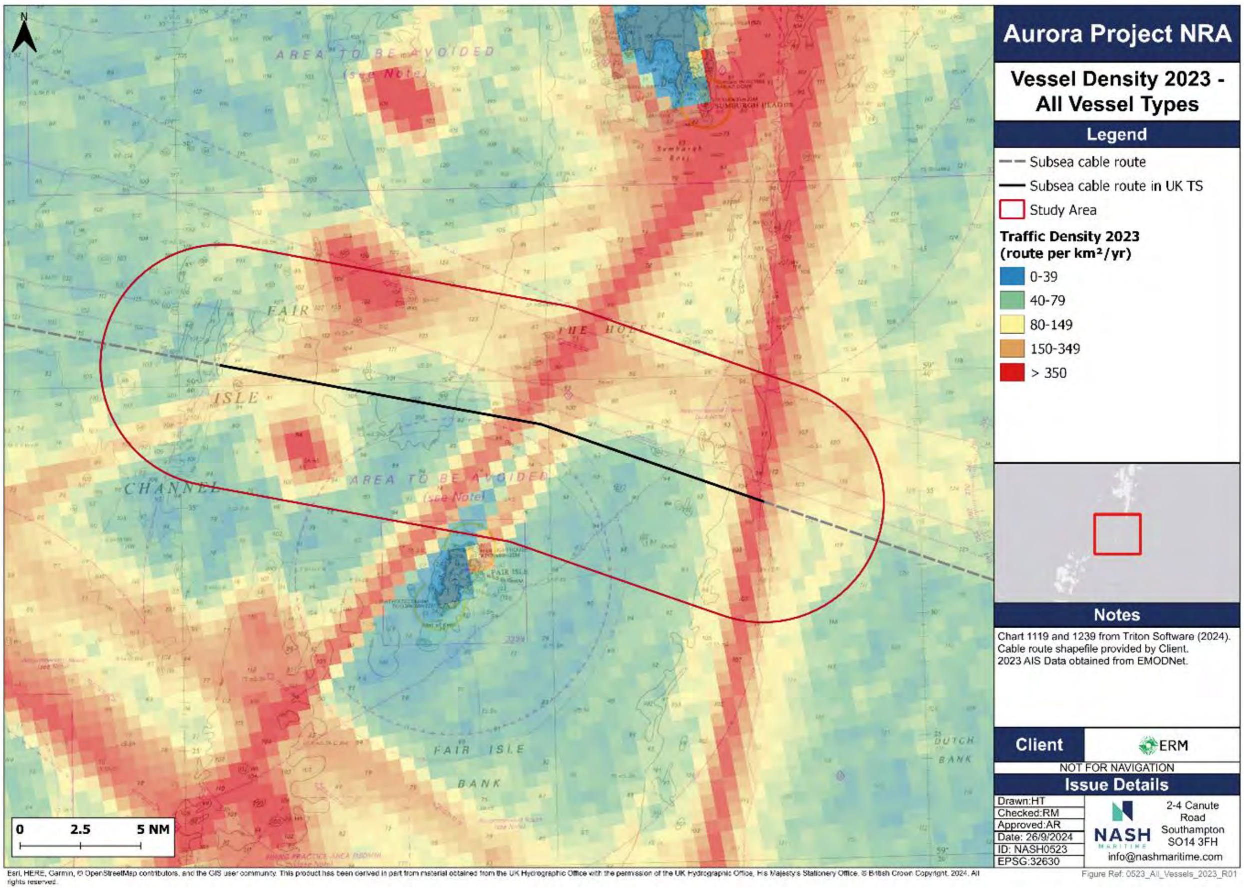
Source: NASH, 2024

6.7.2.3 VESSEL TRAFFIC ANALYSIS

As presented in **Figure 6-26**, annualised vessel traffic density is presented by the number of vessel transits through each grid cell during 2023. Analysis showed the following:

- Two (2) high density routes were observed crossing the Aurora Project within UK TS to and from the Shetland Islands;
- A medium-high density route was observed between Fair Isle and the Shetland Islands;
- Medium density route observed within the north of the shipping and navigation Study Area, crossing the high-density routes to and from the Shetland Islands; and
- Hotspots were observed within the west of the Study Area associated with the installation of the Shetland HVDC link (NASH, 2024).

FIGURE 6-26 VESSEL DENSITY 2023 (ALL VESSEL TYPES)

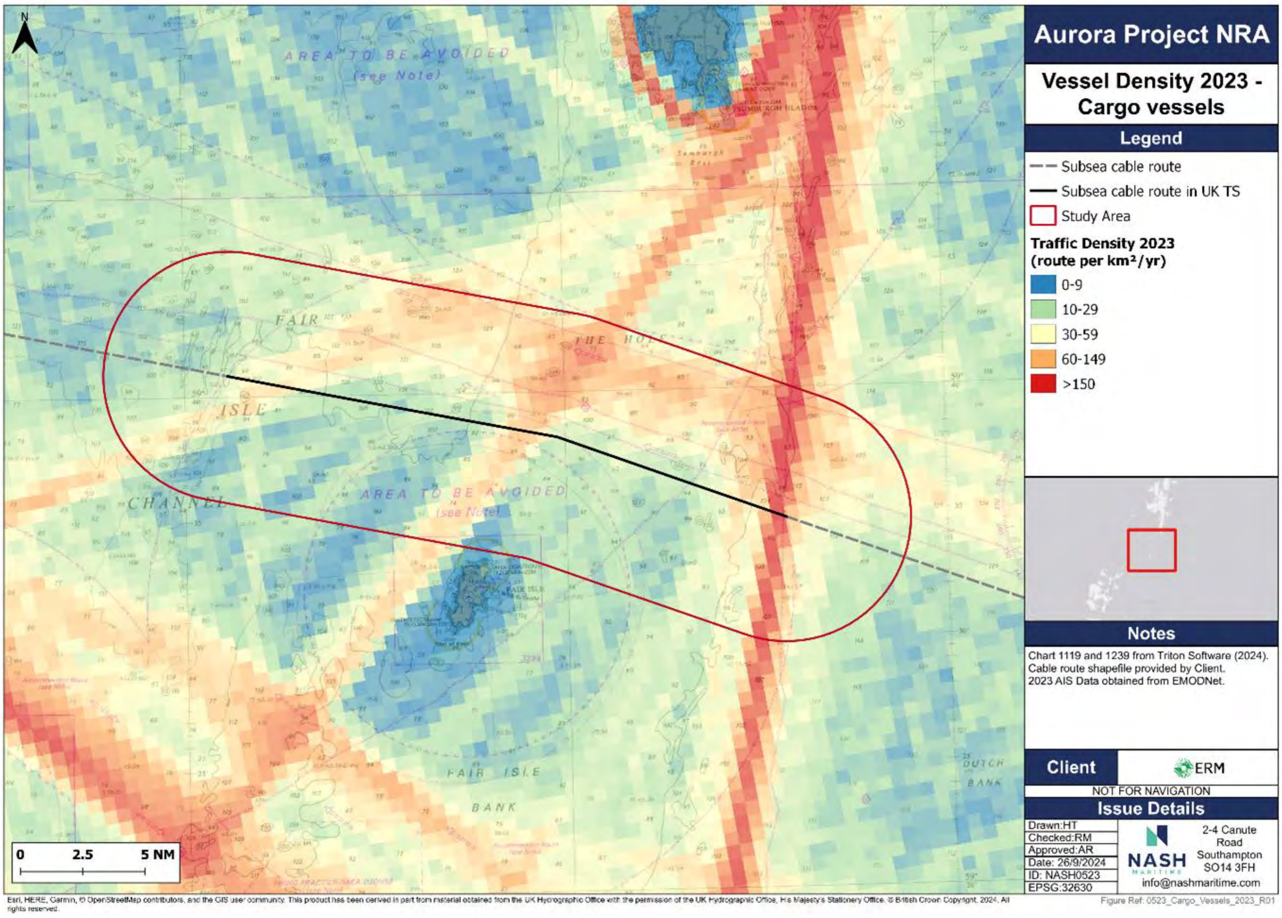


Source: NASH, 2024

Cargo Vessels

As presented in **Figure 6-27**, the vessel density heat maps for cargo vessels exhibits three (3) distinct routes crossing the Aurora Project route within the UK TS, to and from the Shetland Islands (NASH, 2024). The busiest of which was recorded within the east of the shipping and navigation Study Area, attaining approximately 250 vessel transits in 2023.

FIGURE 6-27 VESSEL DENSITY 2023 (CARGO VESSELS)

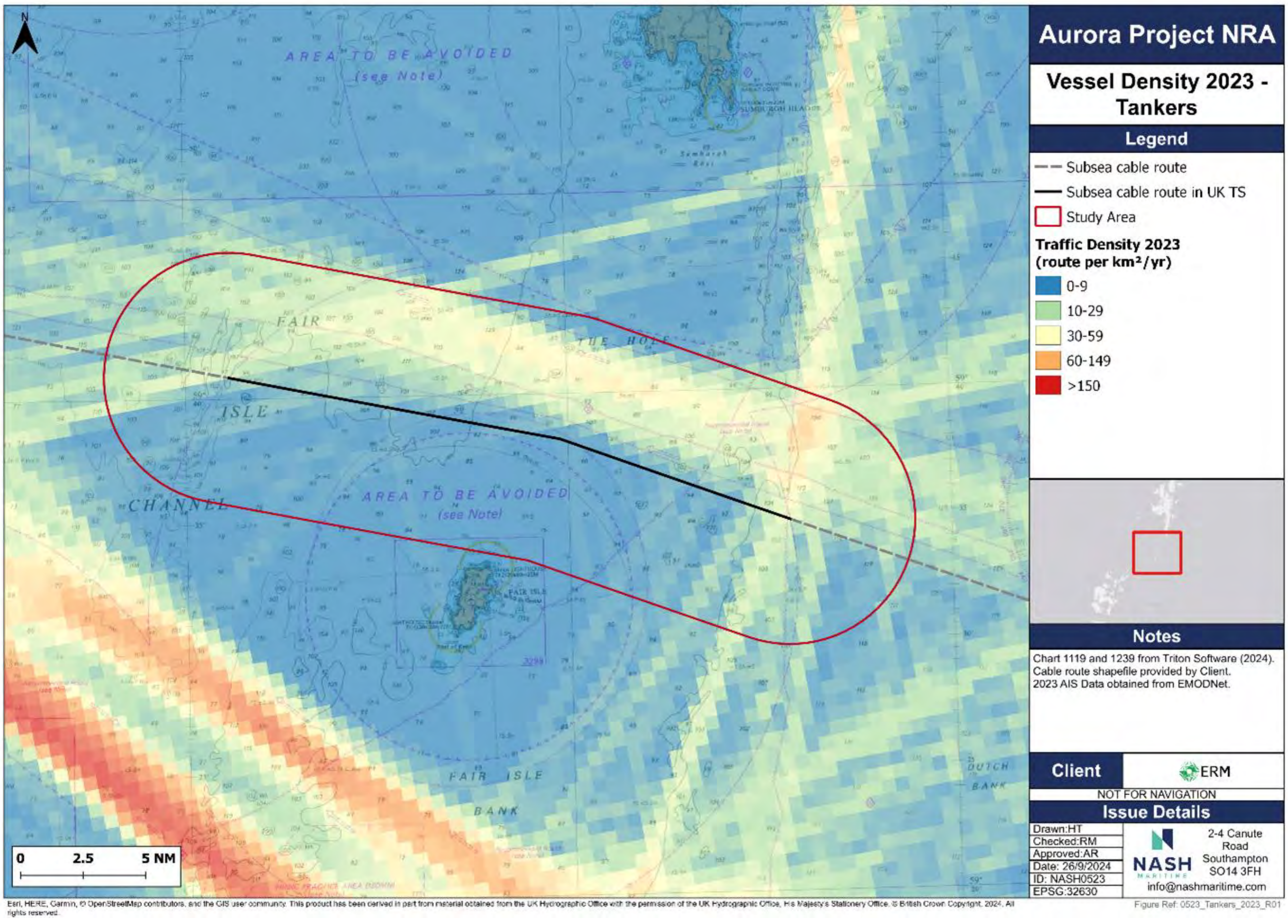


Source: NASH, 2024

Tankers

As presented in **Figure 6-28**, the vessel density heat maps for tankers exhibits two main routes, passing south-west of the shipping and navigation Study Area. The busiest of which was recorded to the south of the shipping and navigation Study Area; approximately 120 vessels transited this route in 2023 (NASH, 2024).

FIGURE 6-28 VESSEL DENSITY 2023 (TANKER VESSELS)

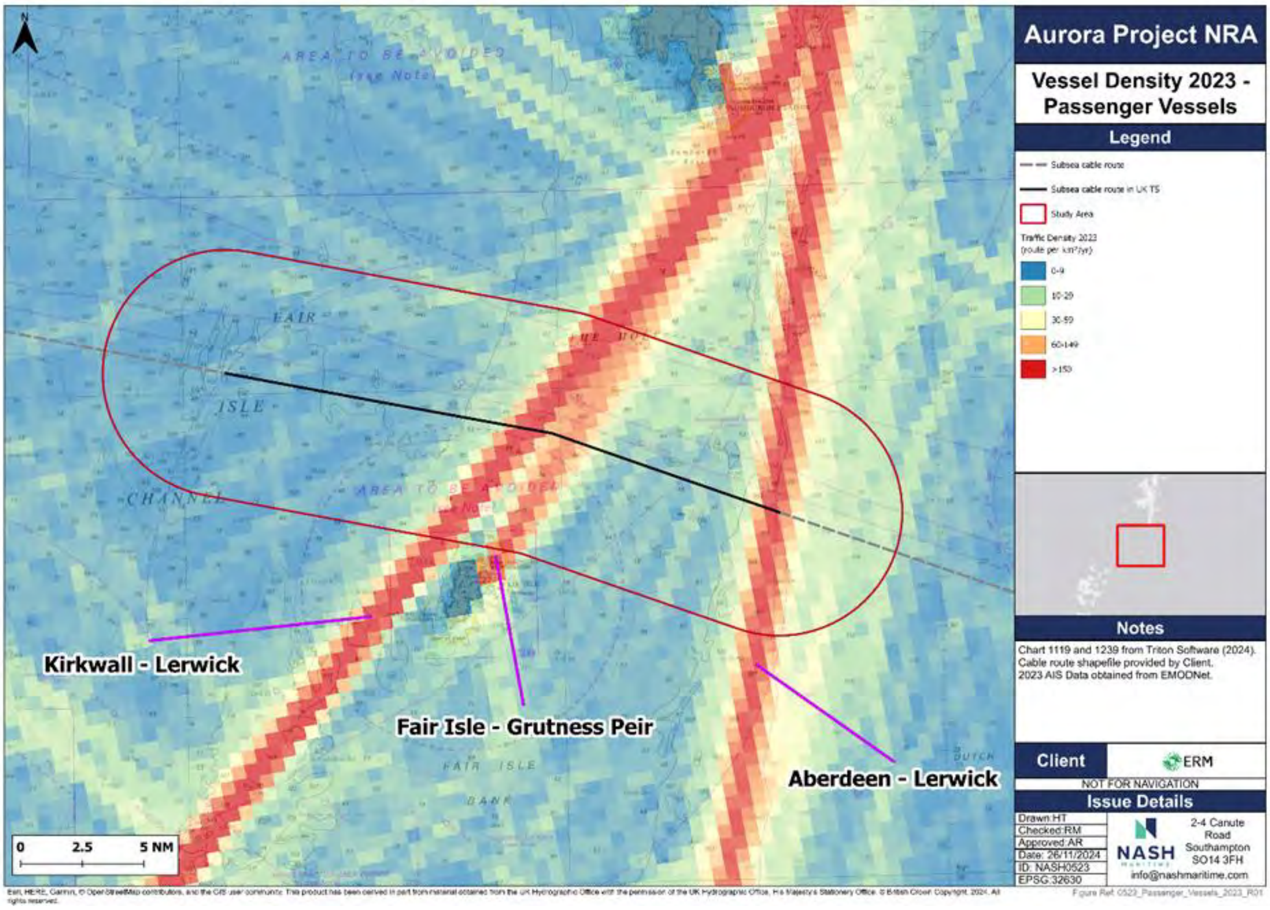


Source: NASH, 2024

Passenger Vessels

As presented in **Figure 6-29**, the vessel density heat maps for passenger vessels exhibits three high density routes passing through the subsea cable route and shipping and navigation Study Area. One (1) route is a ferry route operated between Fair Isle and the Shetland Islands; the other two (2) are ferry routes between the Shetland Islands and Orkney/Aberdeen, operated by NorthLink Ferries (NASH, 2024). Further details on the vessels operated by NorthLink can be found in **Appendix 5**.

FIGURE 6-29 VESSEL DENSITY 2023 (PASSENGER VESSELS)

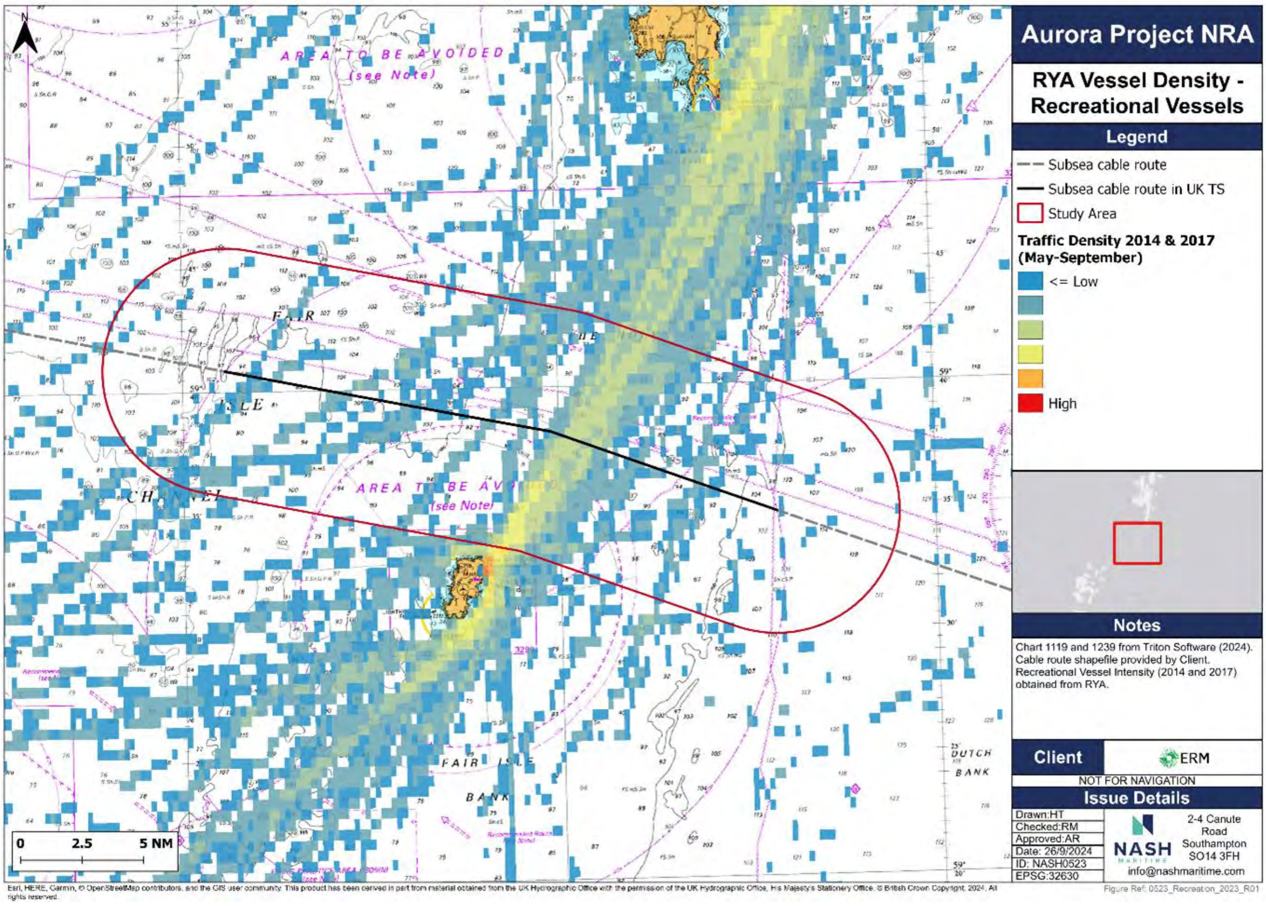


Source: NASH, 2024

Recreational Vessels

As presented in **Figure 6-30**, the vessel density heat map for recreational vessels exhibits one general route through the subsea cable route and shipping and navigation Study Area. Recreational vessel activity was generally low throughout the Study Area; however, a medium density route was observed between the Shetland Islands and Fair Isle (NASH, 2024). It is noted that recreational activity may be under-represented due to AIS broadcasting requirements mandated for vessels over 15 m in length only (NASH, 2024).

FIGURE 6-30 VESSEL DENSITY 2014 AND 2017 (RECREATIONAL VESSELS)



Source: NASH, 2024

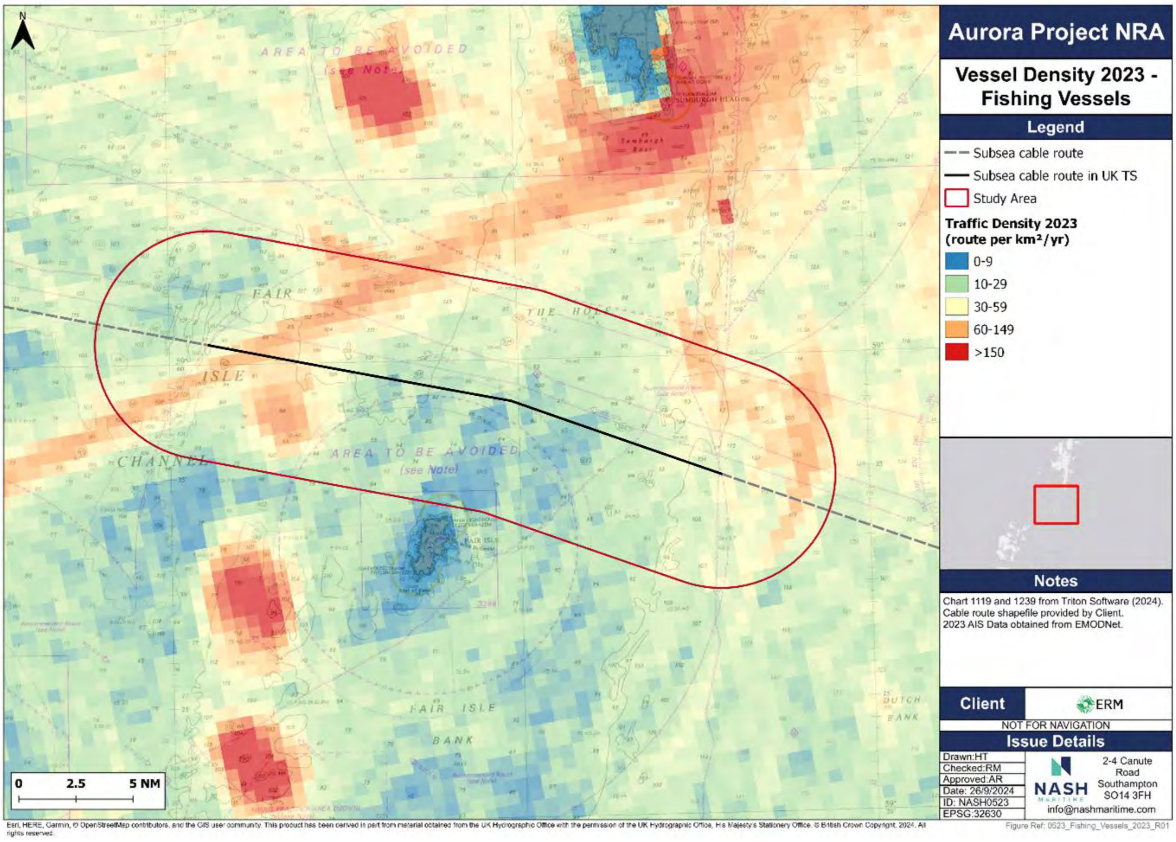
Fishing Vessels

As presented in **Figure 6-31**, the vessel density heat map for fishing vessels exhibits one (1) main route crossing within the west of the subsea cable route and shipping and navigation Study Area; approximately 120 vessels transited this route in 2023 (NASH, 2024). Two (2) other areas of medium-high density of fishing activity were observed within the Study Area (NASH, 2024). The high-density hotspots observed outside of the shipping and navigation Study Area can be attributed to vessels undertaking guard vessel activities for the Shetland HVDC link (NASH, 2024).

Additionally, the fishing vessel density observed with the MMO VMS (2020) dataset is present in **Figure 6-32**; this largely aligns with **Figure 6-31**, which exhibited fishing activity predominantly in the east of the shipping and navigation Study Area. For the cells intersecting the shipping and navigation Study Area, 95% of vessels recorded used demersal gears, particularly bottom otter trawls, pair trawls, otter twin trawls and Scottish seines (NASH, 2024).

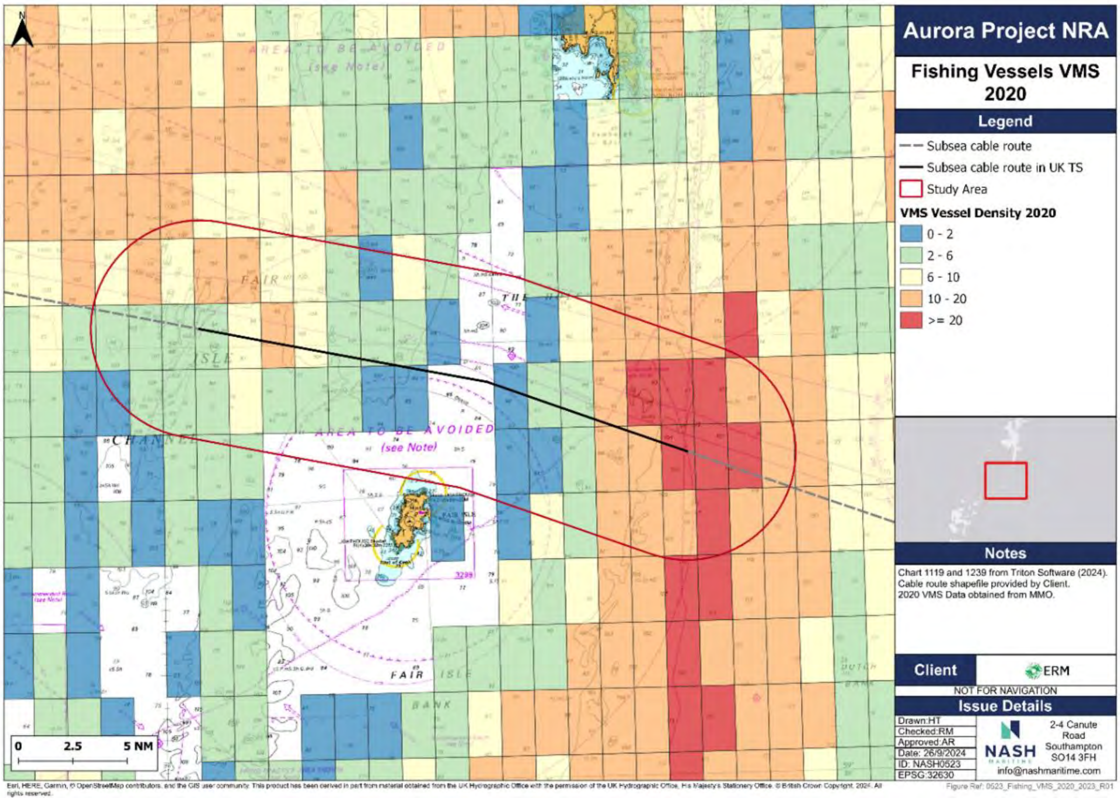
It should be noted that fishing activity may be under-represented due to AIS broadcasting requirements mandated for vessels over 15 m in length only; the VMS data also shows data only for those vessels over 15 m in length (NASH, 2024).

FIGURE 6-31 VESSEL DENSITY 2023 (FISHING VESSELS)



Source: NASH, 2024

FIGURE 6-32 FISHING VESSEL VMS DENSITY 2020

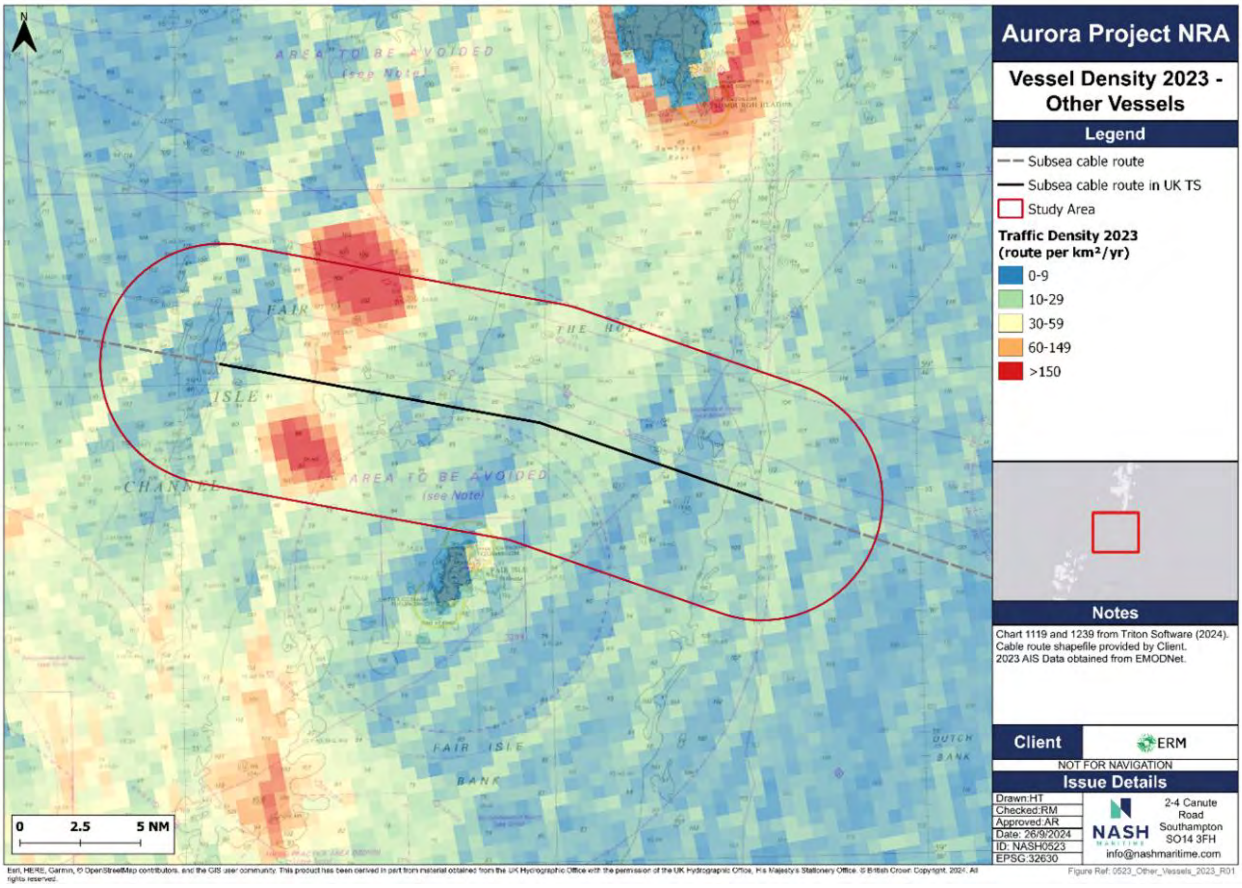


Source: NASH, 2024

Other Vessels

Other vessels include all other vessels recorded on AIS not captured within the previous vessel categories (e.g. survey vessels, service vessels etc.) (NASH, 2024). As presented in **Figure 6-33,** the vessel density heat maps for other vessels exhibits two (2) high density hotspots of activity were observed within the west of the shipping and navigation Study Area, associated with the installation activities for the Shetland HVDC link (NASH, 2024). However, the vessel density for other vessels was relatively low within the Study Area in general (NASH, 2024).

FIGURE 6-33 VESSEL DENSITY 2023 (OTHER VESSELS)

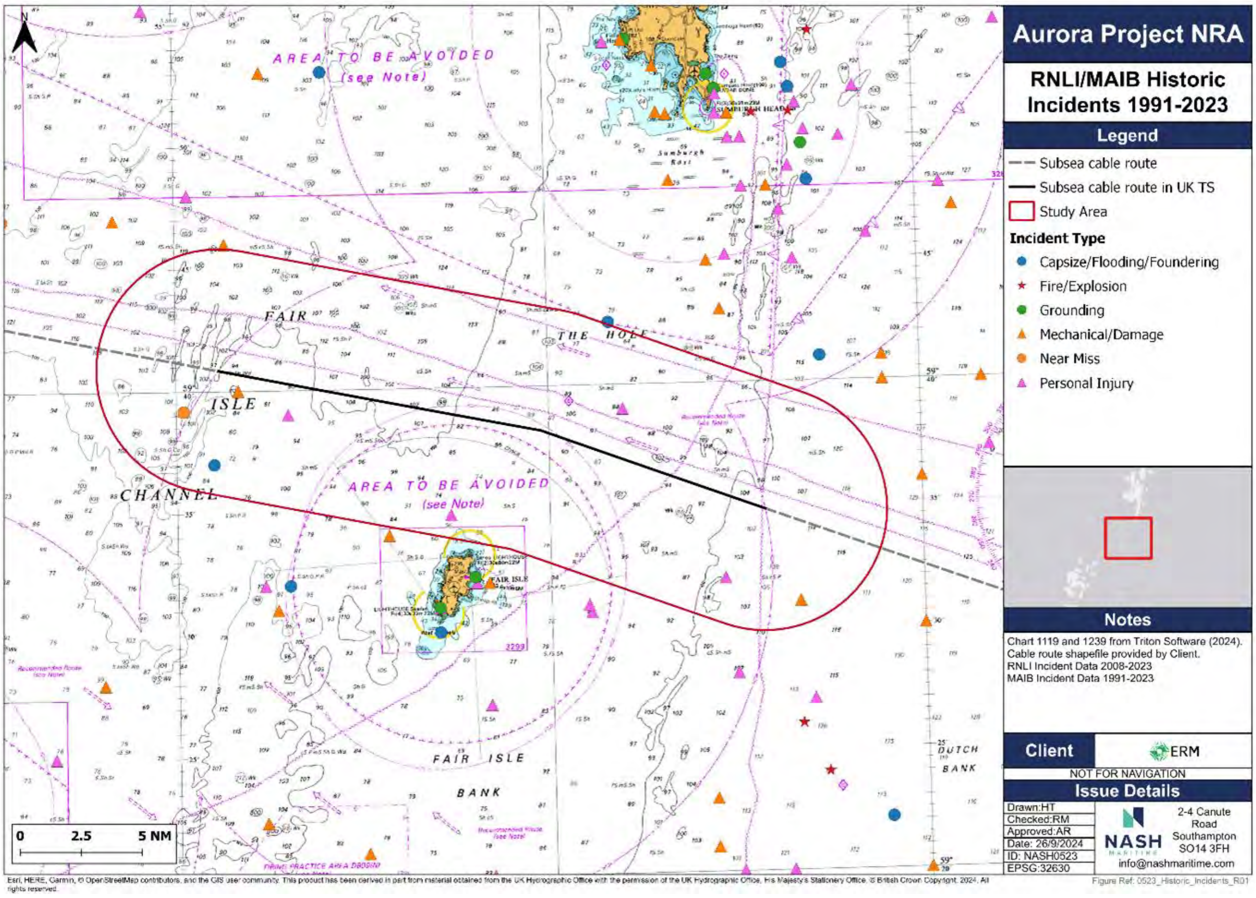


Source: NASH, 2024

6.7.2.4 HISTORICAL MARITIME INCIDENTS

The Marine Accident and Investigations Branch (MAIB) (1991-2022) and RNLI (2008-2023) databases were utilized to determine the maritime incidents recorded within the shipping and navigation Study Area (NASH, 2024). **Figure 6-34** exhibits the recorded maritime incidents spatial extent. The majority of incidents were recorded close to shore and around Fair Isle and the south of the Shetland Islands; a total of 10 incidents took place within the Study Area (further details on the incidents are summarised in **Appendix 5**) (NASH, 2024). No instances of collision were recorded within the shipping and navigation Study Area; the most frequent incident category from the MAIB and RNLI data within the Study Area was personal injury and the most common vessel type involved in incidents was fishing (NASH, 2024).

FIGURE 6-34 MAIB AND RNLI HISTORICAL INCIDENTS (1991-2023)



Source: NASH, 2024

6.7.2.5 METOCEAN DATA (WIND, TIDE AND VISIBILITY)

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 (NASH, 2024).

Tidal diamond D is the closest to the segment of Aurora Project within UK TS; the tidal patterns generally move in an east/west direction at relatively low speeds (NASH, 2024). Further details on the tidal data can be found in **Appendix 5**.

Fog affects visibility approximately 51 days per year, in proximity to Fair Isle (NASH, 2024).

6.7.2.6 EMERGENCY RESPONSE RESOURCES

Within the UK TS, the closest search and rescue (SAR) helicopter base, located in proximity to the Aurora Project, is at Sumburgh, 15.9 nm north of the subsea cable route (NASH, 2024). Two (2) RNLI Stations are located in Shetland, in Lerwick and Aith, the closest located to the shipping and navigation Study Area being Lerwick (located 33 nm from the subsea cable route) which houses a Severn all-weather lifeboat (NASH, 2024; RNLI, 2024).

6.7.2.7 FUTURE TRAFFIC BASELINE

This section presents the predicted future case traffic profile within the shipping and navigation Study Area for commercial, ferries, fishing and recreational vessel traffic. A steady trend in ship arrivals of commercial traffic has been observed at Lerwick and Orkney, as per the

Department for Transport data on UK port trade (NASH, 2024). 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 (NASH, 2024). Further details on the predictions of commercial vessel traffic can be found in **Appendix 5**.

NorthLink Ferries were the principal ferry operator recorded within the shipping and navigation Study Area. During Q2 2023, NorthLink Ferries increased the frequency of transits on their route between Scrabster and Stromness due to increased demand (NASH, 2024). 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 (NASH, 2024). Further details on the trends of ferry vessel traffic can be found in **Appendix 5**.

Fishing activity in the shipping and navigation Study Area is not anticipated to change significantly, with both local and foreign vessels continuing to operate in the area (NASH, 2024). Further details on the trends of fishing vessel traffic can be found in **Appendix 5**.

Similarly, recreational activity in the shipping and navigation Study Area is also not anticipated to change significantly, due to macro trends associated with the fluctuation in activity. Further details on the trends of recreational vessel traffic can be found in **Appendix 5**.

6.7.2.8 SENSITIVE RECEPTORS WITHIN TERRITORIAL SEAS

Sensitive receptors identified within the TS include the aforementioned key vessel routes exhibiting moderate densities within the shipping and navigation Study Area. These key vessel routes are identified to be utilised specifically by:

- Commercial vessels including Cargo vessels;
- Passenger/Ferry vessels;
- Fishing vessels; and
- Other vessels (i.e. survey vessels, service vessels, or any other vessel type not included within the vessel categories listed).

6.7.3 IMPACT ASSESSMENT

The Aurora Project has the potential to result in environmental impacts on the receptor groups described in **Section 6.7.2.** The assessment of potential effects has been undertaken using NRA methodology established in accordance with the IMO’s Formal Safety Assessment (FSA) methodology. This NRA methodology is found in Section 3 of **Appendix 5** and is outlined in **Section 6.7.3.1** below. This approach has been adopted to inform the significance levels established within this section. Whilst a formal EIA is not required as a part of the MLA, the EA Report has been conducted using similar EIA terms and definitions for transparency and ease of understanding (**Section 5.2.2**).

Embedded mitigations during the Aurora Project installation, operation and maintenance, and decommissioning activities within the UK TS are presented in Table 3 of **Appendix 5**. As there is a commitment to implementing these measures, they are considered inherently part of the design of the Aurora Project activities within the UK TS and have therefore been considered in the assessment presented in **Section 6.7.3.3** below (i.e. the determination of magnitude/sensitivity and therefore significance assumes implementation of these measures).

6.7.3.1 NAVIGATIONAL RISK ASSESSMENT METHODOLOGY

SHIPPING AND NAVIGATION STUDY AREA

The shipping and navigation Study Area used within the NRA is defined as an area of 5 nm surrounding the Aurora Project within the UK TS. This Study Area aligns with industry best practice for NRAs.

Data Sources

A number of data sources have been used to inform the NRA, including:

- Consultation and engagement with shipping and navigation stakeholders;
- Vessel traffic datasets;
- Incident data from accident datasets; and
- Other datasets, such as admiralty charts.

6.7.3.2 POTENTIAL IMPACTS

The installation activities of the subsea cable described in **Section 4.3** may potentially impact shipping and navigation receptors in the following ways (as per **Appendix 5**):

- Potential impact to commercial vessel and ferry routing;
- Potential impact to small craft routing and activities;
- Potential impact on vessel-to-vessel collision risk;
- Potential impact on emergency response, search and rescue;
- Potential impact to risk of snagging of anchors and fishing gear;
- Potential impact on under keel clearance;
- Potential impact on access to ports and harbours; and
- Potential impact to recognised sea lanes essential to international navigation.

The impacts scoped out of assessment can be found in **Section 7**.

Once installed, the subsea cable requires no maintenance except in instances where a repair is required, where the repair works will be applied for under a separate licence. In such instances, the potential impacts caused by repairing the subsea cable are similar in nature to those described for the installation activities, but will take place over a much smaller area and time period.

6.7.3.3 IMPACT ASSESSMENT

Potential Impact to Commercial Vessel and Ferry Vessel Routing

During the installation phase it is expected that commercial vessels and ferries may be required to reroute due to the presence of the subsea cable-laying vessel and the requested safe passing distance (NASH, 2024). Commercial and ferry vessels are of a high importance and are therefore considered to have a **High** sensitivity.

Whilst deviations may be required to route around subsea cable laying activities, it is likely that these deviations will only be less than a minute given the low spatial footprint of installation, operation and maintenance, and decommissioning activities and slow speed of the installation vessel (NASH, 2024). Only a slight impact to commercial vessel routing is determined due to the available seabed around the subsea cable route, however, any impacts will be of a temporary nature during the subsea cable laying / installation process which is anticipated to take up to 11 days within the UK TS (NASH, 2024). Additionally, it is not anticipated that adverse weather routes will be negatively affected by the subsea cable installation; in instances where adverse weather conditions are present, adequate available seabed will ensure safe vessel routing (NASH, 2024).

There are no anticipated changes to vessel routing post-installation of the Aurora Project, hence there is no expected impact on vessel-to-vessel collision risk.

Assuming embedded mitigation measures such as the promulgation of NtMs notifying vessel users of any installation, operation and maintenance, and decommissioning works prior, the magnitude of the impact for all receptors is considered to be **Negligible**. Therefore, the risk to commercial vessel and ferry vessel routing is **Minor**, and potential effects are anticipated to be **Not Significant** (**Table 6-35**).

TABLE 6-35 SUMMARY OF IMPACT ASSESSMENT FOR POTENTIAL IMPACT TO COMMERCIAL VESSEL AND FERRY ROUTING ON SHIPPING AND NAVIGATION RECEPTORS

Impact: Commercial Vessel and Ferry Routing	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Ferry Vessels	High	Negligible	Minor	**Not Significant**	None required
Commercial Vessels	High	Negligible	Minor	**Not Significant**	

Potential Impact to Small Craft Routing and Activities

During the installation of the subsea cable, it is expected that small craft may be required to alter their route due to the presence of the cable-laying vessel and safe passing distance (NASH, 2024). Recreational vessels are of a medium importance and are therefore considered to have a **Medium** sensitivity.

The installation of the subsea cable will not disrupt recreational activity within coastal waters, given its distance from the shore (NASH, 2024). Occasional offshore cruisers may encounter the cable-laying vessel, but it is noted there is significant seabed around the subsea cable for recreational craft to pass clear. (NASH, 2024).

There are no anticipated changes to small craft routing post-installation of the Aurora Project, with the exception of during maintenance activities which will be temporary and localised to the site needing repair (NASH, 2024). Assuming embedded mitigation measures such as the promulgation of NtMs notifying vessel users of any installation, operation and maintenance, and decommissioning works prior, the magnitude of the impact for recreational receptors is considered to be **Negligible** (NASH, 2024). It should be noted that it is recommended that relevant local marinas should also notified of all installation works (NASH, 2024). Therefore, the risk to small craft routing and activities is **Minor**, and potential effects are anticipated to be **Not Significant** (**Table 6-36**).

TABLE 6-36 SUMMARY OF IMPACT ASSESSMENT FOR POTENTIAL IMPACT TO SMALL CRAFT ROUTING AND ACTIVITIES ON SHIPPING AND NAVIGATION RECEPTORS

Impact: Small Craft Routing and Activities	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Recreational/Small Craft Vessels	Medium	Negligible	Minor	**Not Significant**	None required

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 the installation vessel, due to either the direct risk of a passing vessel colliding with the Aurora Project vessel, or vessels altering their route and transiting in closer proximity to other vessels (NASH, 2024). The total vessels within the shipping and navigation Study Area are of high importance and are therefore considered to have a **High** sensitivity.

The volume of vessel traffic, along with the subsea cable route and the existing navigational features in proximity, means there is adequate seabed should a passing vessel be required to undertake collision avoidance actions (NASH, 2024).

There are no anticipated changes to vessel routing post-installation of the Aurora Project, hence there is no expected impact on vessel-to-vessel collision risk (NASH, 2024).

Assuming embedded mitigation measures such as the promulgation of NtMs, along with appropriate lighting and marking of Aurora Project vessel, the magnitude of the impact for recreational receptors is considered to be **Negligible** (NASH, 2024). It should also be noted that the installation vessel will be compliant with maritime regulations and will broadcast their status accurately through AIS to reflect the nature of activities being undertaken (NASH, 2024). Therefore, the vessel-to-vessel collision risk is **Minor**, and potential effects are anticipated to be **Not Significant** (**Table 6-37**).

TABLE 6-37 SUMMARY OF IMPACT ASSESSMENT FOR VESSEL-TO-VESEL COLLISION RISK ON SHIPPING AND NAVIGATION RECEPTORS

Impact: Vessel-to-Vessel Collision Risk	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
All Vessels	High	Negligible	Minor	**Not Significant**	None required

Potential Impact on Emergency Response, Search and Rescue

During the installation phase, the presence of the installation vessel has the potential to inhibit search and rescue operations should an incident occur in close proximity to installation activities and the requested safe passing distance for passing vessels (NASH, 2024). Additionally, there is also potential for an increased need for emergency response should an accident occur aboard the Aurora Project vessel or any ancillary vessels (NASH, 2024).

Emergency response and search and rescue vessels are of high importance and are therefore considered to have a **High** sensitivity.

As identified in **Section 6.7.2.4** the vicinity of the Aurora Project within UK TS has experienced a relatively low rate of accidents in recent years (NASH, 2024). The most common incident type within the Study Area was personal injury and the most commonly involved vessel type was fishing; therefore, the impact of the subsea cable-laying vessel on existing SAR activities is minimal (NASH, 2024).

It is not anticipated that there will be any impacts on emergency response post-installation of the subsea cable (NASH, 2024).

Assuming embedded mitigation measures such as an Emergency Response Cooperation Plan (ERCoP) are implemented, in order to safely manage the operations of the subsea cable installation, the magnitude of the impact for emergency response, search and rescue receptors is considered to be **Negligible** (NASH, 2024). Therefore, the risk to emergency response, search and rescue vessels is **Minor**, and potential effects are anticipated to be **Not Significant** (**Table 6-38**).

TABLE 6-38 SUMMARY OF IMPACT ASSESSMENT FOR EMERGENCY RESPONSE, SEARCH AND RESCUE ON SHIPPING AND NAVIGATION RECEPTORS

Impact: Emergency Response, Search and Rescue	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Emergency Response Vessels	High	Negligible	Minor	**Not Significant**	None required
Search and Rescue Vessels	High	Negligible	Minor	**Not Significant**	None required

Potential Impact to Risk of Snagging of Anchors and Fishing Gear

Subsea cables introduce snagging risk, either by vessel anchors or fishing gear (NASH, 2024). The majority of fishing vessels within the shipping and navigation Study Area, utilise demersal gears which have the highest potential to interact with subsea cable (NASH, 2024). Fishing vessels are of high importance and are therefore considered to have a **High** sensitivity.

However, it should be noted that the risk of anchor dragging across the subsea cable is very low, due to the lack of designated or customary anchorages within the shipping and navigation Study Area (NASH, 2024). Commercial ships may choose to deploy an anchor in an emergency (e.g. loss of power), and whilst unlikely, this could result in subsea cable snagging if the anchor penetrates deep enough, however, the most likely outcome would result in subsea cable damage only in this instance; it is unlikely that the subsea cable would pose a risk to the vessel (NASH, 2024).

During operation the subsea cable will be buried wherever feasible (**Section 4.3.2 and 4.3.3**). Cable snagging is more likely where subsea cables are exposed during the installation process, however embedded mitigation includes the circulation of information via NtMs to make vessels aware of installation works (NASH, 2024).

Assuming embedded mitigation measures such as marking the subsea cable route on nautical charts to ensure vessel users are notified of their presence and the promulgation of NtMs, the magnitude of the impact for anchoring and fishing receptors is considered to be **Negligible**. Therefore, the risk of snagging of anchors and fishing gear is **Minor**, and potential effects are anticipated to be **Not Significant** (**Table 6-39**).

TABLE 6-39 SUMMARY OF IMPACT ASSESSMENT FOR RISK OF SNAGGING OF ANCHORS AND FISHING GEAR ON SHIPPING AND NAVIGATION RECEPTORS

Impact: Snagging of Anchors and Fishing Gear	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Anchors and Fishing Gear	High	Negligible	Minor	**Not Significant**	None required

Potential Impact on Under Keel Clearance

Subsea cables have the potential to increase the risk of grounding by reducing the depth of water through the introduction of subsea cable protection post-installation (NASH, 2024). Sufficient under keel clearance for vessels is of high importance and is therefore considered to have a **High** sensitivity.

Analysis showed that the Aurora Project within UK TS is to be situated in water depths between 83 m to 106 m (NASH, 2024). As the reduction in under keel clearance is not as critical within deeper water, reductions primarily affect nearshore areas; therefore, given the depths of the water determined, it is not anticipated that under keel clearance would be compromised. (NASH, 2024). The magnitude of the impact for under keel clearance receptors is considered to be **Negligible**. Therefore, the risk to under keel clearance is **Minor**, and potential effects are anticipated to be **Not Significant** (**Table 6-40**).

TABLE 6-40 SUMMARY OF IMPACT ASSESSMENT FOR UNDER KEEL CLEARANCE ON SHIPPING AND NAVIGATION RECEPTORS

Impact: Under Keel Clearance	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
All Vessels	High	Negligible	Minor	**Not Significant**	None required

Potential Impact on Access to Ports and Harbours

There may be a disruption to port arrivals/departures due to the presence of the Aurora Project vessel operating in close proximity (NASH, 2024). Ports and harbours are of high importance and is therefore considered to have a **High** sensitivity.

As identified in **Section 6.7.2.2**, the closest harbour to the Aurora Project within UK TS is located at North Haven on Fair Isle (NASH, 2024). The approaches to North Haven are considered to be unobstructed by the subsea cable activities, due to the distance of the subsea cable route (7.3 nm) from the harbour and there being adequate seabed around the subsea cable installation activities (NASH, 2024).

There are no anticipated impacts to ports and harbours post-installation of the Aurora Project within UK TS (NASH, 2024).

Assuming embedded mitigation measures such as the promulgation of NtMs prior to installation and maintenance works, the magnitude of the impact for ports and harbours receptors is considered to be **Negligible**. Therefore, the risk to access of ports and harbours is **Minor**, and potential effects are anticipated to be **Not Significant** (**Table 6-41**).

TABLE 6-41 SUMMARY OF IMPACT ASSESSMENT FOR ACCESS TO PORTS AND HARBOURS ON SHIPPING AND NAVIGATION RECEPTORS

Impact: Access to Ports and Harbours	**Sensitivity**	**Magnitude**	**Risk**	**Significance**	**Additional Mitigation**
Vessels utilising Ports and Harbours	High	Negligible	Minor	**Not Significant**	None required

Potential Impact to Recognised Sea Lanes Essential to International Navigation

There are IMO adopted recommended routes within the shipping and navigation Study Area north and south of Fair Isle (NASH, 2024). Recognised sea lanes essential to international navigation are of high importance and is therefore considered to have a **High** sensitivity.

Where vessels require to transit north of Fair Isle, it is anticipated that their routes will not be disrupted as there is adequate seabed north of the Aurora Project within UK TS for these vessels to pass safely (NASH, 2024). As there is no anticipation for installation, operation and maintenance, and decommissioning activities to disrupt recognised sea lanes essential to international navigation, the magnitude of the impact is considered to be **Negligible**. Therefore, the risk to recognised sea lanes essential to international navigation, is **Minor**, and potential effects are anticipated to be **Not Significant** (**Table 6-42**).

TABLE 6-42 SUMMARY OF IMPACT ASSESSMENT FOR RECONGISED SEA LANES ESSENTIAL TO INTERNATIONAL NAVIGATION ON SHIPPING AND NAVIGATION RECEPTORS

Impact: Recognised Sea Lanes Essential to International Navigation	**Sensitivity**	**Magnitude**	**Risk**	**Significance**	**Additional Mitigation**
All Vessels	High	Negligible	Minor	**Not Significant**	None required

6.7.3.4 ASSESSMENT CONCLUSIONS

All assessed risks are determined to be **Minor** for all receptor groups identified, therefore **No Significant Effects** are expected from any of the potential impacts of the Aurora Project on shipping and navigation receptors.

6.7.4 NAVIGATION RISK ASSESSMENT

An NRA was developed by NASH Maritime Ltd., following the IMO's Formal Safety Guidelines, with consideration given to Marine Guidance Note 654. The NRA includes both a hazard log and a risk scoring process based on the data analysis and modelling outlined under the baseline assessment, to provide a quantitative overview. The full methodology and associated analysis are highlighted in Section 9 of the NRA (**Appendix 5**).

6.7.4.1 RISK ASSESSMENT SUMMARY

The results of the NRA concluded that no hazards were assessed as either High Risk – Unacceptable, or as Medium Risk – Tolerable (if as low as reasonably practicable). However, 16 hazards were assessed as Low Risk – Broadly Acceptable (NASH, 2024). **Table 6-43** summarises the top 10 hazards identified in the NRA during installation, operation and maintenance, and decommissioning phases of the Aurora Project; the full hazard log is available in Appendix A of **Appendix 5. Appendix 5** also provides further detail on the collision, snagging and grounding risks identified.

TABLE 6-43 TOP 10 HAZARDS ACROSS ALL IDENTIFIED RISKS

ID	Rank	Hazard title	Score	Rating
6	1	Collision - Large Project Vessel ICW. Ferry/Passenger	6.0	Low Risk - Broadly Acceptable
5	2	Collision - Large Project Vessel ICW. Cargo/Tanker	5.8	Low Risk - Broadly Acceptable
4	3	Collision - Small Craft ICW. Small Craft	5.8	Low Risk - Broadly Acceptable
1	4	Collision - Ferry/Passenger ICW. Cargo/Tanker or Ferry/Passenger	5.3	Low Risk - Broadly Acceptable
3	5	Collision - Small Craft ICW. Ferry/Passenger or Cargo/Tanker	5.1	Low Risk - Broadly Acceptable
9	5	Collision - Small Project Vessel ICW. Ferry/Passenger or Cargo/Tanker	5.1	Low Risk - Broadly Acceptable
7	5	Collision - Recreational or Fishing or Tug/Service or Small Project Vessel ICW. Large Project Vessel	5.1	Low Risk - Broadly Acceptable
2	5	Collision - Cargo/Tanker ICW. Cargo/Tanker	5.1	Low Risk - Broadly Acceptable
8	10	Collision - Small Craft ICW. Small Project Vessel	4.4	Low Risk - Broadly Acceptable

Source: NASH, 2024

6.8 MARINE ARCHEAOLOGY

This subsection describes and assesses the potential for significant effects that the installation of the subsea cable may have on any marine archaeology and cultural heritage that can be found in the designated Study Area sitting within the 12 nm UK TS, north of Scotland. This subsection should be read in conjunction with other influencing topics, such as **Section 6.1** (Marine Physical Processes).

Marine archaeology and cultural heritage assets can be divided into known and unknown assets, with the known cultural heritage assets being further split between designated and non-designated assets. Designated marine assets may include:

- World Heritage Sites;
- Historical MPAs; and
- Protected 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, though there is potential for their presence.

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

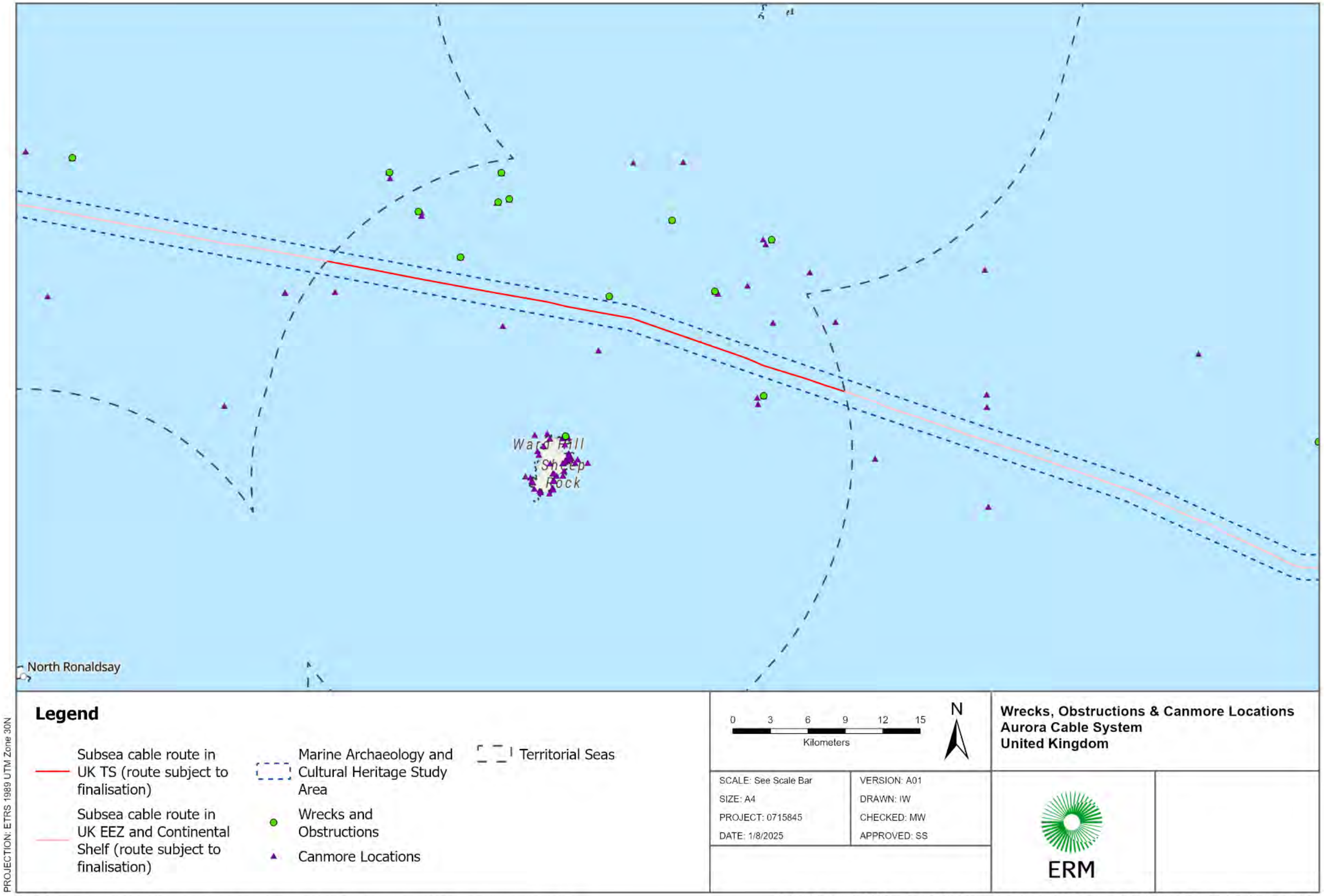
- Submerged prehistory and landscapes;
- Terrestrial and marine archaeology; and
- Aviation archaeology.

As there is no infrastructure above the sea surface, a settings assessment is scoped out, in line with the SLVA, which has also been scoped out (**Section 7**).

6.8.1 MARINE ARCHAEOLOGY STUDY AREA

The Study Area will consist of the subsea cable route within the 12 nm UK TS and a 1 km buffer either side of the route to identify potential known designated and non-designated assets and aid in the assessment of the potential for any previously unknown heritage assets, as well as provide contextual information on which direct or indirect physical impacts may occur from the subsea cable.

FIGURE 6-35 MARINE ARCHAEOLOGY STUDY AREA



SOURCE: World Topographic Map, ESRI. Contains public sector information licensed under the Open Government Licence v3.0, Historic Environment Scotland, UKHO.

Path: G:\7_Cables\ASN_Meta_Denmark\Workspaces\E_A_R\UK\0715845_Aurora_EAR_UK_A01_202501.aprx / L_Wrecks_Canmore

6.8.2 BASELINE ENVIRONMENT

This assessment utilises freely available data from local councils[5], the United Kingdom Hydrographic Office (UKHO) wrecks and obstruction database[6], HES[7], Marine Scotland[8], and United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage List[9][10]. To develop an appropriate baseline for assessment, a consideration is made for the potential direct and indirect physical impacts to known designated and non-designated assets identified via these sources.

There is a high archaeological potential in the waters around Orkney and Shetland. 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 sites.

The submerged areas around Shetland and Orkney have a high potential to find prehistoric settlements due to the regional sea level changes in the area (Dawson *et al.,* 2017). The formerly sub-aerial landscape was only submerged around 4000 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.

6.8.2.1 DESK BASED ASSESSMENT ASSETS

Table 6-44 summarises the findings of the desk-based assessment in the UK TS. As indicated in the table, within the wider Study Area of the TS there is only one (1) report of potential foul ground with a live abandoned net, chain, or tackle (outlined in **Table 6-45**).

TABLE 6-44 SUMMARY OF MARINE ARCHAEOLOGICAL AND CULTURAL HERITAGE ASSETS

		TS	
		500 m buffer of the subsea cable route	Wider Study Area
Designated assets	All*	None	None
Non-designated assets	Prehistory	None	None
	Maritime	None	1
	Aviation	None	None

* Military Remains, Scheduled monuments, Listed buildings, Historic Marine Protected Areas

[5] HER information was requested from the Orkney Islands Council, Highland Council and the Shetland Amenity Trust but no records were identified within the Project Area
[6] Available at ADMIRALTY Marine Data Portal
[7] Available at: https://portal.historicenvironment.scot/downloads
[8] Available at: https://marinescotland.atkinsgeospatial.com/nmpi/default.aspx?layers=628
[9] Available at UNESCO World Heritage Centre - World Heritage List
[10] Available at: Fund og Fortidsminder (slks.dk)

TABLE 6-45 CULTURAL HERITAGE BASELINE IN THE UNITED KINGDOM TERRITORIAL SEAS

Identifier	Name	Site Type	Description	Easting	Northing	Area	Distance (m)
Canmore 323904	Foul: Cables/Chains/Mooring/Nets/Tackle/Wires	OBSTRUCTION: Cables/Chains/Mooring/Nets/Tackle/Wires	Foul: Cables/Chains/Mooring/Nets/Tackle/Wires, snagged and abandoned, live.	-1.541810452	59.65248923	TS	1,170.0 m north of the subsea cable's 500 m buffer

A geophysical survey was completed for the Aurora Project (ASN, 2024) and data were reviewed by the survey company for any anomalies with the potential to be marine archaeology or cultural heritage. No archaeological assets were identified in the review within UK TS. A review of the sediment samples collected during the survey campaign did not reveal any further information about the presence of potential palaeolandscapes, nor were any finds reported.

6.8.2.2 MARINE ARCHAEOLOGY BASELINE SUMMARY

There is a potential for identifying unknown submerged prehistory, marine archaeology, and aviation archaeology within the subsea cable's 500 m buffer, as the Aurora Project passes along the Scottish shelf and in between the Shetland and Orkney Islands, a location with a long period of prehistoric settlement and historical marine trade and defensive routes.

There is limited data available at present, but a thorough review of site specific data may assist in understanding this further (see **Table 6-46** for mitigation).

6.8.3 IMPACT ASSESSMENT

According to the findings of the desk-based review of the datasets, only one (1) known marine archaeological or cultural heritage asset has been identified within the wider Study Area (report of potential foul ground with a live abandoned net, chain, or tackle) and none within the subsea cable's 500 m buffer (**Table 6-44**). The impact assessment is therefore focused on the potential to introduce adverse effects as a result of direct and indirect impacts on the unknown marine archaeological or cultural heritage assets.

6.8.3.1 POTENTIAL IMPACTS

The potential impact on the unknown archaeological or submerged cultural heritage assets within the proximity of the Aurora Project, within UK TS, may include:

- Direct physical impacts – the damage or full removal of a cultural heritage asset through installation, operation and maintenance or decommissioning e.g. dredging, ploughing or crushing by anchor blocks or subsea cable protection; and
- Indirect physical impacts – the damage or full removal of a cultural heritage asset due to physical changes indirectly caused by installation, operation and maintenance or decommissioning e.g. changes in seabed sediment level or current flow.

6.8.3.2 IMPACT ASSESSMENT

The assessment of potential impacts will not focus on the operational phase, or decommissioning phase of the Aurora Project, as any works that may be needed during these phases (e.g. cable repairs, cable removal etc.) will result in comparable but reduced effects compared with the effects resulting from the installation phases. A final decommissioning plan setting out the strategy for dealing with the subsea cable at the end of its operation life, will also only be produced towards the end of subsea cable operation, currently estimated to be in the region of 25 years. At this time the decommissioning options will be assessed and the preferred method, or combination of methods, selected in accordance with the prevailing legislation at that time and in consultation with the relevant authorities.

The sensitivity of unknown cultural heritage for unknown submerged prehistory and landscapes, marine archaeology, and aviation archaeology may range from **Low** to **High**. The sensitivity or value of a receptor is largely a product of its importance, as informed by legislation and policy, and as qualified by professional judgement.

Direct

The greatest impacts are predicted during the Installation Phase, the magnitude of change during this phase would be **High** because the subsea cable installation process would partially or wholly remove or 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. This would result in a significant effect from the Aurora Project where the sensitivity of the asset was medium or high (**Table 6-46**).

Indirect

The greatest impacts are only predicted during the Installation Phase. Anticipated impacts from the installation of the subsea cable may include plumes, which could result in burial, or 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 subsea cable. The magnitude of change during this phase would be **Low** because any change in hydrodynamics would result in a minor alteration of an asset and have limited disturbance of minor features and any burial would result in minor benefits to understanding or preservation of an asset. This would result in a **Not Significant** effect from the Aurora Project (**Table 6-46**).

TABLE 6-46 SUMMARY OF IMPACT ASSESSMENT FOR DIRECT IMPACTS ON MARINE ARCHAEOLOGY RECEPTORS

Impact: Direct	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation	Residual significance
Direct impact to known or unknown submerged prehistory, maritime or aviation archaeology	High to Low	High	Major	**Potentially Significant**	Review of initial investigation, including geophysical survey (such as magnetometer, side-scan sonar, bathymetric, and sub-bottom profiling), with mitigation to include micro-siting and exclusion zones to avoid any potential sites identified during survey. Develop a Written Scheme of Investigation (WSI) and a Protocol for Archaeological Discoveries (PAD), with the potential for targeted site remediation if impacts to submerged prehistory, maritime or aviation archaeology occur and cannot be avoided. These techniques will reduce the potential for loss and serve to mitigate the impact of the Aurora Project. Should any further geophysical or geotechnical surveys be planned, these would be – where appropriate - reviewed by an archaeologist to confirm no new sites of interest.	Not Significant
Indirect impact to known or unknown submerged prehistory, maritime or aviation archaeology	High to Low	Low	Minor	**Not Significant**	As above	Not Significant

6.8.3.3 ASSESSMENT CONCLUSIONS

From the results of the current baseline, there are **no anticipated significant indirect effects** to known marine archaeology or cultural heritage assets from the Aurora Project within UK TS. However, there is the **potential for significant direct adverse effects to unknown archaeology or cultural heritage assets** given the paucity of information regarding the preservation potential or presence of submerged prehistoric, marine archaeology, or aviation archaeology receptors of medium or high sensitivity within the area. Any impacts to unknown archaeology would be of high magnitude and likely result in significant effects.

A review by the survey company of the geophysical and geotechnical data acquired from the CRS in 2024 has not identified any previously unknown submerged prehistory, maritime or aviation archaeology along the subsea cable route which could be directly impacted by installation activities. However, the possibility of encountering unknown archaeology during subsea cable installation cannot be discounted. The area of direct physical impact is small (a plough channel approximately 0.2 m wide, 2 m depth, with the seabed footprint of the plough skids extending to several metres); such that the likelihood of direct physical impact to unknown archaeology is relatively small. The potential for impact can be further mitigated by review of any further geophysical data, where available, avoidance via micro-siting and exclusion zones where receptors are identified, and the development of a robust WSI and PAD.

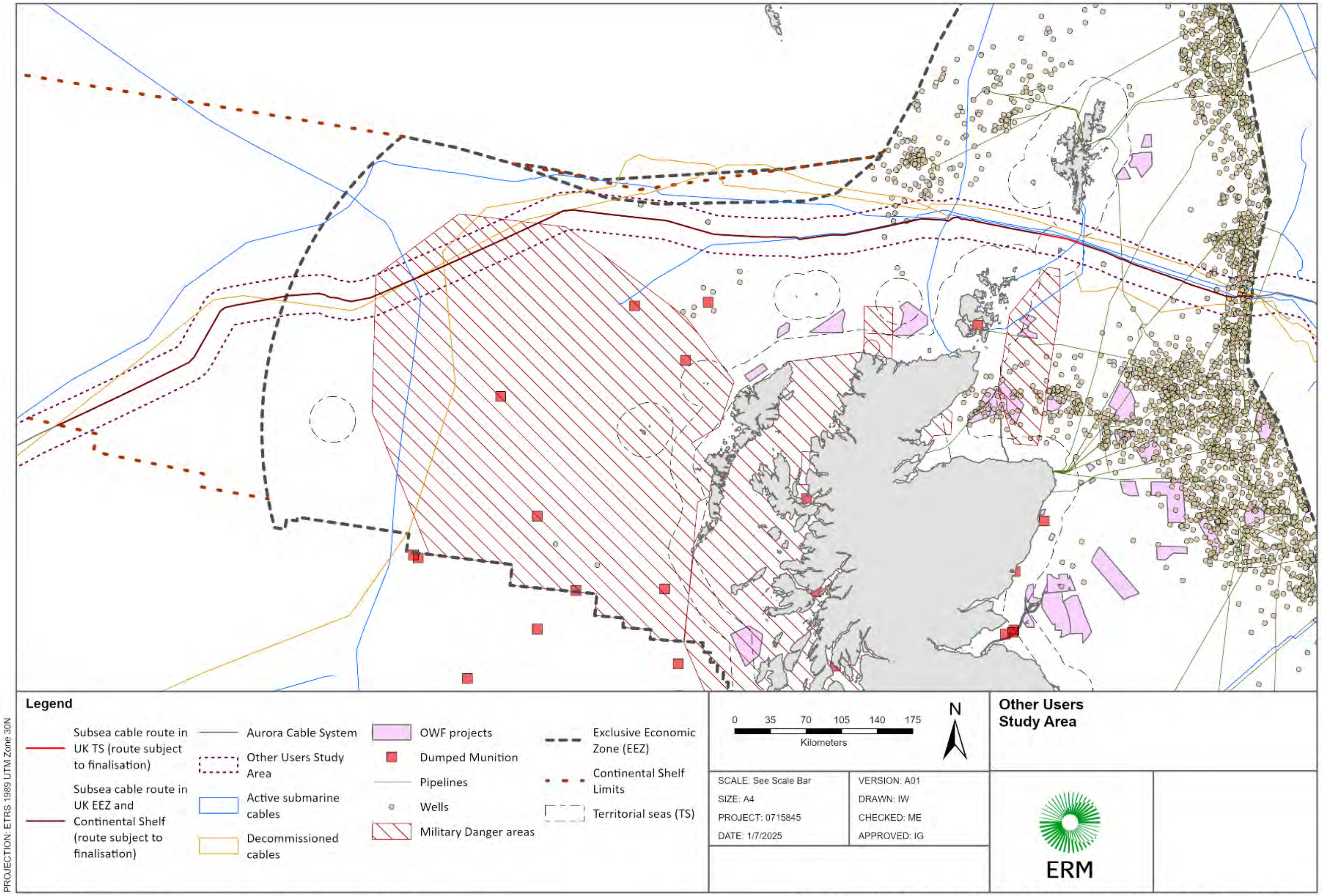
6.9 OTHER USERS

This section describes the baseline environment and EA for other users, including other infrastructure, developments, passenger vessel activity and recreational usage, defined within the other users Study Area of the UK segment of Aurora Project. The assessment of other users has been informed by a desk-based review, utilising a range of published data and peer reviewed literature sources, as listed in the **Section 11** of this EA Report.

6.9.1 OTHER USERS STUDY AREA

The other users Study Area is defined as the area within the 10 nm region surrounding the subsea cable and is presented within **Figure 6-36.** The other users Study Area is designed to encompass other infrastructure, developments, vessel activity and recreational users which have the potential to be impacted during the installation, operation and decommissioning of the Aurora Project.

FIGURE 6-36 OTHER USERS STUDY AREA



SOURCE: World Topographic Map, ESRI, European Union, 2024. Contains information provided by the North Sea Transition Authority and/or other third parties. Contains data from the Scottish Government licensed under the Open Government Licence v3.0.

Path: G:\7_Cables\ASN_Meta_Denmark\Workspaces\E_A_R\UK\0715845_Aurora_EAR_UK_A01_202501.aprx / UK Other Users

6.9.2 BASELINE ENVIRONMENT

Receptors within the other users Study Area across the UK TS around Shetland have been identified as:

- Offshore oil and gas infrastructure;
- Subsea cables and pipelines;
- Recreational and tourism receptors; and
- Military Practice and Exercise Areas (PEXA).

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. As such, the Aurora Project is not considered to result in any potential impacts, and these receptors are scoped out of the assessment.

6.9.2.1 OFFSHORE OIL AND GAS INFRASTRUCUTRE

The majority of oil and gas infrastructure present within the other users Study Area is located at the eastern extent of the UK EEZ, where there is a concentrated region of oil and gas wellbores and oilfields (**Figure 6-36**). There is also another concentrated region of wellbores north of the Aurora Project, in deep waters west of Shetland. Both wellbore clusters supply the Sullom Voe Oil Terminal, located in Shetland.

6.9.2.2 SUBSEA CABLES AND PIPELINES

The Aurora Project has been identified to cross two (2) active telecommunication subsea cables and one (1) power cable within the UK TS (KIS-ORCA, 2024); no pipelines will be crossed by the Aurora Project in the UK TS (**Section 4.3.4**). Also identified within the other users Study Area is the 'TAT 14' cable which is understood to have been removed and the 'TAT 10B' cable which is no longer in use.

6.9.2.3 RECREATIONAL AND TOURISM RECEPTORS

Three (3) ferry routes are identified to cross the Aurora Project. These routes are largely operated by NorthLink Ferries and include the Lerwick to Kirkwall, Lerwick to Aberdeen and Lerwick to Fair Isle routes (NorthLink Ferries, 2024). These passenger vessel routes have a total annual vessel density of >1200 vessels per year (Marine Scotland, 2024) and in general run daily to and from destinations on the Lerwick to Kirkwall and Lerwick to Aberdeen routes. Figure 7 of **Appendix 5** (NASH, 2024) demonstrates the densities and routes of these ferry crossings in relation to the subsea cable route. Smaller passenger vessels and recreational aircraft also operate between these destinations, particularly during the summer months during the peak tourism period between May to September, annually. These smaller passenger vessel routes have a wider spatial coverage of the other users Study Area, however, they occur at a lower density, approximately between 5-20 vessels per year (Marine Scotland, 2024). Other recreational activities such as sailing, cruising, angling and boating are also present, however these are generally restricted within the UK TS around Shetland, discussed further in **Section 6.9.2.5**.

6.9.2.4 MILITARY PEXA

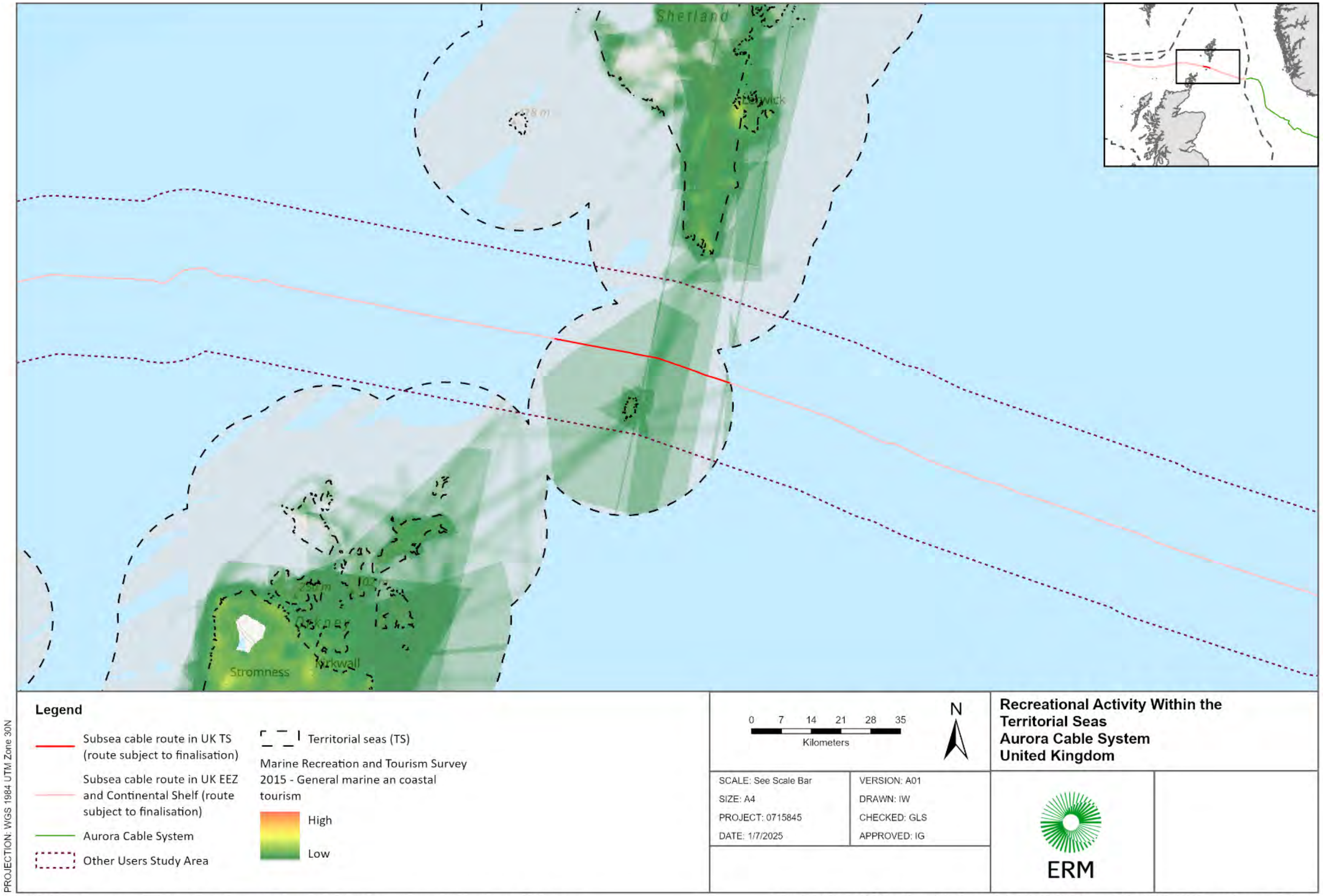
The Hebrides Military Danger Area, D701F, intersects the other users Study Area at the western extent of the UK EEZ (Marine Scotland, 2024). The Hebrides Military Danger Area is used as a firing range for torpedo exercises and weapons testing within its boundaries (CAA, 2016). The Hebrides Military Danger 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, compared to other Military PEXA.

6.9.2.5 SENSITIVE RECEPTORS WITHIN TERRITORIAL SEAS

Specific receptors identified within the TS include recreational receptors and two (2) telecommunication cables (i.e. 'BT R100' and 'SHEFA 2').

As detailed in **Section 6.9.2.3**, three (3) key ferry routes, as well as several smaller passenger vessel routes are identified to transect the TS, and potentially cross the Aurora Project within the TS. Recreational activity is general higher towards the coast, where low levels of sailing, water boating, sea angling and cruising are observed in TS surrounding Shetland and Orkney (Marine Scotland, 2024). **Figure 6-37** highlights the generally low levels of recreational activity within the UK TS of the other users Study Area, and shows the highest activity levels focused around the coastline. Other forms of recreational activities such as paddle boarding, windsurfing, kite surfing and kayaking occur much closer to the coastline, usually within 10 km, and although these are within the UK TS, they are unlikely to overlap with the other users Study Area. Therefore, these activities are not considered to interact with the Aurora Project.

FIGURE 6-37 RECREATIONAL ACTIVITY WITHIN THE TERRITORIAL SEAS



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Path: G:\7_Cables\ASN_Meta_Denmark\Workspaces\E_A_R\UK\0715845_Aurora_EAR_UK_A01_202501.aprx / Recreational_Activity

6.9.3 IMPACT ASSESSMENT

The Aurora Project has the potential to result in environmental impacts on the receptor groups described in **Section 6.9.2**. Whilst a formal EIA is not required as part of this MLA, the MEA has been conducted using similar EIA terms and definitions for transparency and ease of understanding.

6.9.3.1 POTENTIAL IMPACTS

Potential impacts to other users receptors during the installation, operation and maintenance and decommissioning phases of the Aurora Project have been identified as:

- Direct damage to third party infrastructure; and
- Temporary obstruction and/or displacement of other users activities.

Direct damage to third party infrastructure as a result of the Aurora Project has the potential to occur during subsea cable installation and during maintenance and repair events. The Aurora Project will be micro-sited to avoid existing oil and gas infrastructure identified in **Section 6.9.2.1**, as such there is no potential for direct damage to oil and gas infrastructure. The Aurora Project has been identified to cross three (3) active subsea cables (i.e. two [2] telecommunication cables and one [1] power cable), and no active gas pipelines within the UK TS. Therefore, potential impacts of direct damage to subsea cables and pipelines is scoped in. For all other receptors, direct damage is scoped out.

Temporary obstruction and/or displacement of Other Users activities has the potential to occur across all Aurora Project phases due to the presence of the installation vessel and temporary exclusion zones during installation, operation and maintenance, and decommissioning activities. This has the potential to temporarily obstruct recreational users, vessels and other project works, leading to potential displacement of other users. As such temporary obstruction and/or displacement of other users activities is scoped in for all receptor groups.

6.9.3.2 IMPACT ASSESSMENT

DIRECT DAMAGE TO THIRD PARTY INFRASTRUCTURE

As the ‘TAT 14’ and ‘TAT 10B’ cables are no longer in operation, no potential impacts are considered and as such they are scoped out of the assessment. Only cables identified within **Table 4-5** are considered within this assessment.

Subsea cables and pipelines are of high commercial importance and are therefore considered to have a **High** sensitivity. As mentioned in **Section 4.3**, no pipelines are expected to be crossed by the Aurora Project within the UK TS. However, where cable crossings are identified, the Aurora Project will be surface laid over the existing infrastructure. Ploughing will stop at a minimum distance of 250 m either side of the existing infrastructure and crossings will follow the ICPC guidelines, therefore reducing the risk of damage to third party infrastructure.

At the power cable crossing, 100 m of the Aurora Project will be encased in Uraduct® before surface laying, to provide a protective barrier between the subsea cable and the existing power cable. Additionally, cable crossing and proximity agreements will be established with other cable operators as part of embedded mitigation measures. The aim of cable crossing and proximity agreements is to establish how both assets will be protected at the cable crossing location during installation and throughout operation (further information regarding cable crossings can be found in **Section 4.3.4**). Therefore, the magnitude of impact is considered to be **Negligible**, given the localised nature of cable crossings. The risk of damage to subsea cables and pipelines is **Minor**, and potential effects are anticipated to be **Not Significant** (**Table 6-47**).

TABLE 6-47 SUMMARY OF IMPACT ASSESSMENT FOR DIRECT DAMAGE TO THIRD PARTY INFRASTRUCTURE ON SUBSEA CABLES AND PIPELINES RECEPTORS

Impact: Direct Damage to Third Party Infrastructure	**Sensitivity**	**Magnitude**	**Risk**	**Significance**	**Additional Mitigation**
Subsea Cables and Pipelines	High	Negligible	Minor	**Not Significant**	None required: Cable crossing and proximity agreements, including specification of agreed protection measures

TEMPORARY OBSTRUCTION AND/OR DISPLACEMENT OF OTHER USERS ACTIVITIES

As above, subsea cables and pipelines are considered to have a **High** sensitivity. Similarly, oil and gas infrastructure is also of a high commercial importance and has a **High** sensitivity. Recreational receptors, although of a key social importance, are unlikely to be present in high numbers throughout the other users Study Area except for a small segment within the TS around Shetland and Orkney and as mobile receptors are considered to be adaptable. Therefore, recreational receptors are considered to have a **Medium** sensitivity. The Hebrides military PEXA operates over a large area, of which only a small proportion overlaps the other users Study Area exhibiting a high tolerance of this receptor. As such military PEXA are considered to be of a **Low** sensitivity.

The magnitude of impact is considered to be highest across the pre- and post-installation phases when Aurora Project vessel activity is highest. A single purpose-built installation vessel is proposed to undertake the main subsea cable lay, as such other sea users will only be temporarily obstructed and/or displaced from discrete segments of the Aurora Project route at any one time. There are no planned maintenance activities throughout the Aurora Project’s 25-year lifespan, however there is potential for emergency repairs should a fault be detected. Assuming all relevant stakeholders are consulted and best practice measures employed, such as NtMs, Kingfisher notifications and other navigational warnings of the position and nature of works associated with the Aurora Project, as well as the discrete and temporary nature of obstruction and/or displacement, the magnitude of impact is considered to be **Negligible**.

Therefore, the risk of obstruction and/or displacement to other users activities is **Negligible** to **Minor**, and potential effects are anticipated to be **Not Significant** (**Table 6-48**).

TABLE 6-48 SUMMARY OF IMPACT ASSESSMENT FOR TEMPORARY OBSTRUCTION AND/OR DISPLACEMENT OF OTHER USERS ACTIVITIES ON OTHER USERS RECEPTORS

Impact: Temporary Obstruction and/or Displacement of Other Users Activities	Sensitivity	Magnitude	Risk	Significance	Additional Mitigation
Oil and Gas Infrastructure	High	Negligible	Minor	**Not Significant**	None required: Stakeholder engagement and promulgation of installation activities
Subsea Cables and Pipelines	High	Negligible	Minor	**Not Significant**	
Recreational Receptors	Medium	Negligible	Negligible	**Not Significant**	
Military PEXA	Low	Negligible	Negligible	**Not Significant**	

6.9.3.3 ASSESSMENT CONCLUSIONS

The risk of direct damage to third party infrastructure is considered to be **Minor** for subsea cables and pipelines and the risk of temporary obstruction and/or displacement of other users activities is considered to be **Negligible** to **Minor** for all receptor groups. Therefore, **No Significant Effects** are expected from any of the potential impacts of the Aurora Project on Other Users.

7. TOPICS SCOPED OUT OF THE ASSESSMENT

Four (4) topics have been scoped out of the requirement for an environmental assessment for the Aurora Project. These topics are: Ornithology; Aviation and Radar, Airborne Noise and Vibration and Seascape, Landscape and Visual Amenity (SLVA). Details and justification as to why these topics have been scoped out of the environmental assessment are provided below.

7.1 ORNITHOLOGY

The subsea cable route does not pass through any SPA designated under the Birds Directive (**Figure 1-1** in **Appendix 1**), under the Habitats Directive translated in Scotland by the Conservation (Natural Habitats, &c.) Regulations 1994 (see **Appendix 2** for further details on protected sites). There is potential for some seabird species to utilise the Study Area within the vicinity of the subsea cable route for foraging / commuting.

The subsea cable installation will be limited to a single installation vessel whereby disturbance will be transient and temporary. Whilst the Aurora Project is operational, the only potential impact pathway will be during maintenance activities, which are currently not planned and would be highly localised, short term and temporary in nature should repairs become necessary. While decommissioning options will be assessed closer to the end of the planned 25 year operational life of the subsea cable, whether the subsea cable is removed or left *in situ* (or a combination of the two [2]), the potential impacts during decommissioning will be equivalent or less than those generated during installation. Therefore, potential impacts to ornithological receptors as a result of works associated with the Aurora Project would be temporary and **Negligible**.

The potential for effects to ornithological receptors as a result of works associated with the installation, operation and maintenance and decommissioning of the Aurora Project within the UK Study Area is **Not Significant**, therefore, Ornithology has therefore been **Scoped Out** of the environmental assessment.

7.2 AVIATION AND RADAR

Potential impacts to Aviation and Radar receptors (such as physical obstruction to military aircraft or interference with aviation radar systems) for offshore developments are primarily confined to developments that have permanently installed marine infrastructure above the surface of the water, such as offshore windfarms. As the Aurora Project is a subsea cable, there is no pathway for potential impact on radars or military aircraft so these receptors are not considered further.

The Aurora Project will not install any above sea surface infrastructure in the UK offshore environment; the Aurora Project Study Area overlaps with the Hebrides Military Danger Area (D701F), and therefore potential impacts to PEXAs are covered under **Section 6.9** (Other Users). In summary, the potential for effects on Aviation and Radar is **Not Significant**. For this reason, Aviation and Radar has been **Scoped Out** of the environmental assessment.

7.3 AIRBORNE NOISE AND VIBRATION

Underwater noise and vibration impacts produced by installation activities have the potential to disturb sensitive ecological receptors such as marine mammals and fish and shellfish, and therefore are assessed individually in their respective sections of this EA Report.

Separately, increased levels of airborne noise and vibration from installation, operation and maintenance and decommissioning activities associated with installation vessel movements from the Aurora Project for subsea cable installation have also been considered and are discussed below.

Vessels are transient in nature and Aurora Project activities will be temporary, therefore any interaction associated with the installation, operation and maintenance or decommissioning phases of the Aurora Project would only be in the short term. The airborne noise generated by Aurora Project activities will be of a similar level to other vessel use in the area including fishing and shipping activity. Therefore, no increase in the level of noise and vibration beyond baseline levels in the area is anticipated. As potential impacts will be temporary and noise levels will not exceed existing baseline activities, the potential effect of airborne noise from the Aurora Project activities on these receptors is considered to be Not Significant.

The potential for effects as a result of airborne noise and vibration effects from works associated with the installation, operation and maintenance and decommissioning of the Aurora Project within the UK Study Area is **Not Significant**. Therefore airborne noise and vibration has been **Scoped Out** of the assessment, while potential underwater noise and vibration impacts within the UK Study Area are assessed in **Section 6.4** (Marine Mammals) and **Section 6.5** (Fish and Shellfish).

7.4 SEASCAPE, LANDSCAPE AND VISUAL AMENITY

This section describes the SLVA in the UK offshore environment, and assesses whether there is potential for significant effects of the Aurora Project on SLVA. Potential impacts of the Aurora Project on SLVA may include alterations to the physical characteristics and changes to the visual amenity of the seascape. The subsea cable route does not make landfall in the UK and once installed will lie entirely below the seabed. Additionally, installation will take place using a single installation vessel which will not approach within 10 km of land and will therefore not impact the seascape or landscape.

The Study Area can generally be described as an open area of sea, with a number of vessel movements operating in the area. Due to the nature of the Aurora Project and the installation of the subsea cable being below the seabed surface, limited potential impacts to the seascape and associated visual amenity are likely to be perceived.

The subsea cable installation may potentially impact the physical characteristics of the seascape including the seabed and water column, which may indirectly impact the seabed and water column through disturbance to physical characteristics of the environment; however direct impacts to the seascape are considered to be **Negligible.** As the subsea cable installation will be underwater, no significant impacts to the visual seascape are anticipated. During installation, operation and maintenance, and decommissioning of the Aurora Project, vessel movements may potentially impact the visual amenity of the seascape, however due to the transient nature of vessel movements, and the density of other vessel movements associated with commercial shipping routes and other projects within adjacent areas, potential impacts to visual amenity of the seascape are considered to be **Negligible.**

The potential for effects on SLVA as a result of works associated with the installation, operation and maintenance and decommissioning of the Aurora Project within the Study Area is **Not Significant**, and SLVA has, therefore, been **Scoped Out** of the assessment.

8. CUMULATIVE IMPACTS

8.1 INTRODUCTION

Cumulative impacts are considered to be 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. The Cumulative Impact Assessment (CIA) considers combined impacts of the Aurora Project with the impacts from a number of different projects, on the same single receptor / resource. In line with the CIA methodology described in **Section 5.2.2.5**, a two (2) staged approach to assessing cumulative impacts has been undertaken.

8.2 STAGE 1 IDENTIFICATION OF ACTIVITIES, RECEPTORS AND PRESSURES

Projects that have been included within the CIA are those identified within 10 nm of the Aurora Project (The Aurora Project Study Area). For each of the topics scoped into the 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. Cumulative impacts have been assessed where a common pressure-receptor pathway between the Aurora Project and other projects has been identified.

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 (e.g. taking into account the HND and planned Offshore Grid Connection), and tidal energy sites. **Figure 6-36** shows the location of these relevant developments which have been scoped out of the CIA as they are all located over 10 nm from the Aurora subsea cable route.

In the UK TS, the subsea cable route crosses two (2) active telecommunications cables and also one (1) active power transmission cable (see **Table 4-5**).

Interactions between these projects and the Aurora Project 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 subsea cable repair and maintenance/ routine inspection surveys) of these projects are included and assessed cumulatively with the installation, and operation and maintenance, and decommissioning phases of the Aurora Project.

As outlined in **Section 6.7** (Shipping and Navigation), 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 identified projects have been used to inform the CIA, as outlined in **Section 8.3** below.

8.3 STAGE 2 DEFINING AND ASSESSING INTERACTIONS

With consideration to the scoped in projects and density of vessel movements and fishing activity outlined in **Section 8.2** above, the potential cumulative effects 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 Aurora Project 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 Aurora Project Study Area;
- Impacts to commercial and recreational vessels and associated receptors due to increased vessel movements during the installation, operation and decommissioning phases of the Aurora Project.

8.3.1 IMPACTS TO SENSITIVE SPECIES

As outlined in **Section 6.4** (Marine Mammals), increased vessel traffic during the installation phase of the Aurora Project 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 Aurora Project and other projects identified and included within this CIA associated with impacts to sensitive species, as outlined in **Section 6.4** (Marine Mammals), are:

- Vessel displacement and collision to pinnipeds and cetaceans (assessed as a negligible risk on the Aurora Project alone); and
- Noise and vibration to pinnipeds and cetaceans (assessed as a negligible risk on the Aurora Project alone).

There is potential that marine mammals may collide with the installation vessel deployed for the Aurora Project within the UK TS 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 cumulative impacts from vessel movements associated with other projects in the Aurora Project Study Area. 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 subsea cable 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 project alone, therefore the cumulative effect of increased collision risk with vessels is considered **Negligible** and therefore **Not Significant**.

The Aurora Project will contribute to underwater noise in the region during installation and any maintenance or repairs. 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 cumulative effect. Underwater noise may have potential to also disturb migratory fish species (**Section 6.5** [Fish and Shellfish Ecology]). It is expected that noise generated by the Aurora Project 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 mammals and migratory fish species will be no greater than that of the Aurora Project alone, therefore the cumulative effect of underwater noise and vibration to sensitive species with other project activities is considered **Negligible** and therefore **Not Significant**.

8.3.2 IMPACTS TO COMMERCIAL FISHERIES OPERATIONS

As outlined in **Section 6.6** (Commercial Fisheries), there is the potential for temporary loss or restricted access to fishing grounds as a result of activities relating to the installation and any necessary maintenance of the Aurora Project which may contribute to 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 installation phase of the Aurora Project which may contribute to cumulative impacts.

Common pressure – receptors pathways between all phases of the Aurora Project 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** (Commercial Fisheries), are:

- Loss or restricted access to fishing grounds (assessed as a minor risk on the Aurora Project alone);
- Displacement of fishing activity to other areas (assessed as a minor risk on the Aurora Project alone); and
- Increased snagging risk of subsea cable to fishing gear (assessed as a minor risk on the Aurora Project alone).

Given the Aurora Project's short timeframe for installation activities combined with the low probability and short duration of any necessary subsea cable repairs, it is considered that the risk to access to fishing ground, displacement of fishing activity to other areas and increased snagging to fishing gear will be no greater than that of the Aurora Project alone. Therefore, the cumulative effects to commercial fisheries operations is considered **Minor** and therefore **Not Significant**.

8.3.3 IMPACTS TO COMMERCIAL AND RECREATIONAL VESSELS

As outlined in **Section 6.7** (Shipping and Navigation), it is expected that commercial vessels and ferries and small crafts may be required to reroute due to the presence of cable-laying vessels and the requested safe passing distance. Additionally, there is an increased collision risk created during the installation phase 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 impacts on search and rescue operations and ports and harbours within the Aurora Project Study Area. These pathways to impacts may further contribute to cumulative impacts.

Common pressure – receptors pathways between all phases of 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 6.7** (Shipping and Navigation), are:

- Impacts to commercial vessel and ferry routes (assessed as a minor risk on the Aurora Project alone);
- Impacts to small craft routing / recreational vessels and activities (assessed as a minor risk on the Aurora Project alone);

- Increase in vessel-to-vessel collision risk (assessed as a minor risk on the Aurora Project alone);
- Impacts to search and rescue operations (assessed as a minor risk on the Aurora Project alone; and
- Increase snagging risk by the subsea cable, either by vessel anchors or fishing gear (as mentioned in Section 8.3.2) (assessed as a minor risk during on the Aurora Project alone).

Given the Aurora Project's short timeframe for Project activities combined with the low probability and short duration of any necessary subsea cable repairs, 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 Aurora Project alone.

Additionally, under the COLREGs (1972, Part A, Rule 10), a vessel that is engaged in the laying of a subsea cable is defined as a "vessel restricted in its ability to manoeuvre" which requires that power-driven and sailing vessels give way. The installation vessel will deploy signals in accordance with COLREGs to inform other sea users of the vessel's status and the requested safety zones. Therefore, vessels within the Aurora Project area in the UK TS shall, so far as possible, keep out of the way of the installation vessel.

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

8.4 CONCLUSION

The activities associated with 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 impacts will be no greater than those assessed for the Aurora Project alone; hence the cumulative effects are considered to be not greater than **Minor** and therefore are **Not Significant**.

9. TRANSBOUNDARY IMPACTS

Transboundary impacts occur when an impact originating in one (1) country crosses national boundaries to affect other countries. For the Aurora Project, this would involve impacts which extend into other EEZs. The Aurora Project passes through the UK, Norwegian and Danish EEZs. This section of the application relates exclusively to transboundary impacts as a result of the UK segment of the Aurora Project. Transboundary impacts as a result of the Norwegian and Danish segments of the Aurora Project will be reviewed as appropriate within separate applications to the respective national authorities.

Based on the nature and scale of Aurora Project activities, the potential impacts of the Aurora Project on any associated environmental and socio-economic receptors will be highly localised in extent and temporary in duration, meaning that **No Significant Transboundary Impacts** are predicted.

10. CONCLUSION

The purpose of this EA Report is to provide an appropriate level of information to assess the likely environmental impacts of the Aurora Project in the UK TS, based on an understanding of the baseline environment together with a description of the activities to be undertaken and the schedule of planned operations. The information presented in this EA Report is intended to enable MD-LOT to make an informed decision regarding whether or not to grant a Marine Licence for the proposed installation and operation of the Aurora Project through UK TS. Granting of a Marine Licence will be based on the terms of the Marine (Scotland) Act, 2010.

This EA Report has considered the potential effects of the Aurora Project on physical, biological and human receptors. Embedded / inbuilt control measures (**Appendix 3**) have been incorporated into the Project Description (**Section 4**) to avoid and minimise potential impacts on these receptors, including the careful routing of the subsea cable to avoid or minimise interaction with sensitive receptors. The Aurora Project has, as far as reasonably practicable, balanced stakeholder requirements with project needs and environmental sensitivities.

The Project Description presented in **Section 4** outlines the Aurora Project activities proposed in the UK TS, including indicative Project Schedule. It is noted that some of the specific installation details will be further optimised as part of detailed route engineering, in particular taking account of the results of the CRS to maximise subsea cable burial and avoid seabed anomalies. A robust and realistic worst-case impact assessment has been undertaken, informed by specific footprints and durations. Where a degree of flexibility needs to be maintained as the Aurora Project enters detailed design and execution phases, a suitable project envelope has been defined to ensure the assessment is considering a reasonable worst-case scenario, with any areas of uncertainty assessed in accordance with the precautionary principle.

Over the development of the Aurora Project, numerous stakeholders have been engaged with, including regulators, statutory advisors, local agencies and fisheries. Such consultation has proved important in developing the Aurora Project to the stage it has reached, and to informing the extent of the EA Report, as detailed in **Section 3**. On the basis of known sensitivities, proposed Aurora Project activities and stakeholder feedback, specific impact assessments were undertaken for the following topics:

- Marine Physical Processes (Section 6.1);
- Water and Sediment Quality (Section 6.2)
- Benthic Ecology (Section 6.3);
- Marine Mammals (Section 6.4);
- Fish and Shellfish Ecology (Section 6.5);
- Commercial Fisheries (Section 6.6);
- Shipping and Navigation (Section 6.7);
- Marine Archaeology (Section 6.8);
- Other Users (Section 6.9);
- Cumulative Impacts Assessment (Section 8);
- Transboundary Impacts (Section 9);

Habitats Regulations Assessment (Appendix 1); and

Nature Conservation Marine Protected Areas (Appendix 2).

Any topics scoped out of the impact assessment are discussed in **Section 7**.

Where relevant, the impact assessment has considered interactions with protected sites, indirect impacts on other receptors and the potential for cumulative impacts.

Once installed, the footprint of the subsea cable within UK TS is very small, having a maximum diameter of 37.5 mm. The operation of the subsea cable is also not considered to have any significant ongoing environmental impact once installed. Appropriate mitigation measures (**Appendix 3**) will be implemented in order to minimise any interactions with social and environmental receptors to an acceptable level.

Following the implementation of the proposed mitigation measures, given the short duration and highly localised nature of the installation activities, it is predicted that there will be no residual significant impacts as a result of the Aurora Project.

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APPENDIX 1 HABITAT REGULATIONS ASSESSMENT

Aurora: United Kingdom

Appendix 1: Habitats Regulations Assessment

PREPARED FOR

Alcatel Submarine Networks

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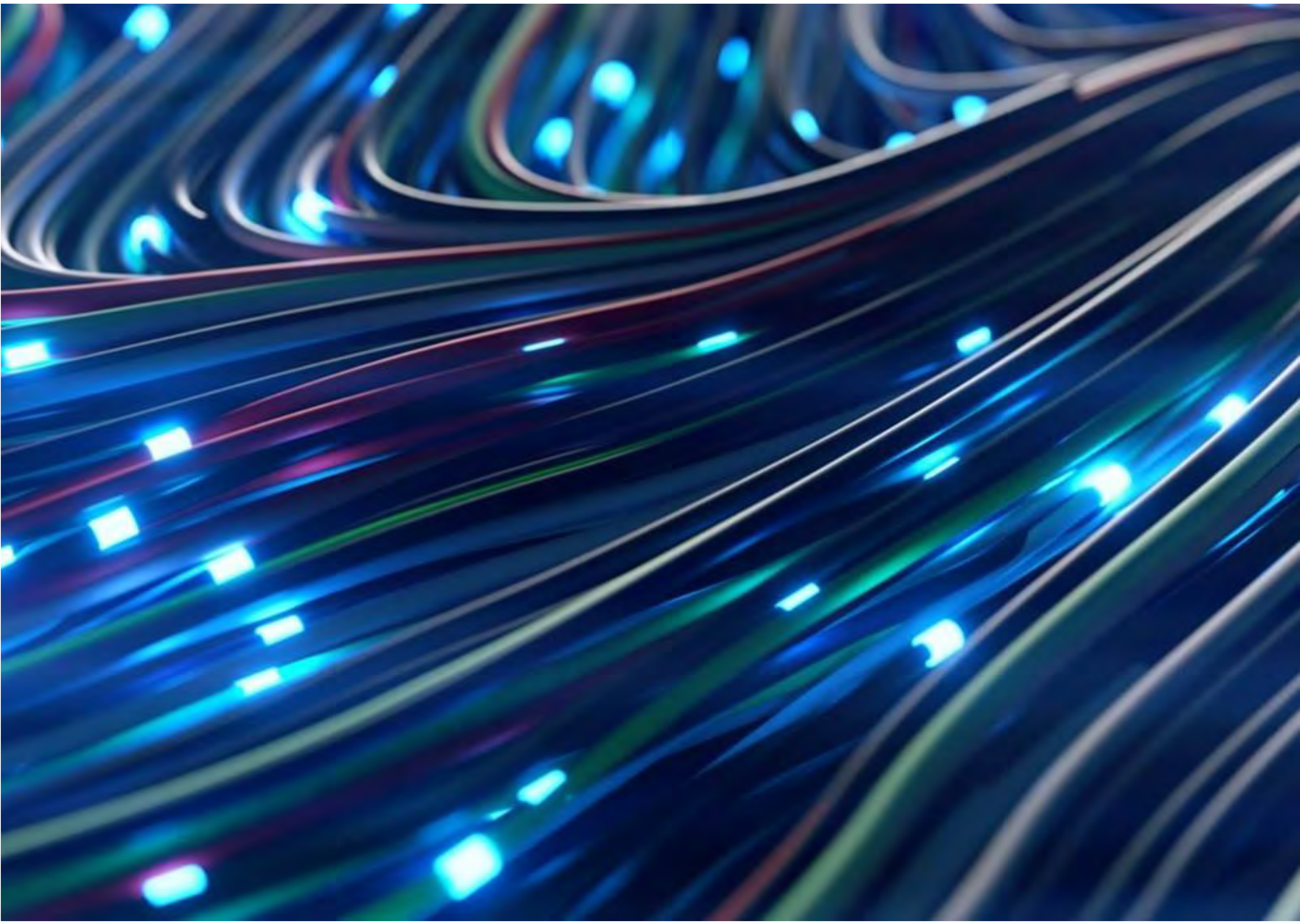

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Appendix 1: Habitats Regulations Assessment

0715845

[Redacted]

Jonathan Perry
Partner

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

T +44 131 221 6750

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
AA	Appropriate Assessment
AoI	Area of Interest
AoO	Advice on Operations
BSH	Broad scale habitat
CRS	Cable Route Survey
EA	Environmental Assessment
EC	European Commission
EEZ	Exclusive Economic Zone
EU	European Union
FeAST	Feature Activity Sensitivity Tool
HRA	Habitats Regulation Assessment
INNS	Invasive non-native species
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
NMPi	National Marine Plan Interactive
PAH	Polyaromatic hydrocarbon
SAC	Special Area of Conservation
SPA	Special Protection Area
SSC	Suspended sediment concentration
TBT	Tributyl tin
TS	Territorial Seas
UK	United Kingdom
WFD	Water Framework Directive

1. INTRODUCTION

The purpose of this Appendix is to present the Habitats Regulation Assessment (HRA) for the Aurora Project. This assessment considers relevant designated protected sites within the Scottish Territorial Seas (TS) and Exclusive Economic Zone (EEZ).

A background to the Aurora Project is presented in **Section 1** of the main Environmental Assessment (EA) Report, and the full description of the Project is presented in **Section 4** of the same document.

1.1 METHODOLOGY

1.1.1 OVERVIEW OF THE HABITATS REGULATION PROCESS

1.1.1.1 HABITAT REGULATIONS ASSESSMENT PROCESS AND THE UNITED KINGDOM'S EXIT FROM THE EUROPEAN UNION

The Conservation (Natural Habitats, &c.) Regulations 1994 as amended[1], The Conservation of Habitats and Species Regulations 2017 (as amended)[2] and The Conservation of Offshore Marine Habitats and Species Regulations 2017[3] (as amended) transpose the European Union (EU) Habitats Directive (Council Directive 92/43/EEC)[4] and certain elements of the Wild Birds Directive (Directive 2009/147/EC)[5] (known together as the Nature Directives) into UK and Scottish law.

Following the United Kingdom (UK)'s exit from the EU and the end of the transition period on the 31 December 2020, legislation has been passed to transfer functions from the European Commission to the appropriate authorities in the UK[6] and Scotland[7]. While references in an EU context throughout the legislation have been re-defined to a UK only context, overall, the legislative changes do not result in material changes in how HRAs are undertaken in the UK. Habitat and species protection and standards will be implemented in the same or an equivalent way, maintaining existing protections for habitats and species. The environmental assessment regimes that inform planning decisions, including HRA, continue to apply post-EU exit.

1.1.1.2 HABITAT REGULATIONS SITE DESIGNATIONS

All European protected sites and species retain the same level of protection now that the UK has left the EU. However, the 2019 Regulations now provide for the creation of a "national site network" within the UK territory. This is comprised of the European Protected Sites already designated under the Nature Directives (Natura 2000 Network) and any further sites designated under these Regulations. Appropriate management objectives will be established for the national site network (the 'network objectives').

References to 'European sites' and 'Natura 2000 sites' throughout this report, are to be read as references to 'European sites within the UK national site network, (as defined by Regulation 3

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[1] https://www.legislation.gov.uk/uksi/1994/2716/contents/made
[2] https://www.legislation.gov.uk/uksi/2017/1012/contents/made
[3] https://www.legislation.gov.uk/uksi/2017/1013/contents/made
[4] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31992L0043
[5] Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147
[6] https://www.legislation.gov.uk/uksi/2019/579/contents/made
[7] https://www.legislation.gov.uk/ssi/2019/113/contents/made

of the Conservation of Habitats and Species Regulations 2017)' designated before the UK left the EU, or designated after the UK left the EU under transposing regulations.

1.1.1.3 STAGE 1 – SCREENING AND DETERMINATION OF LIKELY SIGNIFICANT EFFECT

The screening stage examines the likely effects of a project either alone, or in combination with other projects and plans on a European site and seeks to answer the question "*can it be concluded that no likely significant effect will occur*?". To determine if the installation and/or operation of the Proposed Development[8] is likely to have any significant effects on the designated sites, the issues listed below have been considered:

- Could the proposals affect the qualifying interest and are they sensitive/vulnerable to the effect;
- The probability of the effect happening;
- The likely consequences for the site's conservation objectives if the effect occurred; and
- The magnitude, duration, and reversibility of the effect, considering any mitigation built into the Proposed Development design?

The screening stage will therefore conclude one of the outcomes listed below.

- No likely significant effect (LSE);
- An LSE will occur; and
- It cannot be concluded that there will be no LSE.

Where the assessment concludes the second or third outcome, then the need for an Appropriate Assessment (AA) is triggered[9]. Natural England's internal guidance (Natural England Internal Guidance, 2018) states in paragraphs 4.3 to 4.5 that:

4.3 "*In undertaking an assessment of 'likely significant effects' under the Habitats Regulations, authoritative case law has established that:*

- An effect is likely if it "cannot be excluded on the basis of objective information." (Case C-127-02 Waddenzee – refer para 45);
- An effect is significant if it "is likely to undermine the conservation objectives." (Case C-127-02 Waddenzee – refer para 48); and
- In undertaking a screening assessment for likely significant effects "…it is not that significant effects are probable, a risk is sufficient" but there must be credible evidence that there is "…a real, rather than a hypothetical, risk." (Boggis v Natural England and Waveney DC (2009) EWCA Civ 1061 – refer paras 36-37).

4.4 *The Advocate General's opinion in Sweetman also offers some simple guidance that the screening step 'operates merely as a trigger' which asks, "should we bother to check?" (Case C-258/11 Sweetman Advocate General Opinion (refer paras 49-50).*

4.5 *As such, when determining whether air pollution from a plan or project has a "likely significant effect" upon a given qualifying feature under the Habitats Regulations, "the extent*

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[8] It has been assumed that any effects from decommissioning would be addressed in full by the Competent Authority closer to the time when it may occur, based on more specific information about the activities and processes involved, and also the prevailing environmental conditions.

[9] In the case of the third outcome, European guidance (Assessment of Plans and Projects Significantly affecting Natura 2000 sites (2001)) advises that sufficient uncertainty remains to indicate that an appropriate assessment should be carried out.

to which there are risks of air pollution that might undermine the conservation objectives for the site is central."

Recent case law has also confirmed that measures intended to avoid, or reduce, the harmful effects of a project on a European site should not be considered at the screening stage (C-323/17 People over Wind). Such matters are to be considered as part of an AA. However, from an air quality perspective the assessment does consider the embedded measures that are required to meet emission limits and air quality standards designed for the protection of human health. Recent case law (Case C-721/21 Eco Advocacy CLG v An Bord Pleanála) highlighted that account could be undertaken of features where they are incorporated into a plan / project as standard features irrespective of the effect they have on the European site (e.g. standard measures to remove contaminants, which may reduce harmful effects on a European site).

The screening assessment also must include a consideration of other projects and whether likely significant effects on European site may result in combination with these other projects. In drawing up the list of other projects and plans, account will be taken also of the need to avoid "legislative overkill" that could occur through the inclusion of *"… all plans and projects capable of having any effect whatsoever…"* (Case C-258/11 Sweetman v An Board Pleanála (2013)) and that there is credible evidence that the risk from these other projects and plans is real (see reference to Boggis above). This will include consideration of the likely effects of the project / plans on the conservation objectives of the European site(s) affected.

1.1.1.4 STAGE 2 – APPROPRIATE ASSESSMENT

Where an AA is required, its aim is to determine if the effects of a project will have an adverse effect on European sites. It should provide and analyse sufficient information to allow the competent authority to make this determination. AA should exclusively focus on the qualifying features of the European site and consider any effects on the conservation objectives of those qualifying interests. It should also be based on, and supported by, evidence that stands up to scientific scrutiny. The European Commission (EC) guidance states that without proper reasoning the assessment does not fulfil its purpose and cannot be considered *"appropriate"* and therefore cannot be consented. In terms of what is reasonable, guidance states *"to identify the potential risks, so far as they may be reasonably foreseeable in the light of such information as can be reasonably obtained"* (European Communities, 2000).

The AA contains two (2) stages as listed below.

- A scientific evaluation of all the LSEs of a project alone, or in combination with other projects, on the relevant qualifying interests of a European site; and
- A conclusion based on outcomes of the scientific evaluation as to whether the integrity of a European site will be compromised.

The emphasis for AA is to prove that no adverse effects due to a project will occur which would undermine a European site's conservation integrity. Site integrity can be defined as: *"the coherence of its structure and function across its whole area that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified"* (European Communities, 2000).

The assessment also needs to consider any measures which will be implemented to avoid or reduce the level of impact from a project. The Competent Authority may also consider the use of conditions or restrictions to help avoid adverse effects on site integrity.

If the AA concludes that there will be an adverse effect on the integrity of the European site, or that there is uncertainty and a precautionary approach is taken, then consent can only be granted if there are no alternative solutions, Imperative Reasons of Overriding Public Interest (IROPI) is applicable and compensatory measures have been secured.

1.1.1.5 STAGE 3 – ASSESSMENT OF ALTERNATIVE SOLUTIONS

All feasible alternatives have to be analysed to ensure that there are none which "*better respect the integrity of the site in question*" and its contribution to the overall coherence of the Natura 2000[10] network (EC, 2018). Alternatives could include the location of the site, its scale and design, and the way in which it is constructed and operated. The "*do nothing*" option also has to be considered.

The comparison of alternatives should not allow other assessment criteria (e.g. economics) to overrule ecological criteria (EC, 2018). However, the same guidance also refers to the opinion for the case C-239/04[11], where the opinion of the Advocate General was that "*the choice does not inevitably have to be determined by which alternative least adversely affects the site concerned. Instead, the choice requires a balance to be struck between the adverse effect on the integrity of the SPA and the relevant reasons of overriding public interest*".

1.1.1.6 STAGE 4 – IMPERATIVE REASONS OF OVERRIDING PUBLIC INTEREST AND COMPENSATION MEASURES

Where a development has an adverse effect on the integrity of a European site and there are no alternative solutions, consent can only be granted if there are IROPI, including those of social or economic nature which would require the realisation of a project. A definition of "overriding public interest" does not occur in the directive; however, examples considered are:

- Human health, public safety or beneficial consequences of primary importance to the environment; and
- Any other reasons which are considered by the Competent Authority to be IROPI; or
- If the site does not host a priority habitat or species then IROPI must be demonstrated, and the reasons can include those of a social, or economic nature.

If the importance of a project is deemed to outweigh the effects which will result on the European site, and there are no alternatives, compensatory measures must be secured before consent is granted. Compensatory measures are independent of a project and are intended to offset the adverse effects of a project, corresponding specifically to the negative effects on habitats and species concerned.

To be acceptable, compensatory measures should:

- Take account of the comparable proportions of habitats and species which are adversely affected;
- Be within the same bio-geographical range within which the European site is located;

[10] Now referred to as the national site network in the UK
[11] Commission of the European Communities V Portuguese Republic (2006) Case C-239/04.

Provide functions that are comparable to those which justified the selection of the original site; and

Have clearly defined implementation and management objectives so the measures can achieve the aim of maintaining the overall coherence of the network.

1.1.2 ENVIRONMENTAL BASELINE

Baseline descriptions presented in **Section 6** of the main EA Report focused on the localised marine regions where the Aurora Project overlaps with Scottish TS. The following desktop studies are also used to inform the wider spatial baseline, and the assessment itself that is presented in this section:

Cook and Burton (2010). A review of the Potential Impacts of Marine Aggregate Extraction on Seabirds;

Woodward *et al.* (2019). Desk-based revision of seabird foraging ranges used for HRA screening;

NatureScot (2024). SiteLink;

JNCC Site documentation and conservation objectives / measures; and

Relevant information presented in **Section 6** (Environmental Assessment) of the main EA Report.

1.1.2.1 PROJECT SPECIFIC SURVEYS

Project-specific Cable Route Surveys (CRS) were completed in September 2024. The results of the CRS have been used to inform the final subsea cable route by identifying any obstacles to be avoided, and to validate the baseline environment description as presented in **Section 6** of the main EA Report, which is referenced as appropriate within the HRA.

1.2 STAGE 1 SCREENING OF STATUTORY DESIGNATED SITES AND FEATURES

1.2.1 APPROACH TO INITIAL SCREENING FOR THE AURORA PROJECT

This stage is essentially a site-identification / selection process which effectively identifies all those designated sites and the relevant qualifying features that are at risk of LSE, should those features be sensitive to the relevant effects.

The criteria used in this first stage of selection takes account of the location of the European site(s), the area of influence (AoI) of potential impacts associated with the Aurora Project, and the ecology and distribution of qualifying features. These criteria are described in **Table 1-1**.

TABLE 1-1 CRITERIA USED FOR SCREENING OF RELEVANT EUROPEAN SITES

Criteria	
1	European or Ramsar site with physical overlap with the Aurora Project location.
2	European or Ramsar site with adjoining 'functionally linked habitat' with physical overlap with the Aurora Project.
3	European or Ramsar site with a qualifying feature located within the potential area of influence (the AoI) associated with the Project; the AoI is variable dependent upon different pressures interacting with different receptors (qualifying habitats and species).

Criteria	
	For marine habitats (including Annex I habitats and supporting habitat features) the following AoIs were used: Secondary impacts from suspended sediment plumes and deposition in immediate vicinity of the subsea cable route; Seabird foraging ranges were screened at a radius of 25 km+; and Visual distance resulting from subsea cable installation activities were screened to a distance of 5 km.
4	European or Ramsar site with qualifying mobile species whose range (e.g. foraging, roosting, overwintering, breeding, or natural habitat range) may interact with potential effects from the Aurora Project.

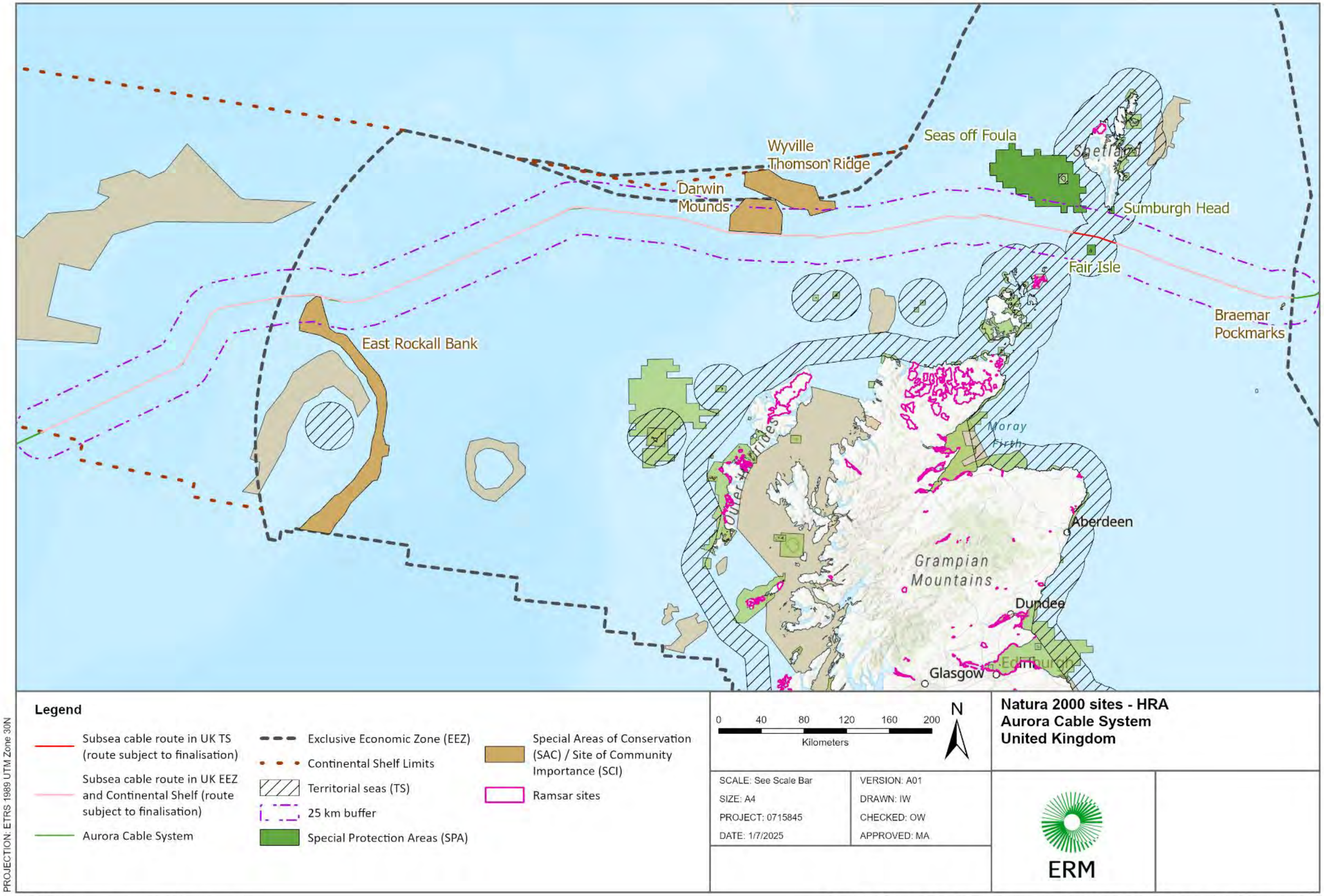
Details of European sites screened in under one or more of the above criteria are provided in **Table 1-2** below. The qualifying features for each site are detailed, using key publicly available information obtained from:

- National Marine Plan Interactive (NMPi) tool (Marine Scotland 2024);
- NatureScot SiteLink (NatureScot, 2024); and
- Joint Nature Conservation Committee (JNCC) online sites (JNCC, 2024).

It is noted that in the EA Report, that the receptor group Ornithology was identified to be scoped out of the requirement for an environmental assessment for the Aurora Project (refer to **Section 7** [Topics Scoped out of Assessment] in the main EA Report).

Four (4) Special Areas of Conservation (SACs) and three (3) Special Protection Areas (SPAs) are screened in for Stage 1 determination of LSE (**Table 1-1**). There are no Ramsar Sites within 25 km of the Aurora Project and as such these sites will not be considered in this assessment.

FIGURE 1-1 EUROPEAN SITES AND RAMSAR SITES



SOURCE: Open Government Licence v3.0. JNCC © copyright 2023

Path: G:\7_Cables\ASN_Meta_Denmark\Workspaces\E_A_R\UK\0715845_Aurora_EAR_UK_A01_202501.aprx / UK HRA

TABLE 1-2 EUROPEAN SITES WITHIN 25 KM RADIUS OF THE AURORA PROJECT

Site Name and Code	Designated Features	Nearest distance to the subsea cable route (km)	Screened In/Out of Assessment
Special Area of Conservation			
Darwin Mounds UK0030317	Annex I habitat:1170 Reefs	1.30 km	**Screened In** Although the European site does not directly overlap with the Aurora Project, there may be potential interaction with secondary impacts (e.g. suspended sediment plumes and deposition).
East Rockall Bank UK0030389	Annex I habitat:1170 Reefs	1.37 km	**Screened In** Although the European site does not directly overlap with the Aurora Project, there may be potential interaction with secondary impacts (e.g. suspended sediment plumes and deposition).
Braemar Pockmarks UK0030357	Annex I habitat: 1180 Submarine structures made by leaking gas	5.37 km	**Screened In** Although the European site does not directly overlap with the Aurora Project, there may be potential interaction with secondary impacts (e.g. suspended sediment plumes and deposition).
Wyville Thomson Ridge UK0030355	Annex I habitat:1170 Reefs	18.00 km	**Screened Out** In consideration of the distance from the Aurora Project, no pressure pathways are expected. Any indirect impacts arising (e.g. suspended sediment plumes and deposition) are likely to be spatially restricted due to sediment deposition only occurring in the area immediately adjacent to the subsea cable.
Special Protection Area			
Fair Isle UK9002091	Common guillemot *Uria aalge* (non-breeding); Arctic tern *Sterna paradisaea* (breeding); and Fair Isle wren *Troglodytes troglodytes fridariensis* (breeding).	7.51 km	**Screened In** **Breeding:** The Aurora Project is 7.51 km from the SPA and overlaps population specific foraging distances (mean-maximum plus 1

Site Name and Code	Designated Features	Nearest distance to the subsea cable route (km)	Screened In/Out of Assessment
	Seabird assemblage (breeding): Arctic skua *Stercorarius parasiticus* (breeding); Razorbill *Alca torda* (breeding); Atlantic puffin *Fratercula arctica* (breeding); Northern fulmar *Fulmarus glacialis* (breeding); Northern Gannet *Morus bassanus* (breeding); European shag *Phalacrocorax aristotelis* (breeding); Black-legged kittiwake *Rissa tridactyla* (breeding); and Great skua *Stercorarius skua* (breeding) (migratory).		standard deviation (±SD)) for the following **breeding features that are screened in** for LSE assessment: Razorbill (breeding): 164 km[12]; Atlantic puffin (breeding): 250.8 km; Northern fulmar (breeding):1,200 km; Northern gannet (breeding): 509.4 km; European shag (breeding): 23.7 km; Black-legged kittiwake (breeding); 300.6 km; Great skua (breeding): 931.2 km; Arctic tern (breeding): 40.5 km; and Guillemot (breeding): 153.7 km. The following **breeding features are <u>screened out</u>** for LSE assessment as their species-specific foraging distances (mean-max±1SD) do not overlap the Aurora Project: Arctic skua (breeding): 2.7 km[13]; and Fair Isle wren (breeding): a terrestrial species that does not use the marine environment.
Seas off Foula UK9020331	Atlantic puffin (breeding); Northern fulmar (breeding); Northern fulmar (non-breeding); Arctic skua (breeding); Great skua (breeding); Great skua (non-breeding); Common guillemot (breeding); Common guillemot (non-breeding); Assemblage of seabirds (breeding); and Assemblage of seabirds (non-breeding).	16.30 km	**Screened In** **Breeding:** The Aurora Project is 16.3 km from the SPA and overlaps species specific foraging distances for the following **breeding features that are screened in** for assessment: Atlantic puffin (breeding): 250.8 km; Northern fulmar (breeding):1,200 km; Great skua (breeding): 931.2 km; and Common guillemot (breeding): 95.2 km.

[12] Screening distances specific to the breeding colonies of Fair Isle SPA
[13] Here the maximum value is used for Arctic skua, the Mean±1SD (not the Max Mean)

Site Name and Code	Designated Features	Nearest distance to the subsea cable route (km)	Screened In/Out of Assessment
			The **following breeding features are screened out** for further assessment as their species-specific foraging distances do not overlap the Aurora Project: Arctic skua (breeding): 2.7 km **Non-breeding:** The following **non-breeding features are screened in** due to the 15 km screening distance for wintering birds overlapping with the Aurora Project: Northern fulmar (non-breeding); Great skua (non-breeding); and Common guillemot (non-breeding).
Sumburgh Head UK9002511	Northern fulmar *(*breeding); Black legged kittiwake (breeding); Arctic tern (breeding); Common guillemot (breeding); and Seabird assemblage (breeding).	24.5 km	**Screened In** The Aurora Project is 24.5 km from the SPA and overlaps species specific foraging distances for the following **breeding features that are screened in** for assessment: Northern Fulmar (breeding):1,2002 km; Black-legged kittiwake (breeding); 300.6 km; Arctic tern (breeding): 40.5 km Common guillemot (breeding): 95.2 km

1.2.2 PRESSURES CONSIDERED IN ASSESSMENT

Identification of pressures considered in these assessments primarily used NatureScot's Feature Activity Sensitivity Tool (FeAST) (NatureScot, 2023), as well as JNCC's Advice on Operations, to identify pressures that

1) Fell under the activity of 'infrastructure – cables and pipelines (operation and installation)'; and
2) Had the potential to interact with features as a result of the activities associated with the Aurora Project.

Pressures with the potential to interact with the benthic and ornithological features of the sites listed in **Table 1-2** are presented below. These are the pressures considered of relevance to the designated features identified as part of the initial screening assessment. It should be noted that all other pressures (such as abrasion) that will arise from the Aurora Project are considered to have no pathway of effect to European sites.

As a result of the above identification process, the following pressures are considered to have the potential to interact with European site(s) features as a result of the activities associated with the Aurora Project:

Localised changes in water flow (tidal current) from the subsea cable installation and use of subsea cable protection (such as URADUCT protective sleeve) on the seabed at specific locations:

- Water flow (tidal current changes) – local

Increases in suspended sediment concentration (SSC) and associated deposition (Heavy and Light siltation) from seabed disturbance during installation, operation and maintenance, and decommissioning:

- 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[14]; and
- Synthetic compound contamination (including pesticides, antifoulants, pharmaceuticals)[14].

Accidental release of contaminated sediments from seabed disturbance during installation, operation and maintenance, and decommissioning:

- Hydrocarbon and PAH contamination[14]; and
- Transition elements and organic metal (e.g. chromium, copper, Tributyl tin [TBT])[14].

Accidental introduction and spread of invasive non-native species (INNS):

- Genetic modification and translocation of indigenous species.

[14] Including those priority substances listed in Annex II of Directive 2008/105/EC.

Disturbance and/or displacement of species from habitats previously available to them by under- and above water noise, and visual disturbance from project vessels and associated works:

- Underwater noise; and
- Visual disturbance (behaviour).

1.2.2.1 CONSIDERATION OF ANNEX I REEF FEATURE

While FeAST does not include Annex I reef as a feature, a number of different benthic hard-bottomed habitats are listed for consideration under the activity of infrastructure- cables and pipelines. These hard bottomed habitats (in particular Northern sea fan and sponge communities, Tide-swept algal communities) may represent Annex I reef or be equivalent to Annex I reef habitats, and so are likely to overlap in sensitivities. An additional review of JNCC and Natural England’s Advice on Operations (AoO) spreadsheets for protected sites to identify pressures commonly associated with ‘telecommunications cables: laying, burial and protection’ for Annex I reef (broad scale habitat (BSH) circalittoral rock) of selected example SACs was also undertaken to ensure the appropriate set of pressures. Within this search, medium-high risk was primarily identified for extraction and abrasion pressures; not relevant for this project due to lack of direct overlap with the subsea cable route. All other relevant pressures were listed as Low.

1.2.2.2 CONSIDERATION OF ORNITHOLOGICAL FEATURES

A consideration for mobile ornithological receptors was also undertaken to identify potential pressure pathways that may impact the feature and/or also its supporting habitat. Presently only a limited number of species of concern to the Aurora Project are included through the FeAST tool. For example, of ornithological features listed under FeAST, only 3 of the 12 were listed, i.e. Arctic tern (breeding); common guillemot (breeding); and puffin (breeding).

As described above for Annex I reefs, an additional review of JNCC and Natural England’s AoOs were also undertaken. From a review of selected example designated SPA sites, no direct pressures were identified as being of Medium-High risk under the activity of ‘telecommunications cables: laying, burial and protection’ for the features themselves. While there are some direct physical pressures of medium-high risk for their supporting habitat (abrasion/disturbance of the substratum of the seabed; penetration and /or disturbance of the substratum below the surface of the seabed including abrasion), these are seemingly limited to intertidal habitats which would not interact with the Aurora Project.

1.3 DETERMINATION OF LIKELY SIGNIFICANT EFFECTS

1.3.1 INTRODUCTION

There is a need to consider the potential for LSE on the sites **Table 1-2** in relation to the Aurora Project. The sites considered here were selected for screening using the criteria outlined in **Table 1-1**. This section combines that information for the Aurora Project alone and presents the assessment of LSE, thus providing the necessary information for Stage 1 of the Habitats Regulations Appraisal process.

The assessment of LSE is based on the Aurora Project’s current understanding of the baseline environment, and the scope and nature of the proposed Aurora Project activities, together with relevant information available for the designated sites. Consultee and advisor responses to this document, survey findings and refinements to the Aurora Project design may change this assessment.

1.3.2 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

The assessment of LSE on the relevant European sites from **Table 1-2** above in **Section 1.2.1** of this document has been carried out taking account of the direct / indirect nature of potential impacts, location of the European sites under consideration and (where known) the distribution of qualifying features in relation to the Aurora Project.

The assessment of LSE for the SACs under consideration is presented below in **Section 1.3.2.1**, and for SPAs under consideration, presented in **Section 1.3.2.2** of this document).

1.3.2.1 SPECIAL AREAS OF CONSERVATION

DARWIN MOUNDS SPECIAL AREA OF CONSERVATION

Key information to support an assessment for Darwin Mounds SAC includes:

- JNCC, 2015a. Standard Data Form for Darwin Mounds Special Area of Conservation;
- JNCC 2018a. Advice on Operations Guidance for Darwin Mounds Special Area of Conservation;
- JNCC, 2018b. Supplementary Advice on Conservation Objectives for Darwin Mounds Special Area of Conservation;
- JNCC Online Resources (JNCC, 2024);
- Site Link (NatureScot, 2024); and
- Published reports and peer reviewed literature.

Darwin Mounds SAC (UK0030317) is at the north end of the Rockall Trough, approximately 160 km north-west of Cape Wrath (Scotland) in depths of between 710 m and 1,129 m. The site covers a total area of approximately 1,377 km^2 and is designated for Annex I reef (biogenic), with its sandy mounds capped with thickets of cold-water corals *Lophelia pertusa*. This feature is predicted to be extensive throughout the site, covering almost half the total area (572 km^2) (JNCC, 2015).

Surveys undertaken in 2011 in the north, west and southwestern region of the SAC (Howell *et al.,* 2014), described two different biotopes, 'Xenophyophore fields' characterised by *Syringammina fragilissima* on sand, and *Lophelia pertusa* colonies, Xenophyophores and scattered rubble on sand', a complex and diverse assemblage associated with coral rubble, dead coral frameworks, and living corals. This more diverse biotope includes a range of associated epifauna, including anemones Halcampoididae, ophiuroids *Ophiactis balli,* squat lobster *Munida tenuimana,* sponges, and burrowing anemones Ceriantnidae on coral rubble and sand, with the major substrate observed to be coral rubble. Whilst the cable route of the Aurora Project is approximately 1.3 km away from the southern boundary of the SAC, the boundary of the feature itself may be at least a further 1.5 km north from this point.

The current site condition is **Unfavourable.**

TABLE 1-3 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS FOR DARWIN MOUNDS SPECIAL AREA OF CONSERVATION

Site Features Screened In	Relevant Pressure Pathway	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
Darwin Mounds SAC UK0030317 (indirect impacts only)			
Annex I habitat **1170 Reefs**	**Localised changes in water flow (tidal current)** from long-term placement of subsea cable protection on the seabed PRESSURE BENCHMARK FeAST, 2013: *Change in peak mean spring tide flow change of >0.1 m/s over an area >1 km^2 or 50% of width of water body >1year.*	Localised changes in current flow may alter sediment transport patterns, causing scour effects to sensitive benthic features. They may also potentially change the amount of food available to filter feeders and patterns of larval dispersal. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO determines that Annex I biogenic reefs (cold-water corals) are sensitive to this pressure through all phases of the Aurora Project life cycle (i.e. subsea cable installation through to decommissioning). FeAST (2023) also assesses carbonate mounds to have High sensitivity to this pressure. Depending on whether the subsea cable installation involves burial or surface laying with subsea cable protection, there is expected to be some local disturbance to water flow while the subsea cable installation occurs, during operation (where surface laid) and also during any necessary operation and maintenance activity. Subsea cable protection is only expected to be required at crossing points and will comprise of a protective sleeve over the subsea cable. Rock placement is not anticipated; however should additional subsea cable protection be necessary as a result of crossing agreements or seabed conditions, this would be limited to a very small segment of the subsea cable and any potential changes in water flow would be highly localised and will not result in LSE. Any localised changes to water flow will be limited to the footprint area of the subsea cable installation works along the subsea cable route (which is approximately 1.3 km from the SAC at its nearest point),and will be short-term, infrequent, temporary and reversible.	**No LSE.**
	Increases in SSC and associated deposition from seabed disturbance	Dependent on method of installation, there may be some degree of movement of fine sediment particles into the water column. These may then be carried by water movement (deep currents, eddies etc.) beyond	**No LSE.**

Site Features Screened In	Relevant Pressure Pathway	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	during installation, operation and maintenance, and decommissioning PRESSURE BENCHMARKS FeAST, 2013: **Heavy deposition**: more than 5 cm and up to 30 cm of fine material added to the habitat in a single discrete event or continuous deposition of fine material. **Light deposition**: up to 5 cm of fine material added to the seabed in a single event or continuous deposition of fine material. **Water clarity changes**: A change in one rank on the Water Framework Directive (WFD) scale, e.g. from clear to intermediate for one year.	the footprint of the operation and redeposited either elsewhere on the feature or in different seabed habitats. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO (JNCC, 2018a) determined that Annex I biogenic reef (cold-water corals) are sensitive to this pressure through all phases of the Aurora Project life cycle (i.e. subsea cable installation through to decommissioning). FeAST (2023) assesses that carbonate mounds and Northern sea fan and sponge communities have High sensitivity to the pressures of siltation rate changes (light) and siltation rate changes (heavy). As the pressure of water clarity changes was only noted as Low in FeAST, this is not considered further here. Increases in siltation rate may affect organisms' ability to feed and remove waste. It may lead to changes in larval dispersal and settlement. Any changes to siltation rate will be limited to the footprint area of the subsea cable installation works along the subsea cable route (which is approximately 1.3 km from the SAC at its nearest point), and will be short-term, infrequent, temporary and reversible.	
	Accidental release of pollutants from vessel activity and subsea equipment PRESSURE BENCHMARKS FeAST, 2013: **Hydrocarbon and PAH contamination**[15]**.** Compliance with all average annual Environmental Quality Standards, or conformance with Probable Effect levels, Environment Assessment Criteria, Effects Range -Low.	During installation, operation and maintenance, and decommissioning activities there may be accidental release of pollutants into the water column or onto the seabed. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO (JNCC, 2018a) determines that there is insufficient evidence concerning the impact on Annex I reef (cold-water corals) to evidence whether they are sensitive to this pressure through all phases of the Aurora Project life cycle (i.e. subsea cable installation through to decommissioning). FeAST (2023) assesses that carbonate mounds and Northern sea fan and sponge communities have Sensitivity to both pressures. Given that both sources of pressure advice cannot advise on sensitivity and that benchmarks relate to compliance with	**No LSE.**

[15] Includes those priority substances listed in Annex II of Directive 2008/105/EC.

Site Features Screened In	Relevant Pressure Pathway	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	Synthetic compound contamination (inc. pesticides, antifoulants, pharmaceuticals)[16].	external quality standards, these pressures are not considered further here.	
	Accidental release of contaminated sediments from seabed disturbance PRESSURE BENCHMARKS FeAST, 2013: **Hydrocarbon and PAH contamination**[17]**.** Compliance with all average annual Environmental Quality Standards, or conformance with Probable Effect levels, Environment Assessment Criteria, Effects Range -Low. **Transition elements and organo-metal** (e.g. Chromium, Copper, TBT) contamination[18].	During installation, operation and maintenance, and decommissioning activities there may be accidental release of contaminated sediments from the seabed. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO (JNCC, 2018a) determines that there is insufficient evidence concerning the impact on Annex I reef (cold-water corals) to evidence whether they are sensitive to this pressure through all phases of the Aurora Project life cycle (i.e. subsea cable installation through to decommissioning). FeAST (2023) assesses that carbonate mounds and Northern sea fan and sponge communities have Sensitivity to both pressures. Given that both sources of pressure advice cannot advise on sensitivity and that benchmarks relate to compliance with external quality standards, these pressures are not considered further here.	**No LSE.**
	Accidental introduction and spread of INNS from vessel activity and subsea equipment PRESSURE BENCHMARKS FeAST, 2013: A significant pathway exists for introduction of one or more INNS.	Presence of vessels and subsea infrastructure may introduce INNS. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO (JNCC, 2018a) notes that there has been no assessment of this pressure for activities in Darwin Mounds SAC. FeAST (2023) also contains no assessment. Given that both sources of pressure advice cannot advise on sensitivity and that benchmarks relate to significant pathways for introduction, these pressures are not considered further here.	**No LSE.**

[16] Includes those priority substances listed in Annex II of Directive 2008/105/EC.
[17] Includes those priority substances listed in Annex II of Directive 2008/105/EC.
[18] Includes those priority substances listed in Annex II of Directive 2008/105/EC.

EAST ROCKALL BANK SPECIAL AREA OF CONSERVATION

Key information to support an assessment for East Rockall Bank SAC includes:

JNCC, 2017. Standard Data Form for East Rockall Bank Special Area of Conservation;

JNCC, 2018c. Advice on Operations Guidance for East of Rockall Bank Special Area of Conservation;

JNCC, 2018d. Supplementary Advice on Conservation Objectives for East of Rockall Bank Special Area of Conservation;

JNCC Online Resources (JNCC, 2024);

Site Link (NatureScot, 2024); and

Published reports and peer reviewed literature.

East Rockall Bank SAC (UK0030389) is situated 320 km west of the Outer Hebrides. The site runs along the eastern edge of Rockall Bank, with minimum water depth being 120 m below sea-level. The seabed then forms a steep escarpment down into Rockall Trough at 1,000 – 1,500 m. The site includes protection for Annex I bedrock reef, Annex I stony reef and Annex I biogenic reef.

The subsea cable route of the Aurora Project is approximately 1.37 km from the outer boundary of the SAC at its nearest point.

TABLE 1-4 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS FOR EAST ROCKALL BANK SPECIAL AREA OF CONSERVATION

Site Features Screened In	Relevant Pressure Pathway	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
East Rockall Bank SAC UK0030389 (indirect impacts only)			
Annex I habitat **1170 Reefs** Biogenic reef (Cold-water coral) Stony and bedrock reef (Deep-sea bed)	**Localised changes in water flow (tidal current)** from long-term placement of cable protection on the seabed PRESSURE BENCHMARK FeAST, 2013: *Change in peak mean spring tide flow change of >0.1 m/s over an area >1 km² or 50% of width of water body >1year.*	Localised changes in current flow may alter sediment transport patterns, causing scour effects to sensitive benthic features. They may also potentially changing the amount of food available to filter feeders and patterns of larval dispersal. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO determines that Annex I biogenic reefs (cold-water corals) are sensitive to this pressure through all phases of the Aurora Project life cycle (i.e. subsea cable installation through to decommissioning) and that for Annex I stony and bedrock reefs (deep-	**No LSE.**

Site Features Screened In	Relevant Pressure Pathway	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
		sea bed) the pressure is not relevant[19]. FeAST (2023) assesses carbonate mounds to have High sensitivity to this pressure and Northern sea fan and sponge communities to have Medium sensitivity. Depending on whether the subsea cable installation involves burial or surface laying with cable protection, there is expected to be some local disturbance to water flow while the subsea cable installation occurs, during operation (where surface laid) and also during any necessary operation and maintenance activity. Subsea cable protection is only expected to be required at crossing points and will comprise of a protective sleeve over the subsea cable. Rock placement is not anticipated; however should additional subsea cable protection be necessary as a result of crossing agreements or seabed conditions, this would limited to a very small segment of the subsea cable and any potential changes in water flow would be highly localised and will not result in LSE. Any localised changes to water flow will be limited to the footprint area of the subsea cable installation works along the subsea cable route (which is approximately 1.37 km from the SAC at its nearest point), and will be short-term, infrequent, temporary and reversible.	
	Increases in SSC and associated deposition from seabed disturbance during installation, operation and maintenance, and decommissioning PRESSURE BENCHMARKS FeAST, 2013: **Heavy deposition**: more than 5 cm and up to 30 cm of fine material added to the habitat in a single discrete event or continuous deposition of fine material.	Dependent on method of installation, there may be some degree of movement of fine sediment particles into the water column. These may then be carried by water movement (deep currents, eddies etc.) beyond the footprint of the operation and redeposited either elsewhere on the feature or in different seabed habitats. These changes may meet and/or exceed the corresponding pressure benchmarks. Concerning water clarity changes, JNCC's AoO (JNCC, 2018a) determined that Annex I biogenic reef (cold-water corals) are not sensitive to this pressure through all phases of the Aurora Project life cycle (i.e. subsea cable installation through to decommissioning) and	**No LSE.**

[19] Not relevant means that the evidence base suggests that there is no interaction of concern between the pressure and the feature or that the activity and the feature could not interact.

Site Features Screened In	Relevant Pressure Pathway	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	Light deposition: up to 5 cm of fine material added to the seabed in a single event or continuous deposition of fine material. **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year.	that for Annex I stony and bedrock reefs (deep-sea bed) the pressure is not relevant. FeAST (2023) assesses that carbonate mounds and Northern sea fan and sponge communities have no sensitivity and low sensitivity respective to the pressure of water clarity changes. This pressure is therefore not considered further here. Concerning siltation rates, JNCC's AoO (JNCC, 2018a) determined that Annex I biogenic reef (cold-water corals) are sensitive to this pressure through all phases of the Aurora Project life cycle (i.e. subsea cable installation through to decommissioning). FeAST (2023) assesses that carbonate mounds and Northern sea fan and sponge communities also have High sensitivity to the pressures of siltation rate changes (light) and siltation rate changes (heavy). Increases in siltation rate may affect organisms' ability to feed and remove waste. It may lead to changes in larval dispersal and settlement. Any changes to siltation rate will be limited to the footprint area of the subsea cable installation works along the route (which is approximately 1.37 km from the SAC at its nearest point),and will be short-term, infrequent, temporary and reversible.	
	Accidental release of pollutants from vessel activity and subsea equipment PRESSURE BENCHMARKS FeAST, 2013: **Hydrocarbon and PAH contamination**[20]**.** Compliance with all average annual Environmental Quality Standards, or conformance with Probable Effect levels, Environment Assessment Criteria, Effects Range -Low.	During installation, operation and maintenance, and decommissioning activities there may be accidental release of pollutants into the water column or onto the seabed. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO (JNCC, 2018a) determines that there is insufficient evidence concerning the impact on Annex I reefs (cold-water corals and stony / bedrock reefs) to evidence whether they are sensitive to this pressure through all phases of the Aurora Project life cycle (i.e. subsea cable installation through to decommissioning). FeAST (2023) assesses that carbonate mounds and Northern sea fan and sponge communities have sensitivity to both pressures. Given that both sources	**No LSE.**

[20] Includes those priority substances listed in Annex II of Directive 2008/105/EC.

Site Features Screened In	Relevant Pressure Pathway	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	Synthetic compound contamination (inc. pesticides, antifoulants, pharmaceuticals)[21].	of pressure advice cannot advise on sensitivity and that benchmarks relate to compliance with external quality standards, these pressures are not considered further here.	
	Accidental release of contaminated sediments from seabed disturbance PRESSURE BENCHMARKS FeAST, 2013: **Hydrocarbon and PAH contamination**[22]**.** Compliance with all average annual Environmental Quality Standards, or conformance with Probable Effect levels, Environment Assessment Criteria, Effects Range -Low. **Transition elements and organo-metal** (e.g. Chromium, Copper, TBT) contamination[23].	During installation, operation and maintenance, and decommissioning activities there may be accidental release of contaminated sediments from the seabed. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO (JNCC, 2018a) determines that there is insufficient evidence concerning the impact on Annex I reef (cold-water corals and stony / bedrock reefs) to evidence whether they are sensitive to this pressure through all phases of the Aurora Project life cycle (i.e. subsea cable installation through to decommissioning). FeAST (2023) assesses that carbonate mounds and Northern sea fan and sponge communities have sensitivity to both pressures. Given that both sources of pressure advice cannot advise on sensitivity and that benchmarks relate to compliance with external quality standards, these pressures are not considered further here.	**No LSE.**
	Accidental introduction and spread of INNS from vessel activity and subsea equipment PRESSURE BENCHMARKS FeAST, 2013: A significant pathway exists for introduction of one or more INNS).	Presence of vessels and subsea infrastructure may introduce INNS. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO (JNCC, 2018a) notes that there has been no assessment of this pressure for activities relating to the biogenic reef feature of East Rockall Bank SAC. For the stony / bedrock reef feature, the AoO notes sensitivity. FeAST (2023) also contains no assessment. Given that both sources of pressure advice cannot advise fully on sensitivity and that benchmarks relate to significant pathways for introduction, these pressures are not considered further here.	**No LSE.**

[21] Includes those priority substances listed in Annex II of Directive 2008/105/EC.
[22] Includes those priority substances listed in Annex II of Directive 2008/105/EC.
[23] Includes those priority substances listed in Annex II of Directive 2008/105/EC.

BRAEMAR POCKMARKS

Key information to support an assessment for Braemar Pockmarks SAC includes documents and maps included in:

JNCC, 2018e. Standard Data Form for Braemar Pockmarks Special Area of Conservation;

JNCC, 2018f. Advice on Operations Guidance for Braemar Pockmarks Special Area of Conservation;

JNCC, 2018g. Supplementary Advice on Conservation Objectives for Braemar Pockmarks Special Area of Conservation;

JNCC Online Resources (JNCC, 2024);

Site Link (NatureScot, 2024); and

Published reports and peer reviewed literature.

Braemar Pockmarks SAC (UK0030357) is located 240 km east of Orkney. It contains a series of pockmarks, crater-like depressions on the sea floor, six of which contain verified records of the Annex I habitat Submarine structures made by leaking gases. Large blocks, pavements, slabs and smaller fragments of methane-derived authigenic carbonate are present, deposited by precipitation associated with microbial organisms.

The subsea cable route of the Aurora Project is approximately 5.37 km from the outer boundary of the Braemar Pockmarks SAC at its nearest point.

TABLE 1-5 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS FOR BRAEMAR POCKMARKS SPECIAL AREA OF CONSERVATION

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
Braemar Pockmarks UK0030357 (indirect impacts only)			
Annex I habitat **1180 Submarine structures made by leaking gas**	**Localised changes in water flow (tidal current)** from installation of subsea cable protection on the seabed PRESSURE BENCHMARK JNCC AoO, 2018a: *A change in peak mean spring bed*	Localised changes in current flow may alter sediment transport patterns, causing scour effects to sensitive benthic features. They may also potentially changing the amount of food available to filter feeders and patterns of larval dispersal. These changes may meet and/or exceed the corresponding pressure benchmarks. However, JNCC's AoO determines that this pressure is not relevant to Annex I submarine	**No LSE.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	flow velocity of 0.1 m/s to 0.2 m/s for >1 year.	structures made by leaking gas. It is therefore not considered further here.	
	Increases in SSC and associated deposition from seabed disturbance during installation, operation and maintenance, and decommissioning PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year.	Dependent on method of installation, there may be some degree of movement of fine sediment particles into the water column. These may then be carried by water movement (deep currents, eddies etc.) beyond the footprint of the operation and redeposited either elsewhere on the feature or in different seabed habitats. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO (JNCC, 2018a) determined that Annex I submarine structures made by leaking gas have not been assessed for sensitivity to this pressure through all phases of the Aurora Project life cycle (i.e. subsea cable installation through to decommissioning). Increases in siltation rate may affect organisms' ability to feed and remove waste. It may lead to changes in larval dispersal and settlement. Any changes to siltation rate will be limited to the footprint area of the subsea cable installation works along the route (which is approximately 5.37 km from the SAC at its nearest point),and will be short-term, infrequent, temporary and reversible.	**No LSE.**
	Accidental release of pollutants from vessel activity and subsea equipment PRESSURE BENCHMARKS MarESA:	During installation, operation and maintenance, and decommissioning activities there may be accidental release of pollutants into the water column or onto the seabed. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO (JNCC, 2018a) determines that there is insufficient evidence concerning the impact on Annex I submarine structures made by leaking gas to evidence whether they are sensitive to this pressure through all phases of the Aurora Project life cycle	**No LSE.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	Hydrocarbon and PAH contamination[24]**.** Exposure of marine species or habitat to one or more relevant contaminants via uncontrolled releases or incidental spills. **Synthetic compound contamination** Exposure of marine species or habitat to one or more relevant contaminants via uncontrolled releases or incidental spills[25].	(i.e. subsea cable installation through to decommissioning). Given that JNCC cannot advise on sensitivity, these pressures are not considered further here.	
	Accidental release of contaminated sediments from seabed disturbance PRESSURE BENCHMARKS MarESA: **Hydrocarbon and PAH contamination**[26]**.** Exposure of marine species or habitat to one or more relevant contaminants via uncontrolled releases or incidental spills. **Transition elements and organo-metal** Exposure of marine species or habitat to one or more relevant contaminants via uncontrolled releases or incidental spills[27].	During installation, operation and maintenance, and decommissioning activities there may be accidental release of contaminated sediments from the seabed. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO (JNCC, 2018a) determines that there is insufficient evidence concerning the impact on Annex I submarine structures made by leaking gas to evidence whether they are sensitive to this pressure through all phases of the Aurora Project life cycle (i.e. subsea cable installation through to decommissioning). Given that JNCC cannot advise on sensitivity, these pressures are not considered further here.	**No LSE.**
	Accidental introduction and spread of INNS from vessel activity and subsea equipment	Presence of vessels and subsea infrastructure may introduce INNS. These changes may meet and/or exceed the corresponding pressure benchmarks. JNCC's AoO (JNCC, 2018a) notes	**No LSE.**

[24] Includes those priority substances listed in Annex II of Directive 2008/105/EC.
[25] Includes those priority substances listed in Annex II of Directive 2008/105/EC.
[26] Includes those priority substances listed in Annex II of Directive 2008/105/EC.
[27] Includes those priority substances listed in Annex II of Directive 2008/105/EC.

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	PRESSURE BENCHMARKS MarESA: The introduction of one or more INNS.	that the features of Braemar Pockmarks SAC are not sensitive to this pressure. Given this, this pressures are not considered further here.	

1.3.2.2 SPECIAL PROTECTION AREAS

FAIR ISLE SPECIAL PROTECTION AREA

Key information to support an assessment for Fair Isle SPA includes:

- JNCC, 2022. Standard Data Form for Fair Isle Special Protection Area;
- NatureScot, 2009a. Conservation Objectives for Fair Isle Special Protection Area;
- Site Link (NatureScot, 2024);
- Data Zone (BirdLife International, 2024); and
- Relevant reports and peer reviewed literature.

Fair Isle SPA (UK9002091) is in Scottish territorial waters, located between mainland Shetland and Orkney. It was designated in September 2009 and covers an area of 68.25 km^2, of which 92% is marine waters (JNCC, 2022). During the breeding season, the site regularly supports a large population of seabirds (180,000; seabird assemblage). Among those are Arctic tern, with the site representing 1% of the UK population, and common guillemot, representing 1.4% (JNCC, 2022). The site boundary also overlaps the Fair Isle SAC, designated for terrestrial and coastal Annex I habitats, H4030 European dry heaths and H1230 Vegetated sea cliffs of the Atlantic and Baltic coasts. Cliff ledges provide important habitat to support breeding populations such as northern fulmar (NatureScot, 2024). Whilst it is notable that 100% of the UK population of Fair Isle wren is present in the site, given that this is a feature that does not interact with marine environments, it is not considered in this assessment. Seven of the 12 designated features of the SPA are in **unfavourable** condition (Arctic skua, common guillemot, black-legged kittiwake, Atlantic puffin, razorbill, European shag, and 'seabird assemblage'), all others are **favourable** (JNCC, 2022). Threats and pressures that are listed to have the most effect on the site and its features are from chemical pollutants (JNCC, 2022).

The subsea cable route of the Aurora Project is approximately 7.51 km from the outer boundary of the Fair Isle SPA at its nearest point.

TABLE 1-6 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS FOR FAIR ISLE SPECIAL PROTECTION AREA

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
Fair Isle SPA UK9002091 (indirect pressures only)			
Terns Arctic tern (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations of Arctic tern ((25.7 ± 14.8 km (Woodward *et al*., 2019)) (**Table 1-2**)). **Increases in SSC and associated deposition** may occur during installation, operation and maintenance, and decommissioning phases of the Aurora Project in UK waters. Should this occur, it will only locally reduce water quality over the short term. This may temporarily impact foraging success, smothering of prey items, and changes to supporting habitat for prey. Arctic tern rely on vision for foraging so they can be sensitive to reduction in water quality, but are also known to have a low vulnerability to increased sedimentation (Cook and Burton, 2010). Arctic tern may also be sensitive to indirect impacts of sedimentation on their prey. Sandeel are a key prey source, and as these fish utilise the seabed, they will be directly vulnerable to subsea cable installation activities at the seabed, and through changes to its habitat. However, for Aurora Project, it has been assessed that that there is no significant effect on sandeel and its supporting habitats (refer to **Section 6.5** of the main EA Report) and as such it is determined unlikely that indirect impacts on Arctic tern will occur. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species.	**No LSE is determined for this classified population.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
		Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities (refer to **Section 4.3** of the main EA Report). Arctic tern have been analysed as having the lowest vulnerability to ship disturbance compared to other species (Fliessbach *et al.,* 2019). The low risk of occurrence and its low sensitivity to visual and /or noise disturbance pressures, mean that no significant effects are likely. It is concluded that no significant effect is likely on the feature from relevant pressures.	
Auks Common guillemot (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury.	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations for the auk species of razorbill and Atlantic puffin, and within the 15 km screening range for non-breeding populations of common guillemot. **Increases in SSC and associated deposition** may occur during installation, operation and maintenance and decommissioning phases of the Aurora Project in UK waters. If it occurs, it will only locally and temporarily reduce water quality, potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Auks are visual feeders so increases in SSC, and thus turbidity, may impact foraging success. However, it is noted that disturbance of the seabed during subsea cable installation at any one time will be highly infrequent, localised and short term, compared to that with aggregate extraction, and with effects being temporary in nature. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species. Common guillemot ('common murre') are reported as being relatively insensitive to visual disturbance (Fliessbach *et al.,* 2019).	**No LSE is determined for these classified populations.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	Visual disturbance The visual disturbance of biota by anthropogenic activities.	Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities (refer to **Section 4.3** of the main EA Report), and as the foraging ranges of both razorbill and Atlantic puffin are extensive at 164 km and 250 km, respectively, the risk of interaction and likelihood of a significant effect will be low.	
Members of seabird assemblage			
Gannets Northern gannet (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance**	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations of Northern gannet. Foraging distances for northern gannet can vary between colonies, the range for northern gannet is 315.2 ±194.2 km (mean-max+1SD) (Woodward *et al*., 2019) (**Table 1-2**). **Increases in SSC and associated deposition** may occur during installation, operation and maintenance and decommissioning phases of the Aurora Project. Such impacts occurring from the Aurora Project will only locally reduce water quality over the short term. This may temporarily impact foraging success, increase smothering of prey items, and make changes to supporting habitat for prey. Northern gannet generally plunge dives to catch prey in depths of up to 20 m, and as such vision will be important. However, gannet also feed from the surface on small shoaling fish, and will feed on discards from fishing vessels. As a scavenging opportunist species, they are unlikely to be significantly impacted from localised sediment plumes and deposition occurring at the seabed along the subsea cable route that may temporarily impact foraging capabilities. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and	**No LSE is determined for these classified populations.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	The visual disturbance of biota by anthropogenic activities.	/or underwater noise. Behavioural responses to these pressures will vary between species, and it is estimated that northern gannet have a relatively low vulnerability to ship disturbance, and it is also acknowledged that this species may have a developed tolerance to vessel activity where it benefits from discards (Fliessbach *et al.,* 2019). Only a single vessel, equipped with a plough, will be operating at any one time during subsea cable installation activities (refer to **Section 4.3** of the main EA Report). In consideration of its extensive foraging habitat available to northern gannet, and its considered sensitivities to relevant pressures., it is assessed that it is not likely that localised project related activities will have significant effects on the feature.	
Tubenoses (Procellariiformes) Northern fulmar (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one (1) year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or	The Aurora Project overlaps the foraging ranges of breeding populations of northern fulmar (542.3 ±657.9 km (Woodward *et al*., 2019)) (**Table 1-2**)). **Increases in SSC and associated deposition** may occur during installation, operation and maintenance and decommissioning phases of the Aurora Project in UK waters. Should this occur, it will only locally reduce water quality over the short term, temporarily potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Northern fulmar feed both day and night and have a diverse diet. They feed on fish, squid. small crustaceans and jellyfish at the sea surface, and through shallow dives. They will also feed on discards from fishing vessels (JNCC, 2024). As a scavenging opportunistic species that can switch between diets, and are likely to be feeding in depths shallower than any plumes generated at the seabed, they are unlikely to be significantly impacted from localised sediment plumes and deposition occurring at the seabed along the subsea cable route.	**No LSE is determined for these classified populations.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	**Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species, and northern fulmar have been demonstrated to have a low sensitivity to vessel disturbance, given that they often benefit from discards from vessels and have exhibited lower proportions of disturbance response, relative to other species (Fliessbach *et al.,* 2019). Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities along the subsea cable route (refer to **Section 4.3** of the main EA Report) and, therefore, the risk of exposure is low, from infrequent vessel activities operating over a discrete area. It is concluded that no significant effect is likely on the feature from relevant pressures assessed.	

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
Gulls Black-legged kittiwake (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one (1) year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations of black-legged kittiwake, i.e. (156.1 ±144.5 km (Woodward *et al*., 2019)) (**Table 1-2**)). **Increases in SSC and associated deposition** may occur during installation, operation and maintenance and decommissioning phases of the Aurora Project. Should it occur, for the Aurora Project this will only locally reduce water quality over the short term, temporarily potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. During breeding season, black-legged kittiwake mainly feed on small pelagic shoaling fish, such as clupeids and sandeel, and like other gulls, are known to scavenge off discards from fishing vessels (JNCC, 2024). Like other gulls they are typically unaffected by disturbance and flexible in habitat usage, but compared to other gulls, they are more constrained by prey selectivity. Impacts on sandeel can result in decline on a black-legged kittiwake population. No significant effect was determined for sandeel and its supporting habitats in the fish and shellfish assessment for the Aurora Project (refer to **Section 6.5** of the main EA Report) and as such it is determined unlikely that indirect impacts on black-legged kittiwake prey will occur. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual and /or underwater noise (continuous) disturbance. Behavioural responses to these pressures will vary between species, and black-legged kittiwake is among those species reported to have a relative low sensitivity to vessel disturbance where it exhibits one of the lowest proportions of disturbance response (Fliessbach *et al.,* 2019). Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities along the	**No LSE is determined for these classified populations.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
		subsea cable route (refer to **Section 4.3** of the main EA Report) and therefore the risk of exposure is low, from infrequent vessel activities operating over a discrete area. It is concluded that no significant effect is likely on the feature from relevant pressures.	
Cormorants and Shags European shag (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations for cormorant (25.6 ± 8.3 km, used as a proxy for European shag (Woodward *et al*., 2019)). **Increases in SSC and associated deposition** during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. Should this occur, it will only locally reduce water quality over the short term, potentially temporarily impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. European shag feed on fish and shellfish species, and exploit both hard and soft sedimentary habitats, across a range of depths (JNCC, 2024; Cook and Burton, 2010). It is predicted that any localised increases in SSCs and associated deposition during the subsea cable installation activities within its foraging range will not result in significant long term changes in prey availability, where any effects if occurring will be temporary, short term and reversible. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual and /or underwater noise (continuous) disturbance. Behavioural responses (e.g. avoidance, fleeing) can depend upon shyness, escape costs and overall vulnerability. European shag has been reported to be sensitive to dredge vessel activities (Cook and Burton, 2010); an activity which share similar pressure pathways as that for subsea cable installation.	**No LSE is determined for these classified populations.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
		However, only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities along the subsea cable route (refer to **Section 4.3** of the main EA Report) and therefore the risk of exposure is low, from infrequent vessel activities operating over a discrete area. It is concluded that no significant effect is likely on the feature from relevant pressures.	
Terns Arctic tern (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations of Arctic tern ((25.7 ± 14.8 km (Woodward *et al.*, 2019)) (**Table 1-2**)). **Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. Should this occur, it will only locally reduce water quality over the short term. This may temporarily impact foraging success, smothering of prey items, and changes to supporting habitat for prey. Arctic tern rely on vision for foraging so they can be sensitive to reduction in water quality, but are also known to have a low vulnerability to increased sedimentation (Cook and Burton, 2010). Arctic tern may also be sensitive to indirect impacts of sedimentation on their prey. Sandeel are a key prey source, and as these fish utilise the seabed, they will be directly vulnerable to subsea cable installation activities at the seabed, and through changes to its habitat. However, for Aurora Project, it has been assessed that that there is no significant effect on sandeel and its supporting habitats (refer to **Section 6.5** of the main EA Report) and as such it is determined unlikely that indirect impacts on Arctic tern will occur. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and	**No LSE is determined for these classified populations.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
		/or underwater noise (continuous). Behavioural responses to these pressures will vary between species. Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities (refer to **Section 4.3** of the main EA Report). Arctic tern have been analysed as having the lowest vulnerability to ship disturbance compared to other species (Fliessbach *et al.,* 2019). Given the low risk of occurrence and its low sensitivity to visual and /or noise disturbance pressures, no significant effects are likely. It is concluded that no significant effect is likely on the feature from relevant pressures.	
Auks Razorbill (breeding) Atlantic puffin (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations for the auk species of razorbill and Atlantic puffin, and within the 15 km screening range for non-breeding populations of common guillemot. **Increases in SSC and associated deposition** may occur during installation, operation and maintenance and decommissioning phases of the Aurora Project. If it occurs, it will only locally and temporarily reduce water quality, potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Auks are visual feeders so increases in SSC, and thus turbidity, may impact foraging success, and Atlantic puffin is noted to be particularly sensitive to direct effects of dredging activities at the seabed (Cook and Burton, 2010); an activity which can result in similar impact pathways to subsea cable installation. However, it is noted that disturbance of the seabed during subsea cable installation at any one time will be highly infrequent, localised and short term, compared to that with aggregate extraction, and with effects being temporary in nature. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment	**No LSE is determined for these classified populations.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species. Razorbill have been shown to exhibit a medium level disturbance behaviour response to vessel activity, while Atlantic puffin are reported as relatively insensitive (Fliessbach *et al.,* 2019; Cook and Burton, 2010). Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities (refer to **Section 4.3** of the main EA Report), and as the foraging ranges of both razorbill and Atlantic puffin are extensive at 164 km and 250 km, respectively, the risk of interaction and an LSE will be low.	
Skuas Great skua (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for	Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations of great skua. **Increases in SSC and associated deposition** during installation, operation and maintenance, and decommissioning phases of the Aurora Project. Should this occur, it will only locally reduce water quality over the short term, temporarily impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Great skua are large predatory seabirds that prey on smaller species such as puffins, as well as rodents and rabbits. It is, therefore, unlikely to be sensitive to localised increases in SSC and sedimentation as the subsea cable is being installed or maintained. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual and /or underwater noise (continuous) disturbance. Skua are reported to display one of the lowest displacement responses for seabirds, and furthermore are considered to show high levels of attraction to fishing activities; considered evidence of non-avoidance (MMO, 2018).	**No LSE is determined for these classified populations.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.		

SEAS OFF FOULA SPECIAL PROTECTION AREA

The Seas off Foula SPA lies about 15 km west of mainland Shetland, covering waters around and to the north-west of Foula. This island hosts more than 190,000 breeding seabirds. The marine SPA protects feeding grounds for great skuas, fulmars, gulls and auks that breed on the island.

At the colony and the waters immediately surrounding it, the seabirds breeding on Foula are protected by the Foula SPA. The Seas off Foula SPA complements this colony SPA, ensuring that the marine foraging habitat is equally protected.

Key information to support an assessment for Seas Off Foula SPA includes:

- JNCC, 2020. Citation for Special Protection Area – Seas off Foula;
- JNCC and Scottish Natural Heritage. 2016a. Seas off Foula Potential Special Protection Area (offshore and inshore) Draft Conservation Objectives and Advice on Operations.
- JNCC and Scottish Natural Heritage. 2016b. Seas off Foula Proposed Special Protection Area Advice to support management
- NatureScot and JNCC. 2021. Foula Special Protection Area and Seas off Foula SPA draft Conservation Objectives.
- Site Link (NatureScot, 2024);
- Data Zone (BirdLife International, 2024); and
- Published reports and peer-reviewed literature.

The Seas Off Foula SPA (UK9020331) is located north of the Scottish mainland and Orkney, and about 15 km west of Shetland. It covers 3,412 km^2 of inshore and offshore waters and surrounds the island of Foula and the Foula SPA. The site protects five species of seabird: great skua, northern fulmar and common guillemot throughout the year, and Arctic skua and Atlantic puffin during the breeding season. These species jointly form important seabird assemblages with more than 20,000 individuals present at the site. The Draft Conservation Advice and Advice on Operations document (JNCC, 2016) does not include cabling as a source of pressures to which features are sensitive.

The subsea cable route of the Aurora Project is approximately 16.3 km from the outer boundary of the Seas Off Foula SPA at its nearest point.

TABLE 1-7 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS FOR SEAS OF FOULA SPECIAL PROTECTION AREA

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
Seas off Foula SPA UK9020331 (indirect pressures only)			
Great skua (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations of great skua (444.3 ± 487.9 km (Woodward *et al*., 2019)). **Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. Should this occur, it will only locally reduce water quality over the short term, temporarily impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Great skua are large predatory seabirds that prey on smaller species such as puffins, as well as rodents and rabbits. It is, therefore, unlikely to be sensitive to localised increases in SSC and sedimentation as the subsea cable is being installed or maintained. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual and /or underwater noise (continuous) disturbance. Skua are reported to display one of the lowest displacement responses for seabirds, and furthermore are considered to show high levels of attraction to fishing activities; considered evidence of non-avoidance (MMO, 2018).	**No LSE is determined for this classified population.**
Great skua (non-breeding)	Increases in SSC and associated deposition Disturbance and/or displacement	Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations of great skua (444.3 ± 487.9 km (Woodward *et al*., 2019)).	**No LSE is determined for this classified population.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	**Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. Should this occur, it will only locally reduce water quality over the short term, temporarily impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Great skua are large predatory seabirds that prey on smaller species such as puffins, as well as rodents and rabbits. It is, therefore, unlikely to be sensitive to localised increases in SSC and sedimentation as the subsea cable is being installed or maintained. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual and /or underwater noise (continuous) disturbance. Skua are reported to display one of the lowest displacement responses for seabirds, and furthermore are considered to show high levels of attraction to fishing activities; considered evidence of non-avoidance (MMO, 2018).	
Northern fulmar (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event	The Aurora Project overlaps the foraging ranges of breeding populations of northern fulmar (542.3 ±657.9 km (Woodward *et al.*, 2019)) (**Table 1-2**)). **Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. Should this occur for the Aurora Project, this will only locally reduce water quality over the short term, temporarily potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey.	**No LSE is determined for this classified population.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	Water clarity changes: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	Northern fulmar feed both day and night and have a diverse diet. They feed on fish, squid. small crustaceans and jellyfish at the sea surface, and through shallow dives. They will also feed on discards from fishing vessels (JNCC, 2024). As a scavenging opportunistic species that can switch between diets, and are likely to be feeding in depths shallower than any plumes generated at the seabed, they are unlikely to be significantly impacted from localised sediment plumes and deposition occurring at the seabed along the subsea cable route. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species, and northern fulmar have been demonstrated to have a low sensitivity to vessel disturbance, given that they often benefit from discards from vessels and have exhibited lower proportions of disturbance response, relative to other species (Fliessbach *et al.,* 2019). Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities along the subsea cable route (refer to **Section 4.3** of the main EA Report) and, therefore, the risk of exposure is low, from infrequent vessel activities operating over a discrete area. It is concluded that no significant effect is likely on the feature from relevant pressures assessed.	
Northern fulmar (non-breeding)	Increases in suspended sediment concentration (SSC) and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA:	The Aurora Project overlaps the foraging ranges of breeding populations of northern fulmar (542.3 ±657.9 km [Woodward *et al*., 2019]) (**Table 1-2**). **Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. Should this occur for the Aurora Project, this will only locally reduce water quality over the short	**No LSE is determined for this classified population.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	'Light' deposition of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	term, temporarily potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Northern fulmar feed both day and night and have a diverse diet. They feed on fish, squid. small crustaceans and jellyfish at the sea surface, and through shallow dives. They will also feed on discards from fishing vessels (JNCC, 2024). As a scavenging opportunistic species that can switch between diets, and are likely to be feeding in depths shallower than any plumes generated at the seabed, they are unlikely to be significantly impacted from localised sediment plumes and deposition occurring at the seabed along the subsea cable route. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species, and northern fulmar have been demonstrated to have a low sensitivity to vessel disturbance, given that they often benefit from discards from vessels and have exhibited lower proportions of disturbance response, relative to other species (Fliessbach *et al.,* 2019). Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities along the subsea cable route (refer to **Section 4.3** of the main EA Report) and, therefore, the risk of exposure is low, from infrequent vessel activities operating over a discrete area. It is concluded that no significant effect is likely on the feature from relevant pressures assessed.	
Arctic skua (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement	Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations of Arctic skua (62.5 ± 17.7 km (Thaxter *et al*., 2012). Woodward *et al*. (2019) does not contain a mean max foraging	**No LSE is determined for this**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	range for Arctic skua, and notes that data from three studies used in Thaxter *et al.*, (2012) measured distance from coast/shore/land rather than from a known breeding colony (**Table 1-2**)). **Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. Should this occur, it will only locally reduce water quality over the short term, temporarily impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Arctic skua are large predatory seabirds that prey on smaller species such as puffins, as well as rodents and rabbits. It is, therefore, unlikely to be sensitive to localised increases in SSC and sedimentation as the subsea cable is being installed or maintained. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual and /or underwater noise (continuous) disturbance. Skua are reported to display one of the lowest displacement responses for seabirds, and furthermore are considered to show high levels of attraction to fishing activities; considered evidence of non-avoidance (MMO, 2018).	**classified population.**
Common guillemot (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations of guillemots ((73.2 ± 80.5 km (Woodward *et al.*, 2019)) (**Table 1-2**)) and within the 15 km screening range for non-breeding populations of common guillemot. **Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. If this occurs, it will only locally and temporarily reduce water quality, potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Auks are visual feeders so increases in SSC, and	**No LSE is determined for this classified population.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	'Heavy' deposition of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	thus turbidity, may impact foraging success, and Atlantic puffin is noted to be particularly sensitive to direct effects of dredging activities at the seabed (Cook and Burton, 2010); an activity which can result in similar impact pathways to subsea cable installation. However, it is noted that disturbance of the seabed during subsea cable installation at any one time will be highly infrequent, localised and short term, compared to that with aggregate extraction, and with effects being temporary in nature. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species. Razorbill have been shown to exhibit a medium level disturbance behaviour response to vessel activity, while Atlantic puffin are reported as relatively insensitive (Fliessbach *et al.,* 2019; Cook and Burton, 2010), Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities (refer to **Section 4.3** of the main EA Report), and as the foraging ranges of both razorbill and Atlantic puffin are extensive at 164 km and 250 km, respectively, the risk of interaction and an LSE will be low.	
Common guillemot (non-breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within the 15 km screening range for non-breeding populations of common guillemot. **Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. If this occurs, it will only locally and temporarily reduce water quality, potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Auks are visual feeders so increases in SSC, and thus turbidity, may impact foraging success. It is noted that disturbance of the seabed during subsea cable installation at any	**No LSE is determined for this classified population.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	'Heavy' deposition of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	one time will be highly infrequent, localised and short term, compared to that with aggregate extraction, and with effects being temporary in nature. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species (Fliessbach *et al.,* 2019; Cook and Burton, 2010). Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities (refer to **Section 4.3** of the main EA Report), and as the foraging ranges of both razorbill and Atlantic puffin are extensive at 164 km and 250 km, respectively, the risk of interaction and an LSE will be low. Although common guillemot (non-breeding) have a more restrictive screening range of 15 km that overlaps with the Aurora Project, like other auk species it has an overall low sensitivity to disturbance from vessel activities, e.g. aggregate vessels (Cook and Burton, 2010).	
Atlantic puffin (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations for Atlantic puffin ((137.1 ± 128.3 km (Woodward *et al*., 2019)) (**Table 1-2**)). **Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. If this occurs, it will only locally and temporarily reduce water quality, potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Auks are visual feeders so increases in SSC, and	**No LSE is determined for this classified population.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	'Heavy' deposition of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	thus turbidity, may impact foraging success, and Atlantic puffin is noted to be particularly sensitive to direct effects of dredging activities at the seabed (Cook and Burton, 2010); an activity which can result in similar impact pathways to subsea cable installation. However, it is noted that disturbance of the seabed during subsea cable installation at any one time will be highly infrequent, localised and short term, compared to that with aggregate extraction, and with effects being temporary in nature. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species. Razorbill have been shown to exhibit a medium level disturbance behaviour response to vessel activity, while Atlantic puffin are reported as relatively insensitive (Fliessbach *et al.,* 2019; Cook and Burton, 2010). Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities (refer to **Section 4.3** of the main EA Report), and as the foraging ranges of both razorbill and Atlantic puffin are extensive at 164 km and 250 km, respectively, the risk of interaction and an LSE will be low.	
Assemblage of breeding seabirds		The site protects five (5) species of seabird: great skua, northern fulmar and common guillemot throughout the year, and Arctic skua and Atlantic puffin during the breeding season. These species jointly form important seabird assemblages with more than 20,000 individuals present at the site. All the species contained within the assemble have undergone separate qualifying species assessments.	**No LSE is determined for the seabird assemblage.**
Assemblage of non-breeding seabirds		The site protects three (3) species of non-breeding seabird: great skua, northern fulmar and common guillemot throughout the year.	**No LSE is determined**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
		These species jointly form important seabird assemblages with more than 20,000 individuals present at the site. All the species contained within the assemble have undergone separate qualifying species assessments.	**for the seabird assemblage.**

SUMBURGH HEAD SPECIAL PROTECTION AREA

Key information to support an assessment for Sumburgh Head SPA includes:

JNCC, 2015b. Citation for Special Protection Area – Sumburgh Head Special Protection Area;

NatureScot. 2009b. Sumburgh Head SPA draft Conservation Objectives.

Site Link (NatureScot, 2024);

Data Zone (BirdLife International, 2024); and

Published reports and peer-reviewed literature.

Sumburgh Head SPA (UK9002511) covers an area of cliffs and boulder beaches at the southern tip of Mainland, Shetland. The seaward extension of the SPA extends approximately 2 km into the marine environment to include the seabed, water column and surface.

TABLE 1-8 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS FOR SUMBURGH HEAD SPECIAL PROTECTION AREA

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
Sumburgh Head SPA UK9002511 (indirect pressures only)			
Arctic tern (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding populations of Arctic tern ((25.7 ± 14.8 km (Woodward *et al*., 2019)) (**Table 1-2**)). **Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. Should this occur during the Aurora Project, it will only locally reduce water quality over the short term. This may temporarily impact foraging success, smothering of prey items, and changes to supporting habitat for prey. Arctic tern rely on vision for foraging so they can be sensitive to reduction in water quality, but are also known to have a low vulnerability to increased sedimentation (Cook and Burton, 2010).	**No LSE is determined for this classified population.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	Water clarity changes: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	Arctic tern may also be sensitive to indirect impacts of sedimentation on their prey. Sandeel are a key prey source, and as these fish utilise the seabed, they will be directly vulnerable to subsea cable installation activities at the seabed, and through changes to its habitat. However, for Aurora Project, it has been assessed that that there is no significant effect on sandeel and its supporting habitats (refer to **Section 4.3** of the main EA Report) and as such it is determined unlikely that indirect impacts on Arctic tern will occur. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species. Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities (refer to **Section 4.3** of the main EA Report). Arctic tern have been analysed as having the lowest vulnerability to ship disturbance compared to other species (Fliessbach *et al.,* 2019). The low risk of occurrence and its low sensitivity to visual and /or noise disturbance pressures, no significant effects are likely. It is concluded that no significant effect is likely on the feature from relevant pressures.	
Seabird assemblage			
Guillemot (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement PRESSURE BENCHMARKS MarESA:	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges it of breeding populations of guillemots ((73.2 ± 80.5 km (Woodward *et al.*, 2019)) (**Table 1-2**)) and within the 15 km screening range for non-breeding populations of common guillemot. and within the 15 km screening range for non-breeding populations of common guillemot.	**No LSE is determined for this classified population.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	'Light' deposition of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	**Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. If this occurs, it will only locally and temporarily reduce water quality, potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Auks are visual feeders so increases in SSC, and thus turbidity, may impact foraging success, and Atlantic puffin is noted to be particularly sensitive to direct effects of dredging activities at the seabed (Cook and Burton, 2010); an activity which can result in similar impact pathways to subsea cable installation. However, it is noted that disturbance of the seabed during subsea cable installation at any one time will be highly infrequent, localised and short term, compared to that with aggregate extraction, and with effects being temporary in nature. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species. Razorbill have been shown to exhibit a medium level disturbance behaviour response to vessel activity, while Atlantic puffin are reported as relatively insensitive (Fliessbach *et al.,* 2019; Cook and Burton, 2010). Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities (refer to **Section 4.3** of the main EA Report), and as the foraging ranges of both razorbill and Atlantic puffin are extensive at 164 km and 250 km, respectively, the risk of interaction and an LSE will be low.	
Northern Fulmar *Fulmar glacialis* (breeding)	Increases in SSC and associated deposition Disturbance and/or displacement	The Aurora Project overlaps the foraging ranges of breeding populations of northern fulmar (542.3 ±657.9 km (Woodward *et al*., 2019)) (**Table 1-2**)). **Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning	**No LSE is determined for this classified population.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	phases of the Aurora Project. Should this occur, it will only locally reduce water quality over the short term, temporarily potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. Northern fulmar feed both day and night and have a diverse diet. They feed on fish, squid. small crustaceans and jellyfish at the sea surface, and through shallow dives. They will also feed on discards from fishing vessels (JNCC, 2024). As a scavenging opportunistic species that can switch between diets, and are likely to be feeding in depths shallower than any plumes generated at the seabed, they are unlikely to be significantly impacted from localised sediment plumes and deposition occurring at the seabed along the subsea cable route. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual disturbance and /or underwater noise (continuous). Behavioural responses to these pressures will vary between species, and northern fulmar have been demonstrated to have a low sensitivity to vessel disturbance, given that they often benefit from discards from vessels and have exhibited lower proportions of disturbance response, relative to other species (Fliessbach *et al.,* 2019). Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities along the subsea cable route (refer to **Section 4.3** of the main EA Report) and, therefore, the risk of exposure is low, from infrequent vessel activities operating over a discrete area. It is concluded that no significant effect is likely on the feature from relevant pressures assessed.	
Black-legged Kittiwake (breeding)	Increases in suspended SSC and associated deposition	The Aurora Project does not directly overlap the boundary of the Fair Isle SPA, however, it is within foraging ranges of breeding	**No LSE is determined for this**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
	Disturbance and/or displacement PRESSURE BENCHMARKS MarESA: **'Light' deposition** of up to 5 cm of fine material added to the habitat in a single, discrete event **'Heavy' deposition** of up to 30 cm of fine material added to the habitat in a single discrete event **Water clarity changes**: A change in one rank on the WFD scale, e.g. from clear to intermediate for one year. **Underwater noise** Anthropogenic sound sources that exceed levels that elicit a response from an individual, in terms of movement away, or cessation of feeding (for disturbance), for example, or exposure which leads to auditory injury. **Visual disturbance** The visual disturbance of biota by anthropogenic activities.	populations of kittiwake (156.1 ± 144.5 km (Woodward *et al*., 2019)) (**Table 1-2**)). **Increases in SSC and associated deposition** may occur during the installation, operation and maintenance, and decommissioning phases of the Aurora Project. Should this occur, it will only locally reduce water quality over the short term, temporarily potentially impacting foraging success, smothering of prey items, and changes to supporting habitat for prey. During breeding season, black-legged kittiwake mainly feed on small pelagic shoaling fish, such as clupeids and sandeel, and like other gulls, are known to scavenge off discards from fishing vessels (JNCC, 2024). Like other gulls they are typically unaffected by disturbance and flexible in habitat usage, but compared to other gulls, they are more constrained by prey selectivity. Impacts on sandeel can result in decline on a black-legged kittiwake population. No significant effect was determined for sandeel and its supporting habitats in the fish and shellfish assessment for the Aurora Project (refer to **Section 6.5** of the main EA Report) and as such it is determined unlikely that indirect impacts on black-legged kittiwake prey will occur. **Disturbance and /or displacement** of features may occur from presence of vessels and subsea cable installation equipment operating at the seabed, resulting in both visual and /or underwater noise (continuous) disturbance. Behavioural responses to these pressures will vary between species, and black-legged kittiwake is among those species reported to have a relative low sensitivity to vessel disturbance where it exhibits one of the lowest proportions of disturbance response (Fliessbach *et al.,* 2019). Only a single vessel, equipped with a plough will be operating at any one time during subsea cable installation activities along the subsea cable route (refer to **Section 4.3** of the main EA Report)	**classified population.**

Site Features Screened In	Relevant Pressure Pathway(s)	Consideration of Likely Significant Effects	Conclusion of Likely Significant Effects
		and therefore the risk of exposure is low, from infrequent vessel activities operating over a discrete area It is concluded that no significant effect is likely on the feature from relevant pressures.	
Assemblage of breeding seabirds		The site protects three (3) species of seabird under Article 4.2: common guillemot, black-legged kittiwake and Northern fulmar. These species jointly form an important seabird assemblage with more than 20,000 individuals present at the site. All the species contained within the assemble have undergone separate qualifying species assessments.	**No LSE is determined for the seabird assemblage.**

1.3.2.3 SUMMARY

No conclusions of LSE were found for any features of the SACs and SPAs under consideration to the pressures expected to occur from the Aurora Project.

1.4 HABITAT REGULATIONS ASSESSMENT IN COMBINATION ASSESSMENT

Given that each of the features of the six sites assessed is screened out as having no LSE to any pressure pathways considered, an in combination assessment had not been undertaken.

2. TRANSBOUNDARY IMPACTS

No transboundary effects or impacts are expected.

3. CONCLUSIONS

HRA screening has been undertaken to determine if the proposed works have potential to impact features of European sites (herein SACs and SPAs).

No LSE was concluded for all sites outside of the screening distances due to the absence of pressure-receptor pathway.

A total of six (6) sites (three [3] SAC and 3 SPA) were situated within the stated screening distances, and were screened for further consideration within **Table 1-2** and further tables.

The SPAs screened into assessment are classified for a range of breeding and non-breeding features including gulls, terns, skuas, auks, 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. The Aurora Project is of relatively small magnitude and effects will be highly localised and restricted to the immediate vicinity of any ongoing works. In addition, assessment of impacts to benthic habitats and fish and shellfish receptors within the EA Report are not significant, thus, impacts to seabird prey and supporting habitat are also considered to be minimal. In view of these factors, **No Likely Significant Effect** was concluded for all SPAs considered within assessment:

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

The SACs screened into assessment are designated for the benthic features biogenic, bedrock and stony reefs and submarine structures made by leaking gases. Direct impacts from the Aurora Project do not interact with any of these SACs, though indirect impacts may. However, given the pressure pathways, the SNCB advice and the positioning of the site features, **No Likely Significant Effect** was concluded for all SPAs considered within assessment:

- Darwin Mounds SAC;
- East Rockall Bank SAC; and
- Braemar Pockmarks SAC.

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

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APPENDIX 2 NATURE CONSERVATION MARINE PROTECTED AREAS

Aurora: United Kingdom

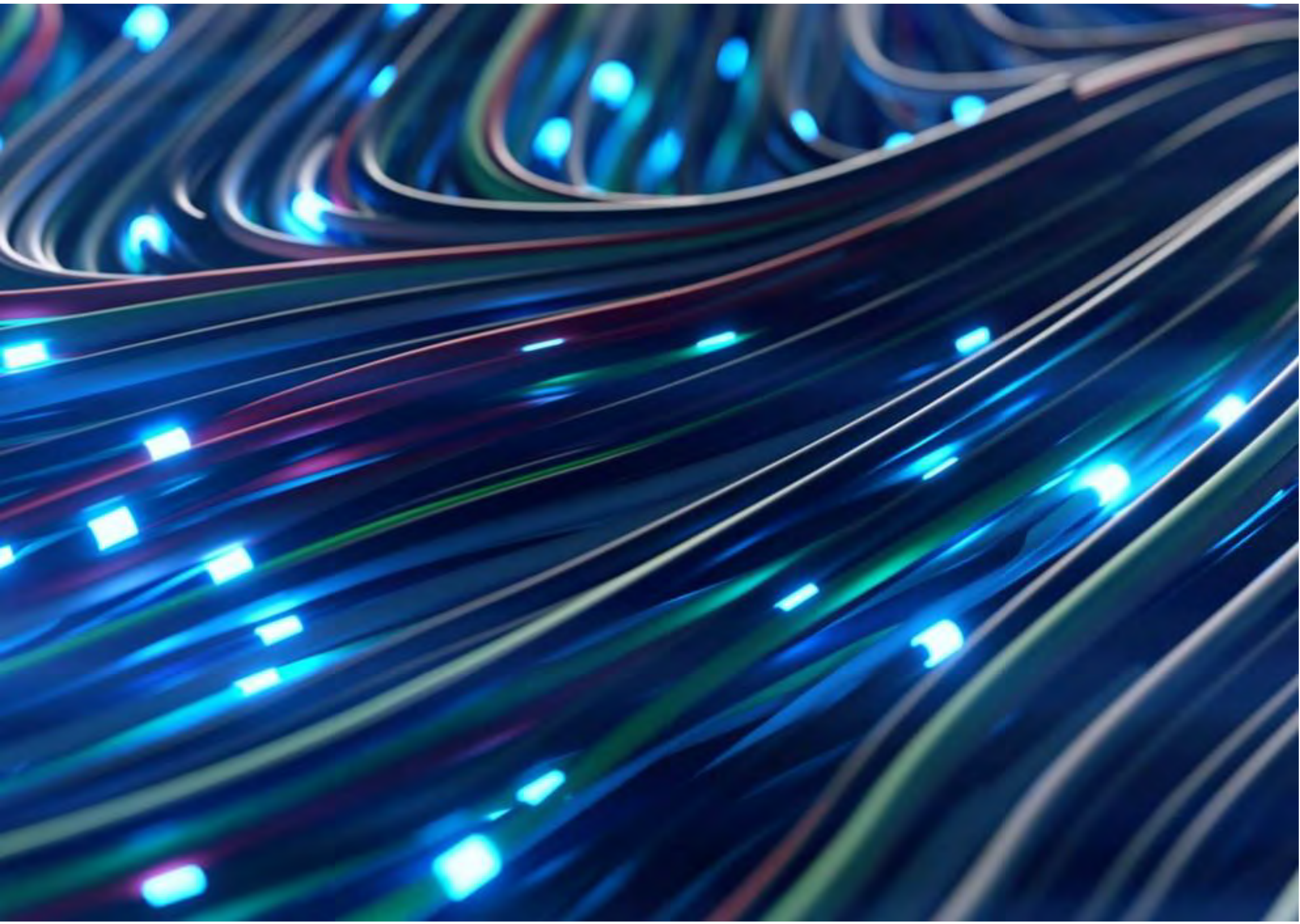
Appendix 2: Nature Conservation Marine Protected Area

PREPARED FOR

ALCATEL SUBMARINE NETWORKS

DATE
13 January 2025

REFERENCE
0715845



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Appendix 2: Nature Conservation Marine Protected Area

0715845

[Redacted]

Jonathan Perry
Partner

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

T +44 131 221 6750

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
EA	Environmental Assessment
FeAST	Feature Activity Sensitivity Tool
JNCC	Joint Nature Conservation Committee
MarESA	Marine Evidence based Sensitivity Assessment
MCAA	Marine and Coastal Access Act 2009
MCZ	Marine Conservation Zone
MD-LOT	Marine Directorate – Licensing and Operations Team
MLA	Marine Licence Application
MMO	Marine Management Organisation
MPA	Marine Protected Area
NC MPA	Nature Conservation Marine Protected Area
ODSM	Offshore Deep Sea Muds
OSSG	Offshore Subtidal Sands and Gravels
SAC	Special Area of Conservation
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
ZoI	Zone of Influence

1. INTRODUCTION

1.1 PURPOSE OF THIS APPENDIX

Marine Protected Areas (MPAs) in Scottish TS are designated under Section 1 of the Marine (Scotland) Act 2010[1]. Section 83 of the Marine (Scotland) Act 2010 notes that a public authority has the function of determining an application (whenever made) for authorisation of the doing of any act, and whether the act is capable of affecting (other than insignificantly)—

> *i)a protected feature in a Nature Conservation MPA, …*

> *(iv)any ecological or geomorphological process on which the conservation of any protected feature in a Nature Conservation MPA … is (wholly or in part) dependent. (ii) is capable of affecting (other than insignificantly) a protected feature in a NC MPA or any ecological or geomorphological process on which the conservation of any protected feature in a NC MPA is dependent*

Section 83 also requires the Marine Directorate – Licensing and Operations Team (MD-LOT), as the public authority, to not grant authorisation for the doing of the act unless either—

"(a)the person applying for the authorisation satisfies the authority that there is no significant risk of the act hindering the achievement of (as the case may be)—

> *(i) the stated conservation objectives for the Nature Conservation MPA,*

(b)that person is not able to satisfy the authority as mentioned in paragraph (a) but—

> *(i) satisfies it that there is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of those objectives or (as the case may be) that purpose,*

> *(ii) satisfies it that the benefit to the public of proceeding with the act clearly outweighs the risk of damage to the environment that will be created by proceeding with it, and*

> *(iii) satisfies it and the Scottish Ministers that the person will undertake, or make arrangements for the undertaking of, measures of equivalent environmental benefit to the damage which the act will or is likely to have in or on the marine protected area concerned."*

MPAs in Scottish offshore waters (i.e. beyond 12 nm) are designated under the Marine and Coastal Access Act 2009[2] (MCAA). Section 126 of the MCAA details duties of public authorities in relation to certain decisions where a public authority has the function of determining an application (whenever made) for authorisation of the doing of an act, where the act is capable of affecting (other than insignificantly)—

"(i)the protected features of an MCZ;

[1] https://www.legislation.gov.uk/asp/2010/5/contents
[2] https://www.legislation.gov.uk/asp/2010/5/contents

(ii)any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent."

The person seeking the authorisation must satisfy the authority that there is no significant risk of the act hindering the achievement of the conservation objectives stated for the Marine Conservation Zone (MCZ). If the person seeking the authorisation is not able to satisfy the authority that there is no significant risk of the act hindering the achievement of the conservation objectives stated for the MCZ, that person satisfies the authority that—

"(a)there is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of those objectives,

(b)the benefit to the public of proceeding with the act clearly outweighs the risk of damage to the environment that will be created by proceeding with it, and

(c)the person seeking the authorisation will undertake, or make arrangements for the undertaking of, measures of equivalent environmental benefit to the damage which the act will or is likely to have in or on the MCZ."

It should be noted that under Section 116 (7) of the MCAA, an MCZ designated by the Scottish Ministers is to be known as an MPA. As per Section 83 of the Marine (Scotland) Act 2010, the relevant designation for assessment for the proposed Aurora Project is a Nature Conservation MPA (i.e. NC MPA).

1.2 AIMS AND OBJECTIVES

This document has been produced as part of the Marine Licence Application (MLA) to provide evidence on whether the potential impact of the Aurora Project will:

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

The following sections describe the approach to the initial screening and main assessment stages of the process. Given that *Marine Scotland's 2013 Nature Conservation Marine Protected Areas: Draft Management Handbook* remains unavailable in the public domain, the following sections are based on guidance provided in *Marine conservation zones and marine licensing* (MMO, 2013)[3].

This NC MPA Assessment should be read alongside the following sections of the main Environmental Assessment (EA) Report, all of which have been drawn upon and referred to throughout this document, including:

- **Section 6.1**: Marine Physical Processes; and
- **Section 6.3**: Benthic Ecology.

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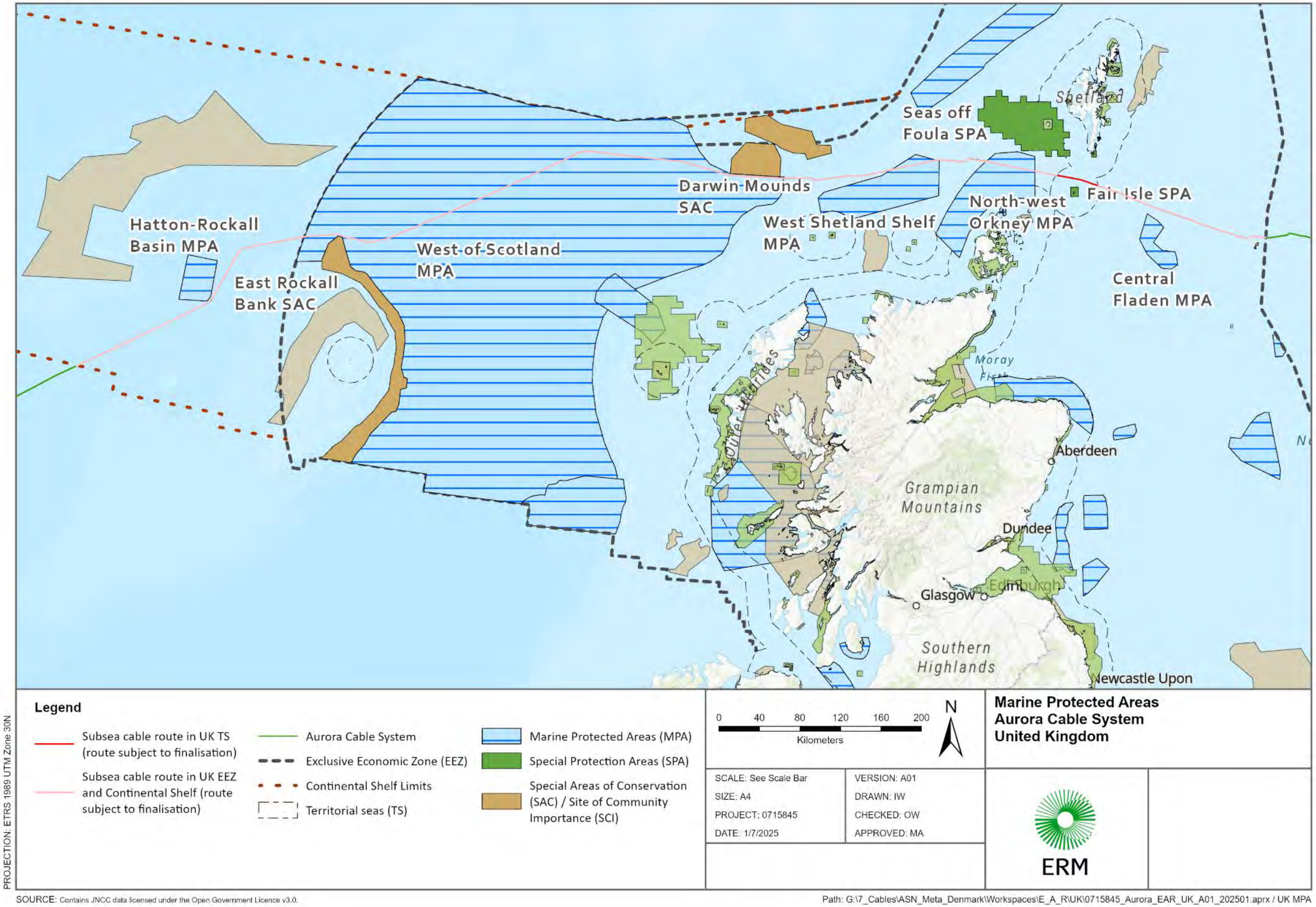
[3] https://www.gov.uk/government/publications/marine-conservation-zones-mczs-and-marine-licensing

2. LOCATION AND PROJECT DESCRIPTION

The subsea cable route will directly overlap with North-West Orkney NC MPA, West Shetland Shelf NC MPA, and West of Scotland NC MPA, and will be within 50 km of the Central Fladen NC MPA and the Hatton-Rockall Basin MPA. It will also pass within 50 km of the Fair Isle Special Protection Area (SPA), Seas off Foula SPA, Darwin Mounds Special Area of Conservation (SAC) and the East Rockall Bank SAC (**Figure 2-1**).

A more detailed description of the Aurora Project can be found in **Section 4** of the main EA Report.

FIGURE 2-1 THE AURORA PROJECT SUBSEA CABLE ROUTE LOCATION



3. METHODOLOGY

Under Section 126 of the MCAA and Section 83 of the Marine (Scotland) Act 2010, the public authority is initially required, when determining consenting application, to consider whether the activity applied for is capable of affecting (other than insignificantly) a protected feature in an MPA or any ecological or geomorphological process on which the conservation of any protected feature in an MPA is dependent.

The overall process of this assessment has been considered in **Section 4** of this Appendix. It is understood that during the process, consultation is sought from the appropriate statutory nature conservation bodies (SNCBs)[4].

In the absence of formal guidance from MD-LOT in relation to the assessment of NC MPAs during the licence decision making process, the Marine Management Organisation (MMO) guidance (2013) for MCZ assessments has been applied here.

The MMO guidelines (2013) form a staged approach, comprising three (3) sequential stages:

- Screening;
- Stage 1 Assessment; and
- Stage 2 Assessment (equivalent to derogation).

The assessment will also be supported by the following documentation:

- Appropriate sections from the EA Report and appropriate technical appendices.

The MCAA and the Marine (Scotland) Act 2010 does not provide any legislative requirement for explicit consideration of in combination or cumulative impact assessment to be undertaken when assessing the impacts of licensable activities upon an NC MPA (MMO, 2013). However, the MMO considers that in combination and potential cumulative effects must be considered for their full discharge of duties under Section 69 (1) of the MCAA.

3.1 SCREENING

Screening focusses on what can reasonably be predicted as a result of the proposal and whether it is capable of affecting (other than insignificantly) the protected features of an NC MPA. This stage should result in removing from further consideration all pressures/operations which are not in any way connected to the protected feature(s).

Screening uses information that is currently available on the activities applied for and consider aspects such as the scale, timing, and duration of proposed activities / developments, either within an NC MPA or beyond it.

Section 83 of the Marine (Scotland) Act 2010 aims to determine through the course of screening that:

"the activity is capable of affecting (other than insignificantly) either: (i) a protected feature in a Nature Conservation MPA; (ii) a stated purpose for a Demonstration and Research MPA; (iii) a marine historic asset in a Historic MPA; or (iv) any ecological or

[4] NatureScot for NC MPAs within 12 nautical miles (nm) or the Joint Nature Conservation Committee (JNCC) for MPAs out with 12 nm).

geomorphological process on which the conservation of any protected feature in a Nature Conservation MPA, or on which the stated purpose for a Demonstration and Research MPA, is (wholly or in part) dependent".

"*Capable of affecting*" is a simple test that assesses whether operations interact spatially or temporally with an NC MPA, either directly or indirectly. Understanding whether there is a potential effect (other than insignificantly) can involve assessing whether any features are sensitive to pressures spatially and temporally interacting.

In order to determine if the proposed activity may take place within or near to an area being put forward for, or already designated as an NC MPA, the following risk-based approaches are used. An appropriate buffer that exceeds the Zone of Influence (ZoI) is used as a screening distance that allows for a consideration of both direct and indirect potential impacts arising from the Aurora Project on NC MPAs.

Features:

- Benthic – both direct and indirect potential effects may occur to sites designated for benthic features as a result of impacts associated with the proposed Aurora Project. A precautionary 5 km buffer was used for all potential effects from the proposed development;
- Fish – both direct and indirect potential effects may occur to sites designated for fish features as a result of impacts associated with the proposed Aurora Project. Due to a lack of available scientifically robust buffers for mobile fish species, all designated fish species within the NC MPA were considered;
- Geomorphology – both direct and indirect potential effects may occur to sites designated for geomorphological features as a result of impacts associated with the proposed Aurora Project. A precautionary 5 km buffer was used for all potential effects from the proposed Aurora Project; and
- Large-scale features – both direct and indirect potential effects may occur to sites designated for large-scale features as a result of impacts associated with the proposed Aurora Project. A precautionary 5 km buffer was used for all potential effects from the proposed Aurora Project.

To determine whether the proposed activity may be capable of affecting (other than insignificantly) the protected features of an NC MPA or any ecological or geomorphological process on which the conservation of any protected feature of an NC MPA is (wholly or in part) dependent, the following evidence and information are then used:

MPA Site documentation;

MPA Conservation and Management Advice documentation;

Feature Activity Sensitivity Tool (FeAST) (FeAST, 2020);

The Marine Life Information Network - Marine Evidence based Sensitivity Assessment (MarESA) (Tyler-Walters *et al.*, 2023); and

Joint Nature Conservation Committee (JNCC) Marine Habitat Classification for Britain and Ireland (JNCC, 2022).

Only pressures assessed as medium or high in FeAST have been included in this assessment.

Screening results should include advice provided by the SNCBs and regulators on which sites should be included in the MPA Assessment.

Where it is concluded that the activity is capable of affecting (other than insignificantly) the protected features of an MPA, then a Stage 1 Assessment must be carried out to consider impact against the conservation objectives of the site features (see **Section 3.2** of this Appendix).

3.2 STAGE 1 ASSESSMENT

Section 83 also requires MD-LOT, as the public authority, to not grant authorisation for the doing of the act unless the authority is satisfied that there is no significant risk of the act hindering the achievement of the stated conservation objectives for the Nature Conservation MPA. This is considered a 'Stage 1' assessment.

In determining 'significant risk of hindering', the Marine Scotland (2014a) guidance states:

"*The assessment should build on the initial screening assessment that considers the pressures associated with the activity and the sensitivity of the protected features, and information on the likely spatial overlap. To determine whether there is a 'significant risk of hindering' the achievement of the conservation objectives of the protected features of a nature conservation MPA aspects such as the intensity, frequency, and duration of any activities associated with the function or act should be considered*."

Within this stage of assessment, hinderance of objectives is considered as any operation that could, either alone or in combination, directly or indirectly:

- In the case of a conservation objective of "*maintain*", increase the likelihood that the current status of a feature would go downwards (e.g. from favourable to degraded) either immediately or in the future; or
- In the case of a conservation objective of "*recover*", decrease the likelihood that the current status of a feature could move upwards (e.g. from degraded to favourable) either immediately or in the future.

Consultation with relevant SNCBs and other advisors may be undertaken at this stage.

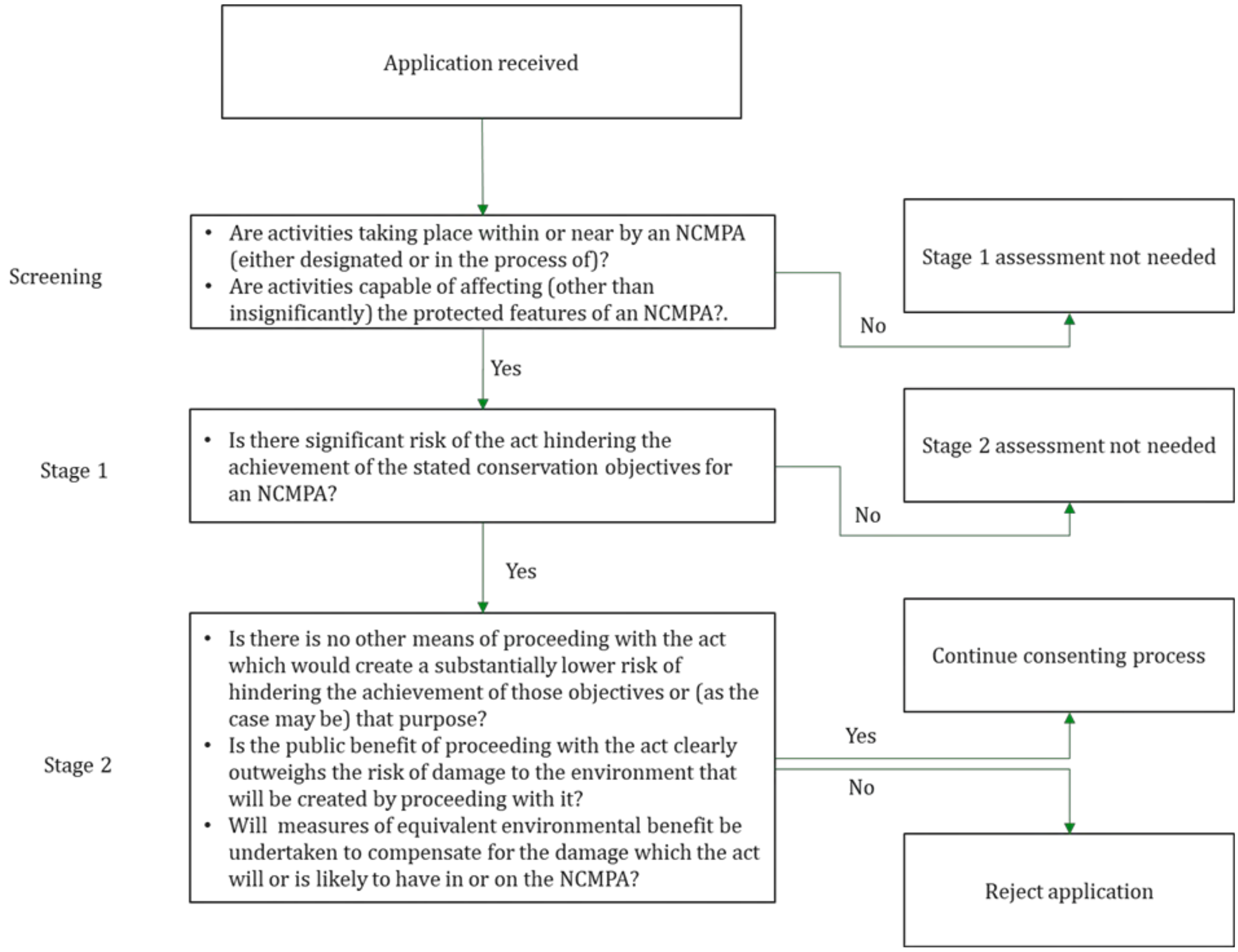
Where it is concluded that the activity is capable of hindering the conservation objectives of an NC MPA, either directly or indirectly, alone or cumulatively, then a Stage 2 Assessment derogation assessment must be carried out before authorisation can occur (see **Section 3.3** of this Appendix).

3.3 STAGE 2 ASSESSMENT

The Stage 2 assessment will consider whether the conditions in Section 83 can be met by consideration of the benefit to the public of proceeding with the act clearly outweigh the risk of damage to the environment that will be created by proceeding with it; and, if so, then whether MD-LOT can be satisfied that arrangements will be made for the undertaking of measures of equivalent environmental benefit to the damage which the act will or is likely to have in or on the NC MPA.

Figure 3-1 presents a summary of the NC MPA decision process.

FIGURE 3-1 SUMMARY OF THE NATURE CONSERVATION MARINE PROTECTED AREA MARINE LICENCE DECISION PROCESS



Source: Adapted from MMO, 2013

4. SCREENING

Screening is undertaken in two (2) parts – firstly assessing whether the proposed activity takes place in, or near, a NC MPA, and secondly, whether the proposed activities are capable of affecting (other than insignificantly) the protected features of an NC MPA or any ecological or geomorphological process on which the conservation of any protected feature of an NC MPA is (wholly or in part) dependent. In this way, a proportionate understanding of potential impacts and potential effects on NC MPAs can be elucidated. If a site is outwith the area of influence of the proposed subsea cable installation activities, then it is removed from inclusion in the second question.

4.1 IS A LICENSABLE ACTIVITY TAKING PLACE WITHIN OR NEAR TO AN AREA BEING PUT FORWARD FOR, OR ALREADY DESIGNATED AS AN NC MPA?

There are five (5) NC MPAs within 50 km of the proposed subsea cable route, namely:

- Hatton-Rockall Basin NC MPA;
- West of Scotland NC MPA;
- West Shetland Shelf NC MPA;
- North-West Orkney NC MPA; and
- Central Fladen NC MPA.

Given the buffers considered appropriate around features in **Section 3.1** of this Appendix, both Hatton-Rockall Basin NC MPA and Fladen Grounds NC MPA are excluded from this assessment as there are no direct or indirect pathways of impact at the distance of the NC MPAs from the proposed works.

The following assessment therefore will be undertaken for West of Scotland NC MPA, West Shetland Shelf NC MPA and North-West Orkney NC MPA.

4.2 IS A LICENSABLE ACTIVITY CAPABLE OF AFFECTING (OTHER THAN INSIGNIFICANTLY) THE PROTECTED FEATURES OF A NATURE CONSERVATION MARINE PROTECTED AREA?

Each of the three (3) sites is here taken in turn to assess whether the proposed installation activities are 'capable of affecting' the protected features or any ecological or geomorphological process on which the conservation of any protected feature of an NC MPA is (wholly or in part) dependent.

4.2.1 WEST OF SCOTLAND NATURE CONSERVATION MARINE PROTECTED AREA

The West of Scotland deep-sea marine reserve is intended to safeguard the conservation of a range of Scotland's deep-sea marine habitats, wildlife, geology and undersea landforms (**Figure 4-1** [A] and [B]). It is 107,718 km^2 in size. It covers a wide diversity of seabed features, from continental slope to sediment plains and seamounts. The interaction of volcanic deposits and glacial remnant features with ocean currents determines the major sediment types of offshore deep-sea muds and offshore subtidal sands and gravels and the biological communities that inhabit them (JNCC, 2020).

4.2.1.1 SITE FEATURES

- Burrowed mud (including Sea-pens);
- Coral gardens;
- Cold-water coral reefs (including *Lophelia pertusa* Reefs);
- Deep-sea sponge aggregations;
- Offshore deep-sea muds;
- Offshore subtidal sands and gravels;
- Seamount communities;
- Blue Ling (*Molva dypterygia*);
- Leafscale gulper shark (*Centrophorus squamosus*);
- Gulper shark (*Centrophorus granulosus*);
- Orange roughy (*Hoplostethus atlanticus*);
- Portuguese dogfish (*Centroscymnus coelolepis*);
- Round-nose grenadier (*Coryphaenoides rupestris*); and
- Large-scale feature: Seamounts.
- Geological and geomorphological features: bioherm reefs, continental slope turbidite canyons, erosional scour fields, iceberg plough marks, ice-distal and glacimarine facies, ice-proximal and ice-contact facies (e.g. mega-scale glacial lineation), large bank (Palaeogene igneous centre), parasitic cones, prograding wedge, scour moat, seamount, sediment drifts, sediment wave field, slide deposit, slide scars, small scale ridges and turbidite accumulations.

For the features above, the approximate distances from the subsea cable route are noted in Table 4-1 below.

TABLE 4-1 APPROXIMATE DISTANCE OF FEATURES FROM THE SUBSEA CABLE ROUTE

Site feature	Approximate Distance from subsea cable route
Burrowed mud (including Sea-pens)	46 km
Coral gardens	67 km
Cold-water coral reefs (including *Lophelia pertusa* Reefs)	25 km
Deep-sea sponge aggregations	9 km
Offshore deep-sea muds	Potential direct interaction
Offshore subtidal sands and gravels	Direct interaction

Site feature	Approximate Distance from subsea cable route
Seamount communities	25 km
Blue Ling	Potential direct or indirect spatial interaction if depth ranges coincide
Leafscale gulper shark	
Gulper shark	
Orange roughy	
Portuguese dogfish	
Round-nose grenadier	
Geological and geomorphological features[5]	Likely direct or indirect spatial interaction

Source: JNCC, 2020

It should be noted that, while it is likely that subsea cable laying activities may interact with the geological and geomorphological features of the site, JNCC (2020) does not consider subsea cable laying as an activity of interest for management of these features. These are therefore also screened out.

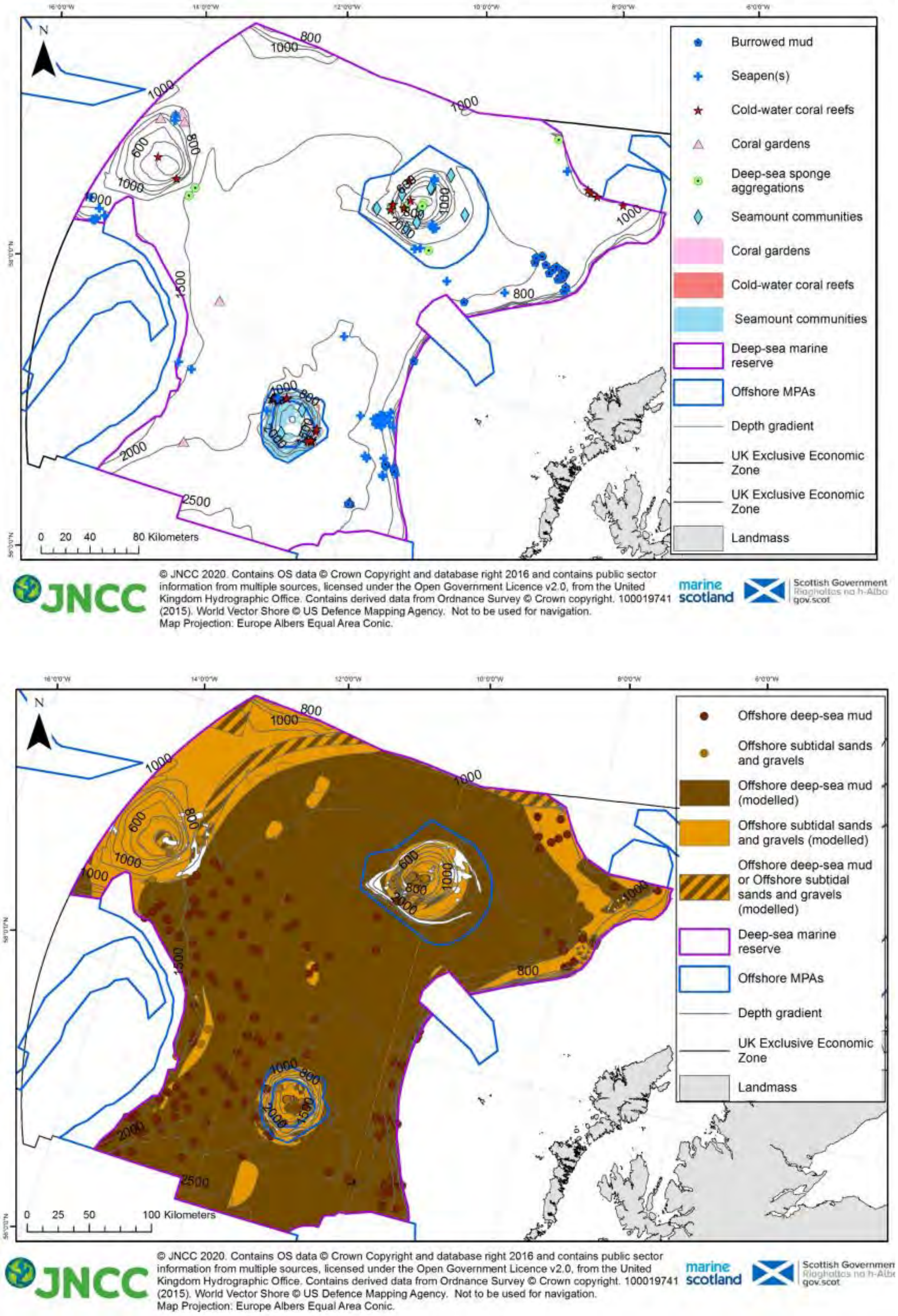
4.2.1.2 SITE FEATURES TO UNDERGO SCREENING

Where distances from the subsea cable route in Table 4-1 are over 5 km, these features are screened out. Features therefore taken forward to the second part of screening are:

- Offshore deep-sea muds;
- Offshore subtidal sands and gravels;
- Blue Ling;
- Leafscale gulper shark;
- Gulper shark;
- Orange roughy;
- Portuguese dogfish; and
- Round-nose grenadier.

[5] bioherm reefs, continental slope turbidite canyons, erosional scour fields, iceberg plough marks, ice-distal and glacimarine facies, ice-proximal and ice-contact facies (e.g. mega-scale glacial lineation), large bank (Palaeogene igneous centre), parasitic cones, prograding wedge, scour moat, seamount, sediment drifts, sediment wave field, slide deposit, slide scars, small scale ridges and turbidite accumulations.

FIGURE 4-1 (A) VULNERABLE MARINE ECOSYSTEMS AND (B) SEDIMENTARY FEATURES OF THE WEST OF SCOTLAND NATURE CONSERVATION MARINE PROTECTED AREA



Source: JNCC, 2020

4.2.1.3 SCREENING ASSESSMENT

OFFSHORE DEEP-SEA MUDS

The Aurora Project is expected to interact (directly or indirectly) with the Offshore Deep Sea Muds (ODSM) feature of the West of Scotland NC MPA (**Figure 4-1** [B]).

Within the NC MPA, the ODSM feature occurs along with Offshore Subtidal Sands and Gravels (OSSG) throughout the majority of the deeper seabed. Species characteristic of offshore deep-sea muds include polychaete worms, brittlestars (ophiuroids), bivalves, sea-pens and crustaceans. The feature's communities are zoned by depth (Davies *et al.*, 2006):

- 800 – 1,000 m communities characterised by burrowed muds and include ophiuroids, anemones and cut-throat eels;
- 1,000 – 1,400 m communities characterised by the hexactinellid sponge (*Pheronema carpenteri*) and can overlap with high abundances of ophiuroids;
- 1,000 – 1,400 m in communities can be characterised by xenophyophores; and
- 1,500 – 2,000 m communities contain high abundances of the octocoral (*Acanella arbuscula*) and brittlestars (Doggett *et al.*, 2018).

Many fish species, including commercial species, are also directly linked to deep-sea sedimentary habitats, for feeding, reproductive or nursery areas. (Doggett *et al.*, 2018).

FeAST provides an understanding of what pressures the proposed operations (cables and pipelines (operation and installation)) are considered to have medium or high sensitivity to:

- Organic enrichment;
- Physical removal (extraction of substratum);
- Removal of non-target species (including lethal);
- Siltation rate changes (heavy);
- Siltation rate changes (light);
- Sub-surface abrasion/penetration;
- Surface abrasion; and
- Temperature changes (local).

It is noted, however, that while temperature change has a medium sensitivity for the subsea cable installation in FeAST, the pressure description notes that this is applicable only to power cables. Removal of non-target species (including lethal) has a high sensitivity, however, this is not considered an appropriate pressure to consider for a telecommunications cable installation and operation. Organic enrichment is equally not considered here given that the enrichment benchmark is deposition of 100gC/m^2/yr. These three pressures are not considered further in this assessment.

The screening assessment for ODSM is provided in **Table 4-2** below.

TABLE 4-2 FEATURE OFFSHORE DEEP SEA MUDS - OVERVIEW

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
Physical removal (extraction of substratum) (H) Surface abrasion (H) Subsurface abrasion (including penetration) (H)	Sediment will be removed from its undisturbed position in the seabed as the plough moves forward and the subsea cable is laid in the trench. Sediment will be pushed to either side of the trench, and may undergo compaction. Some may also be suspended. This sediment will either be actively returned to the trench area or allowed to passively settle. The impact will be short-lived, based on the rate of movement of the plough through the sediment and the total duration of ploughing activities. The scale of impact will be constrained to the footprint of the plough plus a small buffer. Only if there is considerable sediment suspension in an area	Removal of sediment will impact the biodiversity in that area, causing potential injury or death to organisms. Removal of sediment will alter any structural complexity / three dimensional structure of that area of fauna, for example, the structure and integrity of infaunal burrows as well as decreasing biodiversity through burrow dwellers and associates. This decline may impact prey availability for commercial species. Removal of sediment will also impact bioturbation activities in the area, impacting oxygen penetration into the sediments. Mud habitats have the potential for high storage of organic carbon and can have an important contribution to carbon sequestration and climate	It is concluded that the Aurora Project is not capable of affecting (other than insignificantly) the ODSM of the West of Scotland NC MPA as a result of physical removal of sediment, surface abrasion or subsurface abrasion (including penetration).

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
	of unidirectional water movement could the footprint increase. The impact will occur once during the subsea cable lay. Subsea cable maintenance may require further impact assessment.	regulation (Potts *et al.*, 2014). This may be disrupted. However, physical removal of sediment will be mitigated by sediment being kept within the local area of the trench and resettling.	
Siltation rate changes (heavy) (H) Siltation rate changes (light) (H)	Dependent on method of installation, there may be some movement of fine sediment particles into the water column. These may then be carried by water movement (deep currents, eddies etc.) beyond the footprint of the installation and redeposited either elsewhere in the ODSM feature or in different seabed habitats.	Increases in siltation rate may affect organisms' ability to feed and remove waste. It may lead to changes in larval dispersal and settlement.	Given the pressure benchmarks of: • Heavy: deposition of more than 5 cm and up to 30 cm of fine material added to the habitat in a single discrete event or continuous deposition of fine material; and • Light: deposition of up to 5 cm of fine material added to the seabed in a single event or continuous deposition of fine material.

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
			it is concluded that the Aurora Project is not capable of affecting (other than insignificantly) the ODSM of the West of Scotland NC MPA as a result of change to siltation rates.

OFFSHORE SUBTIDAL SANDS AND GRAVELS

The Aurora Project is expected to interact (directly or indirectly) with the OSSG feature of the West of Scotland NC MPA (**Figure 4-1** [B]).

Within the MPA, the OSSG feature occurs along with ODSM through the majority of the deeper seabed. OSSG are characterised by echinoderms (sea urchins, brittlestars, sea cucumbers), gastropods and polychaete worms. Many fish species, including commercial species are directly linked to deep-sea sedimentary habitats, for feeding, reproductive or nursery areas, for example anglerfish *Lophius piscatorius* and Atlantic halibut *Hippoglossus hippoglossus* inhabit sandy and muddy substrates (Doggett *et al.*, 2018).

OSSG are not included on FeAST, so the assessment here is composed of FeAST results for Deep-sea Sand, Deep-sea Muddy Sand and Seep-sea Mixed Sediments.

FeAST provides an understanding of what pressures the proposed operations (Cables and pipelines (operation and installation)) are considered to have medium or high sensitivity to:

- Organic enrichment;
- Physical change (to another seabed type);
- Physical removal (extraction of substratum);
- Removal of non-target species (including lethal);
- Siltation rate changes (heavy);
- Siltation rate changes (light);
- Sub-surface abrasion/penetration;
- Surface abrasion; and
- Water flow (tidal current) changes – local.

While removal of non-target species (including lethal) has a high sensitivity for all habitats, this is not considered an appropriate pressure to consider for a telecommunications cable installation. Organic enrichment is equally not considered appropriate given that the enrichment benchmark is deposition of 100gC/m^2/yr. These two (2) pressures are not considered further in this assessment.

The screening assessment for OSSG is provided in **Table 4-3** below.

TABLE 4-3 FEATURE OFFSHORE SUBTIDAL SANDS AND GRAVELS - OVERVIEW

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
Physical removal (extraction of substratum) (H) Surface abrasion (H) Subsurface abrasion (including penetration) (H)	Sediment will be removed from its undisturbed position in the seabed as the plough moves forward and the subsea cable is laid in the trench. Sediment will be pushed to either side of the trench and may undergo compaction. Some may also be suspended into the water column. This sediment will either be actively returned to the trench area or allowed to passively settle. The impact will be short-lived, based on the rate of movement of the plough through the sediment and the total duration of ploughing activities. The scale of impact will be constrained to the footprint of the plough plus a small buffer. Only if there is considerable sediment suspension in an area of unidirectional water	Removal of sediment or abrasion of the sediment will impact the biodiversity in that area, causing potential injury or death to organisms. Abrasion of sediment would potentially impact both epifaunal and infaunal organisms. Hard substrates may be overturned and attached epifauna may be buried, either temporarily or permanently. This could interrupt feeding or reproductive processes. Sediment abrasion may also alter any structural complexity / three dimensional structure of that area of fauna, for example, the structure and integrity of infaunal burrows as well as decreasing biodiversity through burrow dwellers and associates. This decline may impact may decrease prey availability for commercial species.	It is concluded that the Aurora Project is not capable of affecting (other than insignificantly) the OSSG of the West of Scotland NC MPA as a result of physical removal of sediment, surface abrasion or subsurface abrasion (including penetration).

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
	movement could the footprint increase. The impact will occur once during the subsea cable lay. Subsea cable maintenance may require further impact assessment.		
Siltation rate changes (heavy) (H) Siltation rate changes (light) (H)	Dependent on method of installation, there may be some movement of fine sediment particles into the water column. These may then be carried by water movement (deep currents, eddies etc.) beyond the footprint of the installation and redeposited either elsewhere in the feature or in different seabed habitats. Transport distance would depend on size of particle, flocculation (etc.) and local water flow.	Increases in siltation rate may affect organisms' ability to feed and remove waste. It may lead to changes in larval dispersal and settlement. It may also lead to burial, temporary or permanent, and death.	Given the pressure benchmarks of: • Heavy: deposition of more than 5 cm and up to 30 cm of fine material added to the habitat in a single discrete event or continuous deposition of fine material; and • Light: deposition of up to 5 cm of fine material added to the seabed in a single event or continuous deposition of fine material. It is concluded that the Aurora Project is not capable of affecting (other than insignificantly) the OSSG of the

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
			West of Scotland NC MPA as a result of change to siltation rates.
Water flow (tidal current) changes – local (For deep sea muddy sands and deep sea sands, this pressure is noted in FeAST as high sensitivity. For deep sea mixed sediments and deep sea muds, no exposure is noted.)	Dependent on method of installation, there will be some local disturbance to water flow while the installation occurs. There is currently no consideration of using subsea cable protection, other than short lengths of protective sheath at cable crossing locations.	Changes to local water flow may either increase or decrease water movement, and/or change direction of water movement. This may impact conditions needed for feeding, reproduction, dispersal and connectivity.	As the pressure benchmark for this is a change of peak mean spring tide flow of greater than 0.1 m/s over an area >1 km^2 or 50% of width of water body for > 1 year, it is concluded that the Aurora Project is not capable of affecting (other than insignificantly) the OSSG of the West of Scotland NC MPA as a result of change to local water flow.

BLUE LING

The Aurora Project is expected to interact (directly or indirectly) with the Blue ling feature (including its spawning grounds) of the West of Scotland NC MPA (**Figure 4-2,** under Demersal Elasmobranchs and Chimaeras, below).

FeAST provides an understanding of what pressures the proposed operations (cables and pipelines (operation and installation)) are considered to have medium or high sensitivity to:

- Removal of target species (including lethal); and
- Removal of non-target species (including lethal).

Removal of target and non-target species (including lethal) have a high sensitivity for Blue ling, however, these are not considered appropriate pressures to consider for a telecommunications cable installation.

As such, without any pressures that are considered valid for the proposed installation activities, Blue ling is screened out of this assessment.

ORANGE ROUGHY

The Aurora Project is expected to interact (directly or indirectly) with the Orange roughy feature of the West of Scotland NC MPA (**Figure 4-2**, under Demersal Elasmobranchs and Chimaeras, below).

FeAST provides an understanding of what pressures the proposed operations (cables and pipelines (operation and installation)) are considered to have medium or high sensitivity to:

- Removal of target species (including lethal).

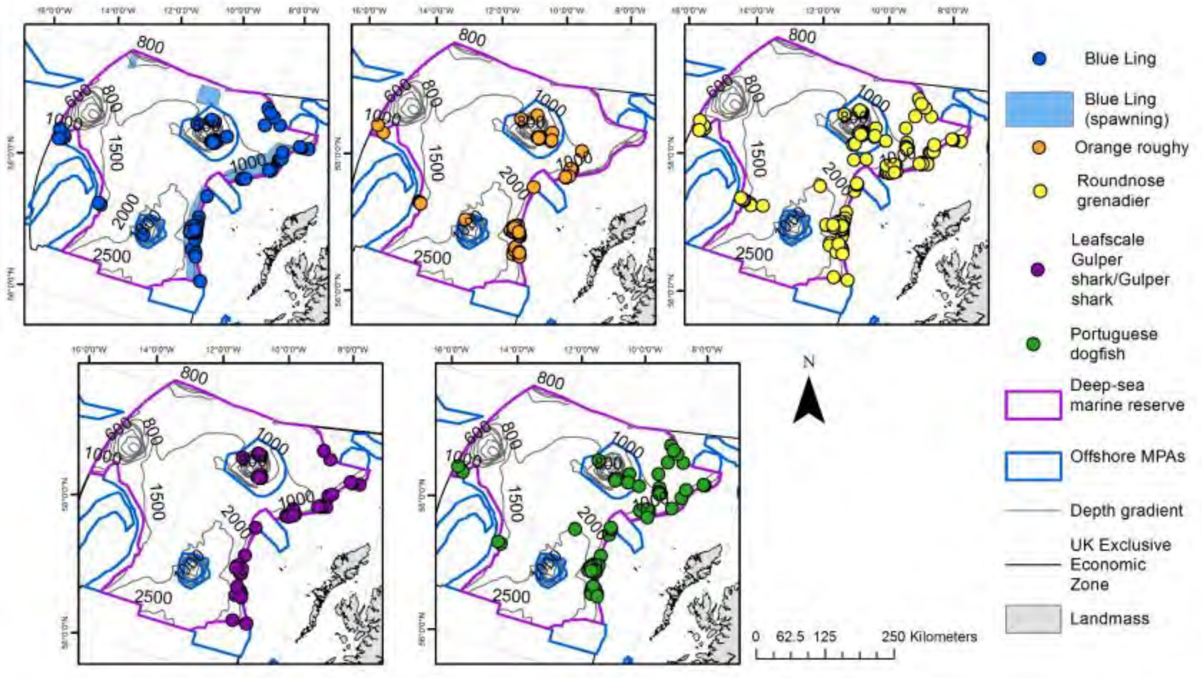
While removal of target species (including lethal) has a high sensitivity for Orange roughy, this is not considered appropriate pressures to consider for a telecommunications cable installation.

As such, without any pressures that are considered valid for the proposed installation activities, Orange roughy is screened out of this assessment.

DEMERSAL ELASMOBRANCHS AND CHIMAERAS

Four (4) species of deep-sea demersal elasmobranchs and chimaeras are protected features of the West of Scotland deep-sea marine reserve (**Figure 4-2**): Leafscale gulper shark, Gulper shark, Portuguese dogfish, and Round-nose grenadier. Although characteristic habitat for these species is found across much of the marine reserve, distribution is concentrated on the continental slope and around seamount structures. The importance of the area for reproduction remains unclear (Moura *et al.*, 2014), due in part to juveniles and pregnant females absent from samples taken within the reserve for some species (e.g. Leafscale gulper shark).

FIGURE 4-2 DISTRIBUTION OF DESIGNATED DEEP-SEA FISH FEATURES (INCLUDING DEMERSAL ELASMOBRANCH AND CHIMAERA SPECIES)



Source: JNCC, 2020

The Aurora Project has the potential to interact directly with demersal elasmobranch and chimaera features of the West of Scotland NC MPA, however as distribution of these species is concentrated on the continental slope and around seamounts, the subsea cable route avoids the areas of highest known abundance (**Figure 4-2**).

For these species and site features, FeAST does not provide any details of sensitivity for cables and pipelines (operation and installation). However, compared to the other ichthyological features of the site, it could be suggested that the following pressures are appropriate to consider for these species:

- Removal of target species (including lethal); and
- Removal of non-target species (including lethal).

While removal of target and non-target species (including lethal) could have high sensitivities for these species, these are not considered appropriate pressures to consider for a telecommunications cable installation.

As such, without any pressures that are considered valid for the proposed installation activities, the demersal elasmobranch and chimaera species are screened out of this assessment.

4.2.2 WEST SHETLAND SHELF NATURE CONSERVATION MARINE PROTECTED AREA

The MPA represents a wide variety of sand and gravel habitats that support a particularly rich diversity of wildlife (**Figure 4-3**).

4.2.2.1 SITE FEATURES

- Offshore subtidal sands and gravels (JNCC, 2014a).

4.2.2.2 SITE FEATURES TO BE ASSESSED

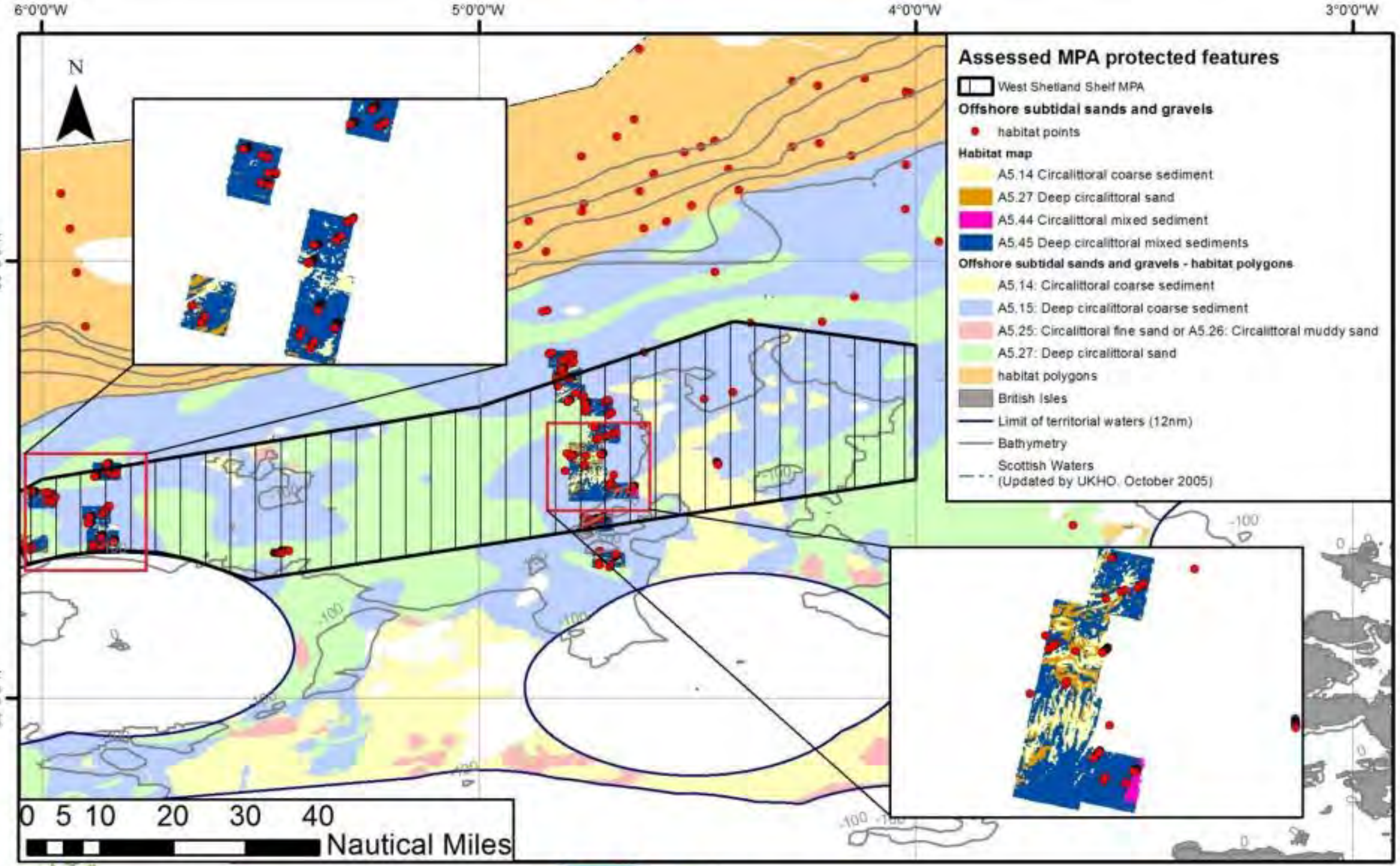
For the feature above, the approximate distances from the subsea cable route is noted in Table 4-4 below.

TABLE 4-4 APPROXIMATE DISTANCE OF FEATURE FROM THE SUBSEA CABLE ROUTE

Site feature	Approximate distance from subsea cable route
Offshore subtidal sands and gravels	Direct interaction

Source: JNCC, 2014a

FIGURE 4-3 WEST OF SHETLAND NATURE CONSERVATION MARINE PROTECTED AREA



Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad
marinescotland
The Scottish Government
JNCC
Joint Nature Conservation Committee

Map displayed in geographic coordinates WGS84. The exact limits of the UK Continental Shelf are set out in the Continental Shelf (Designation of Areas) Order 2013, Statutory Instrument 2013/3162 (© Crown Copyright). Landmass Ordnance Survey © Crown Copyright and database right 2011. All rights reserved. Scotland (Adjacent waters) Updated by the Law of the Sea Division, United Kingdom Hydrographic Office October 2005. Bathymetry © GEBCO, 2011. Biological data from Geodatabase of Marine features in Scotland (GeMSv4) © Crown Copyright; MPA © JNCC and SNH 2014. All rights reserved. PSA data © BGS. Habitat map © JNCC, 2014. EUSeaMap © EUSeaMap consortium 2012 (www.emodnet-seabedhabitats.eu)

Source: JNCC, 2014a

4.2.2.3 SCREENING ASSESSMENT

OFFSHORE SUBTIDAL SANDS AND GRAVELS

Offshore subtidal sands and gravels are characterised by urchins, brittlestars (ophiuroids), sea cucumbers (holothurians), gastropods and polychaete worms. Many fish species, including commercial species are directly linked to deep-sea sedimentary habitats, for feeding, reproductive or nursery areas, for example Anglerfish and Atlantic halibut inhabit sandy and muddy substrates and blue ling feed on benthic fish species of flatfish, gobies and rockling (Doggett *et al.,* 2018).

The Aurora Project in UK waters is expected to interact (directly or indirectly) with the OSSG feature of the West Shetland Shelf NC MPA. OSSG are not included on FeAST, so the assessment here is composed of FeAST results for Deep-sea Sand, Deep-sea Muddy Sand, Deep-sea Mixed Sediments as well as Tide swept coarse sands with burrowing bivalves and Kelp and seaweed communities on sublittoral sediment to cover shallower areas of OSSG.

FeAST provides an understanding of what pressures from cables and pipelines (operation and installation) are considered to have medium or high sensitivity to:

- Introduction or spread of non-indigenous species and translocations (competition);
- Organic enrichment;
- Physical change (to another seabed type);
- Physical loss (to land or freshwater habitat);
- Physical removal (extraction of substratum);
- Removal of non-target species (including lethal);
- Removal of target species (including lethal);
- Siltation rate changes (heavy);
- Siltation rate changes (light);
- Sub-surface abrasion/penetration;
- Surface abrasion; and
- Water flow (tidal current) changes – local.

Removal of non-target species (including lethal) has a high sensitivity for all habitats, however, this is not considered an appropriate pressure to consider for a telecommunications cable installation. Introduction or spread of non-indigenous species and translocations (competition) is considered of medium sensitivity for Kelp and seaweed communities on sublittoral sediment. Again, this is not considered an appropriate pressure for this type of subsea cable installation. Organic enrichment is equally not considered here given that the enrichment benchmark is deposition of 100gC/m^2/yr. As such, these pressures are not considered further in this assessment.

The screening assessment for OSSG is provided in **Table 4-5** below.

TABLE 4-5 FEATURE OFFSHORE SUBTIDAL SANDS AND GRAVELS - OVERVIEW

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
Physical removal (extraction of substratum) (H) Surface abrasion (H) Subsurface abrasion (including penetration) (H)	Sediment will be removed from its undisturbed position in the seabed as the plough moves forward and the subsea cable is laid in the trench. Sediment will be pushed to either side of the trench and may undergo compaction. Some may also be suspended into the water column. This sediment will either be actively returned to the trench area or allowed to passively settle. The impact will be short-lived, based on the rate of movement of the plough through the sediment and the total duration of ploughing activities. The scale of impact will be constrained to the footprint of the plough plus a small buffer. Only if there is considerable sediment suspension in an area of unidirectional water	Removal of sediment or abrasion of the sediment will impact the biodiversity in that area, causing potential injury or death to organisms. Abrasion of sediment would potentially impact both epifaunal and infaunal organisms. Hard substrates may be overturned and attached epifauna may be buried, either temporarily or permanently. This could interrupt feeding or reproductive processes. Sediment abrasion may also alter any structural complexity/three dimensional structure of that area of fauna, for example, the structure and integrity of infaunal burrows as well as decreasing biodiversity through burrow dwellers and associates. This decline may impact prey availability for commercial species.	It is concluded that the Aurora Project is not capable of affecting (other than insignificantly) the OSSG of the West Shetland Shelf NC MPA as a result of physical removal of sediment, surface abrasion or subsurface abrasion (including penetration).

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
	movement could the footprint increase. The impact will occur during the subsea cable lay. Subsea cable maintenance may require further impact assessment.		
Siltation rate changes (heavy) (H) Siltation rate changes (light) (M)	Dependent on method of installation, there may be some movement of fine sediment particles into the water column. These may then be carried by water movement (deep currents, eddies etc.) beyond the footprint of the installation and redeposited either elsewhere in the feature or in different seabed habitats. Transport distance would depend on size of particle, flocculation (etc.) and local water flow.	Increases in siltation rate may affect organisms' ability to feed and remove waste. It may lead to changes in larval dispersal and settlement. It may also lead to burial, temporary or permanent, and death.	Given the pressure benchmarks of • Heavy: deposition of more than 5 cm and up to 30 cm of fine material added to the habitat in a single discrete event or continuous deposition of fine material; and • Light: deposition of up to 5 cm of fine material added to the seabed in a single event or continuous deposition of fine material. It is concluded that the Aurora Project is not capable of affecting (other than insignificantly) the OSSG of the

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
			West of Scotland NC MPA as a result of change to siltation rates.
Water flow (tidal current) changes – local (For deep sea muddy sands and deep sea sands, this pressure is noted in FeAST as high sensitivity. For deep sea mixed sediments and deep sea muds, there is no exposure)	Dependent on method of installation, there will be some local disturbance to water flow while the installation occurs. There is currently no consideration of using subsea cable protection, other than short lengths of protective sheath at cable crossing locations.	Changes to local water flow may either increase or decrease water movement, and change direction of water movement. This may impact conditions needed for feeding, reproduction, dispersal and connectivity.	As the pressure benchmark for this is a change of peak mean spring tide flow of greater than 0.1 m/s over an area >1 km^2 or 50% of width of water body for > 1 year, it is concluded that the Aurora Project is not capable of affecting (other than insignificantly) the OSSG of the West of Scotland NC MPA as a result of change to local water flow.

4.2.3 NORTH-WEST ORKNEY NATURE CONSERVATION MARINE PROTECTED AREA

The North-West Orkney NC MPA plays an important role in supporting wider populations of sandeels in Scottish waters (**Figure 4-4**). The area also encompasses several sand banks, and sand and sediment wave fields of geological importance.

4.2.3.1 SITE FEATURES

- Sandeels; and
- Sandbanks, sand wave fields and sediment wave fields representative of the Fair Isle Strait Marine Process Bedforms Key Geodiversity Area.

4.2.3.2 SITE FEATURES TO BE ASSESSED

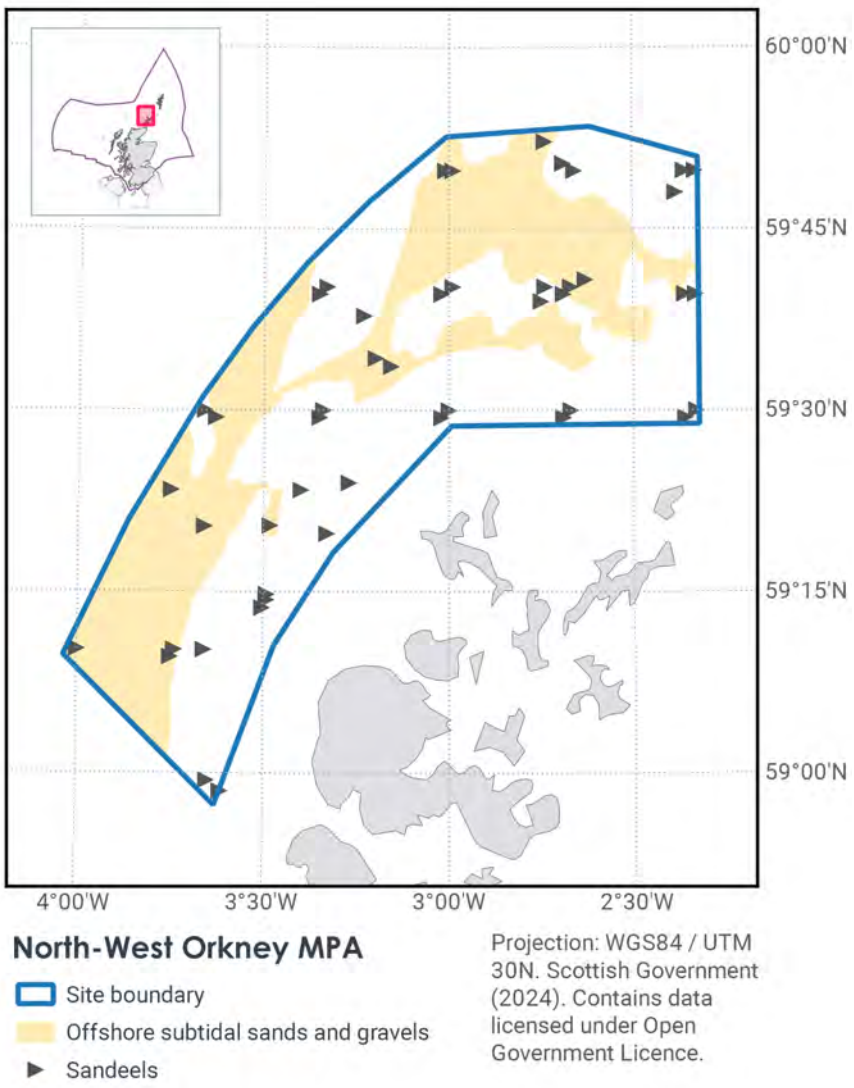
For the features above, the approximate distances from the subsea cable route are noted in **Table 4-6** below. Where distances are over 5 km, these features are screened out.

TABLE 4-6 APPROXIMATE DISTANCE OF FEATURES FROM THE SUBSEA CABLE ROUTE

Site feature	Approximate Distance from subsea cable route
Sandeels	Assumed direct interaction
Sandbanks, sand wave fields and sediment wave fields representative of the Fair Isle Strait Marine Process Bedforms Key Geodiversity Area	Assumed direct interaction

Source: JNCC 2014b, c

FIGURE 4-4 NORTH-WEST ORKNEY FISHERIES MANAGEMENT MEASURES



Source: JNCC, 2014b

4.2.3.3 SCREENING ASSESSMENT

SANDEELS

The Aurora Project in UK waters is expected to interact (directly or indirectly) with the Sandeels feature of the North-West Orkney NC MPA (**Figure 4-4**).

The presence of adult sandeels in the North-West Orkney MPA is supported by the presence of the high density of newly emerged (1–10 day old) sandeel larvae across the MPA area (Wright & Bailey, 1996; Proctor *et al.*, 1998). The high density of emergent larvae and simulations of larval transport indicate this spawning area is an important source of larvae that populate sandeel grounds around Shetland and south to the Moray Firth (Proctor *et al*., 1998). The persistence of sandeels spawning in the area is evident from larval surveys ranging from 1950 (Langham, 1971; Proctor *et al.*, 1998), through to 2005 (Lynam *et al.*, 2013). The patchiness of emergent sandeel larvae may be considered natural in the MPA owing to the patchiness of the sediments suitable for sandeel colonisation.

Sandeel spawning may take place between the months of August and October (inclusive); however given the limited potential effects of the Aurora Project activities and significance / screening results as detailed below, it is not expected that any temporal restrictions will need to be applied to Aurora Project activities.

FeAST provides an understanding of what pressures cables and pipelines (operation and installation) are considered to have medium or high sensitivity to:

- Organic enrichment (M);
- Physical change (to another seabed type) (H);
- Physical change (to land or freshwater) (M);
- Physical removal (extraction of substratum) (H);
- Siltation rate changes (heavy) (H);
- Siltation rate changes (light) (M);
- Sub-surface abrasion/penetration (H); and
- Surface abrasion (M).

Removal of non-target species (including lethal) has a high sensitivity for all habitats, however, this is not considered an appropriate pressure to consider for a telecommunications cable installation. It is noted that temperature change has a medium sensitivity for subsea cable installation in FeAST, however, the pressure description notes that this is applicable only to power cables. Organic enrichment is equally not considered here given that the enrichment benchmark is deposition of 100gC/m^2/yr. As such, these pressures are not considered further in this assessment.

The screening assessment for sandeels is provided in **Table 4-7** below.

TABLE 4-7 FEATURE SANDEELS - OVERVIEW

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
Physical removal (extraction of substratum) (H) Physical loss (to land or freshwater) (M) Surface abrasion (H) Subsurface abrasion (including penetration) (H)	Sediment will be removed from its undisturbed position in the seabed as the plough moves forward and the subsea cable is laid in the trench. Sediment will be pushed to either side of the trench and may undergo compaction. Some may also be suspended into the water column. This sediment will either be actively returned to the trench area or allowed to passively settle. The impact will be short-lived, based on the rate of movement of the plough through the sediment and the total duration of ploughing activities. The scale of impact will be constrained to the footprint of the plough plus a small buffer. Only if there is considerable sediment suspension in an area of unidirectional water	Removal of sediment or abrasion of the sediment may impact sandeels within the sediment, causing potential injury or death to organisms.	Given that sandeels are mobile, and can rebury after disturbance, it is concluded that the Aurora Project is not capable of affecting (other than insignificantly) the Sandeels of the North-West Orkney NC MPA as a result of physical removal of sediment, physical loss to land or freshwater, surface abrasion or subsurface abrasion (including penetration).

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
	movement could the footprint increase. The impact will occur once during the subsea cable lay. Subsea cable maintenance may require further impact assessment.		
Siltation rate changes (heavy) (H) Siltation rate changes (light) (M)	Dependent on method of installation, there may be some movement of fine sediment particles into the water column. These may then be carried by water movement (deep currents, eddies etc.) beyond the footprint of the installation and redeposited either elsewhere in the feature or in different seabed habitats. Transport distance would depend on size of particle, flocculation (etc.) and local water flow.	Increases in siltation rate may affect organisms' ability to feed and remove waste. It may lead to changes in larval dispersal and settlement. It may also lead to burial, temporary or permanent, and death. Siltation may change any visual cues needed to enter the sediment.	Given the pressure benchmarks of • Heavy: deposition of more than 5 cm and up to 30 cm of fine material added to the habitat in a single discrete event or continuous deposition of fine material; and • Light: deposition of up to 5 cm of fine material added to the seabed in a single event or continuous deposition of fine material. It is concluded that the Aurora Project is not capable of affecting (other than

FeAST pressures scoring H / M sensitivity	Magnitude of Impacts	Potential Effects	Significance / screening result
			insignificantly) the Sandeels feature of the NWO NC MPA as a result of change to siltation rates.

GEODIVERSITY FEATURES

JNCC (2014 b, c) notes that sediment wave fields, sand banks and sand wave fields are predominantly formed by the action of tidal currents. If current patterns and flow rates are maintained, these features are likely to remain, even if subject to physical disturbance. It is therefore concluded that the Aurora Project is not capable of affecting (other than insignificantly) the geodiversity features of the NWO NC MPA.

4.3 SCREENING – CUMULATIVE

Given that each of the features of the three (3) sites assessed is screened out as either having no direct or indirect pathway of impact, or not having an impact (other than insignificant) on the protected features of the sites, a cumulative impacts assessment has not been undertaken.

4.4 CONCLUSIONS

While there are a number of direct and indirect pathways of potential impacts between the proposed installation activities of the Aurora Project and protected features of the three (3) sites, it is considered that all features of the three (3) sites will not to be impacted (other than insignificantly) by the proposed activities of the Aurora Project (**Table 4-8**).

TABLE 4-8 SCREENING CONCLUSIONS FOR THE AURORA PROJECT

	Screened out – Q1	Screened out – Q2
West of Scotland		
Burrowed mud (including Sea-pens)	X	
Coral gardens	X	
Cold-water coral reefs (including *Lophelia pertusa* Reefs)	X	
Deep-sea sponge aggregations	X	
Offshore deep-sea muds		X
Offshore subtidal sands and gravels		X
Seamount communities	X	
Blue ling		X
Leafscale gulper shark		X
Gulper shark		X

	Screened out – Q1	Screened out – Q2
Orange roughy		X
Portuguese dogfish		X
Round-nose grenadier		X
Geological and geomorphological features	X	
West Shetland Shelf		
Offshore subtidal sands and gravels		X
North-West Orkney		
Sandeels		X
Geodiversity features	X	

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APPENDIX 3 EMBEDDED / INBUILT MITIGATION MEASURES FOR THE AURORA PROJECT IN UK WATERS

Aspect	Inbuilt Control / Mitigation Measures
Pre-Installation Phase	
General	• Notify relevant authorities of location and timing of Aurora Project activities prior to commencement. • Notify the public of location and timing of installation if necessary. • Ensure that relevant environmental authorisations and the approved Environmental and Social Management Plan (ESMP) are available onboard the installation vessel. • The environmental authorisations and the ESMP should be referenced within the contractor's contract and a copy of the document provided to contractors prior to installation works.
Impact to coastal zone, Offshore / seabed / habitats	• Use the results of the CRS to avoid sensitive benthic habitats and any areas or archaeological significance along the route, as far as reasonably practicable.
Occupational and Community Health and Safety	• A health and safety policy will be applied throughout the Aurora Project and across all Aurora Project contractors. • Abide by all national occupational health and safety regulations. • Provision of suitable Personal Protective Equipment (PPE), training and safety checks.
Installation Phase	
General	• Compliance with national legislation and policies on the environment. • Contracted installation personnel to be aware of the Aurora Project ESMP and to ensure compliance with legislation.
Ambient Air Quality and Climate Change	• Aurora Project vessel must operate in compliance with MARPOL 73/78 regarding limits on SO_2 and NOx emissions, the prohibition of ozone depleting substances and limit on sulphur content of fuel.
Ambient Noise and Vibration	• Contractors shall use equipment that are in good working order and are well maintained.

Aspect	Inbuilt Control / Mitigation Measures
Waste Generation	• A WMP will be implemented as part of the installation activities. Waste management during the Aurora Project activities will comply with applicable local legislation and MARPOL 73/78.
Impact to Coastal Processes	• Use the results of the CRS to avoid sensitive benthic habitats along the route, as far as reasonably practicable. • The level of disturbance of the seabed is limited by the subsea cable installation techniques, including use of a cable plough to simultaneously trench and bury the subsea cable. • The subsea cable ploughing technique and jetting shall ensure that disturbed sediments can infill the trench wherever possible. • The subsea cable will be buried and seasonal fluctuations in sediment levels monitored.
Impact to Water and Sediment Quality	• The Aurora Project vessel 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.
Impact to Marine and Coastal Ecology and Biodiversity	• Lighting on the installation vessel will be minimised as far as reasonably practicable whilst ensuring compliance with the COLREGs Rule and general safe working practices • All vessels of appropriate size and class will have a Ballast Water Management Plan and adhere to the IMO Ballast Water Guidelines. All ballast movements will be recorded and ballast regulations in each country reviewed before discharging / renewing ballast water. Any ballast water renewal will be in deep mid-ocean water and as far away from the shore as possible outside of any TS boundaries.
Impact to Socio-Economic Environment: Offshore Fishing and Fisheries	• In TS the subsea cable will be buried wherever feasible reducing the potential for interaction with fisheries. • Vessel operators must adhere to International Maritime Law and safe practice guidelines, including those by the UNCLOS, COLREGs Rule and SOLAS, and local regulations. • A notice to mariners and a navigational warning shall be issued to Mariners prior to installation giving notice of the proposed timeframes for subsea installation and an indication of the safety zone. • Lighting on the installation vessel will be minimised as far as reasonably practicable whilst ensuring compliance with COLREGs.
Impact to Socio-Economic Environment: Marine	• The relevant Port Authority must be notified of marine installation activities so that vessels in the area are warned in advance. • A notice to mariners and a navigational warning will be issued to communicate the location of the installation safety zone.

Aspect	Inbuilt Control / Mitigation Measures
Navigation (i.e. Shipping)	
Impact to Socio-Economic Environment: Cultural Heritage	• In the event that an unrecorded shipwreck is encountered during subsea cable installation offshore, the relevant cultural heritage authority must be notified and a decision taken on how to avoid or minimise impacts. • A suitably qualified archaeologist must be engaged to assess the significance of the unexpected find in consultation with the relevant cultural heritage authority. • Under no circumstances may any archaeological material be destroyed or removed from site unless under direction of the archaeologist and with approval from the relevant authorities.
Impact to Socio-Economic Environment: Oil and Gas Concessions	• Communication with relevant parties shall be undertaken to ensure no conflicts may occur.
Impact to Socio-Economic Environment: Existing Subsea Cables	• Ploughing will not take place 500 m from the existing subsea cables, unless the existing subsea cables to be crossed by the Aurora Project had been laid by ASN, in which case ploughing will be up to 250 m from the crossed subsea cable. • Notify owners prior to crossing of in-service subsea cables for a crossing agreement.
Unplanned Events (Waste)	• Appropriate waste containment facilities shall be included on the vessel and be managed to avoid overflow or accidental release to the environment. • No waste materials shall be disposed of overboard; all non- biodegradable and hazardous wastes will be collected, stored, processed and disposed of in accordance with the vessel's Garbage Management Plan as required under Regulation 9 of MARPOL Annex V. • Hazardous wastes shall be separated, labelled and retained in appropriately controlled storage areas. • All recyclable and general wastes shall be collected in labelled, covered bins (and compacted where possible).

Aspect	Inbuilt Control / Mitigation Measures
Unplanned Events (Dropped objects)	• All equipment and gear on the vessels shall be securely fastened during transit. • Lifting is to be carried out by competent personnel using equipment that is suitable, certified and maintained.
Unplanned Events (Collision risk for marine mammals and marine turtles)	• Assign suitably trained and experienced vessel staff to perform turtle and marine mammal observations and notifications. • Carry out daylight observations and record relevant incidence of turtles and marine mammals, and their responses to vessel activities.
Unplanned Events (Seawater quality)	• Modern, appropriately equipped installation vessel will be used which complies with relevant MARPOL 73/78 and IMO requirements for drainage systems, effluent treatment and materials storage.
Unplanned Events (Damaged fuel tank)	• Measures to avoid collisions will be in place in accordance with COLREGs and good industry practice, including notifications, lighting and signage. • Spill response equipment located on board. • Oil spill response will be executed in accordance with the vessel's SOPEP, as specified under MARPOL 73/78.
Unplanned Events (Worker and occupational health and safety incidents)	• Appropriate PPE shall be provided to all workers. Training and awareness on the use of PPE shall also be carried out as part of induction for workforce. • A health and safety policy shall be applied throughout the Aurora Project and across all Aurora Project contractors. • The vessel contractors shall abide by all national occupational health and safety regulations. • All divers must be suitably qualified and experienced and adhere to ASN policy for safe diving, which includes: ◦ Reporting to and following the instructions of the Diving Supervisor. ◦ Holding original diving training and medical examination certificates which shall be valid for at least three (3) months beyond the scheduled date of demobilisation. ◦ Informing the diving supervisor if there is any reason why they cannot dive. ◦ Checking the diving equipment is working correctly and is suitable for the planned dive. ◦ Confirming that they fully understand the dive plan, operating and emergency procedures (including rope/line signals), first aid arrangements, risk assessment and method of work and are competent to carry out the planned task.

Aspect	Inbuilt Control / Mitigation Measures
	◦ Report any medical problems or symptoms that they experience during or after the dive and any equipment faults, other potential hazards, near misses or accidents ◦ Updating logbooks on regular basis and present it for signing by the diving supervisor.
Operations and Maintenance	
Waste Generation	• An offshore WMP will be implemented. Waste management during the Aurora Project activities will comply with applicable legislation and MARPOL 73/78.
Impact to Coastal Processes	• The level of disturbance of the seabed is limited by the subsea cable installation techniques, including use of a cable plough to simultaneously trench and bury the subsea cable.
Impact to Water and Sediment Quality	• The Aurora Project vessels 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.
Impact to Marine and Coastal Ecology and Biodiversity	• Lighting on the installation vessel will be minimised as far as reasonably practicable whilst ensuring compliance with the COLREGs Rule. • All vessels of appropriate size and class will have a Ballast Water Management Plan and adhere to the IMO Ballast Water Guidelines. All ballast movements will be recorded and ballast regulations in each country reviewed before discharging / renewing ballast water. Any ballast water renewal will be in deep mid-ocean water and as far away from the shore as possible outside of any TS boundaries.
Impact to Socio-Economic Environment: Occupational Health and Safety	• Compliance with national health and safety regulations.

APPENDIX 4 FISH AND SHELLFISH ECOLOGY AND CONSERVATION INFORMATION

APPENDIX 4A ADDITIONAL ELASMOBRANCH ECOLOGICAL INFORMATION

Common name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
Common skate	*Dipturus batis*	Egg-laying occurs in spring and summer	Demersal, preferring sandy and muddy substrates at depths between 10 and 600 m, with juveniles found in shallower waters	Not described as migratory	Typically feeds on benthic prey, including bristle worms, crustacea, and small demersal fish species (such as sandeel and flatfish spp.)	Fish with no swim bladder
Cuckoo ray	*Leucoraja naevus*	Egg cases produced throughout the year	Demersal from 30-500 m, though most common <200 m. Found on continental shelf and upper slopes over sandy and coarse sediment	Not described as migratory	Feeds on crustaceans, polychaete worms and teleosts	Fish with no swim bladder
Thornback ray	*Raja clavata*	Overwinters in deeper water, migrating into shallower areas in the late spring and summer (February-September) to spawn	Inhabits continental shelf and upper slope waters from 10-300 m, though it is most abundant in waters 10-60 m. Frequents a range of sediments, though not typically coarser sediments	Mostly non-migratory, though fish often moves close inshore during the spring	Adults feed on large crustaceans and small teleost fish such as sandeels, small gadoids and dragonets, whereas juveniles prefer small crustaceans	Fish with no swim bladder
Spotted ray	*Raja montagui*	Limited information on the reproductive biology of this species	Majority of population found in waters 100-500 m deep. Prefers soft, sandy substrates in	Mostly non-migratory, though females migrate to shallow waters	Adults feed on large crustaceans, teleost fish, polychaetes and molluscs, juveniles on small crustaceans	Fish with no swim bladder

Common name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
			coastal seas and on continental shelves	from April-July to spawn		
Lesser spotted dogfish	*Scyliorhinus canicula*	Egg-laying occurs during spring and early summer	Found from shallow sublittoral waters up to 400 m, mostly on sand and mud, but also on algae, rocky and gravelly bottoms	Females come inshore during the warmer months to lay eggs	It feeds opportunistically on a range of benthic fauna, mostly crustaceans and molluscs. Feeding intensity is highest during the summer	Fish with no swim bladder
Spurdog	*Squalus acanthias*	Timing of reproduction varies by location, though it broadly occurs between January and August	Found in inshore waters to continental shelf, most commonly 10-200 m but recorded up to 900 m. Is epibenthic but also occurs in water column, with no preference for habitat	Highly migratory, dependent on age and sex. Young females migrate to shallow waters to give birth	Diet consists of mostly teleost fish (herring, whiting, Norway pout, cod, and Atlantic mackerel), with crustaceans often taken by smaller individuals	Fish with no swim bladder
Leafscale gulper shark	*Centrophorus squamosus*	Seasonality/reproductive strategies are unclear.	Found on or near the seabed of continental slopes or pelagically at depths down to 4,000 m.	Not described as migratory	Feeds on fish and cephalopods.	Fish with no swim bladder
Gulper shark	*Centrophorus granulosus*	Seasonality is unclear but this species is ovoviparous.	Found on the outer continental shelves and upper slopes at depths below 200 m.	Not described as migratory.	Feeds on bony fish such as hake, squid and crustaceans.	Fish with no swim bladder

Common name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
Portuguese Dogfish	*Centroscymnus coelolepis*	Seasonality/reproductive strategies are unclear.	Found on continental slopes and abyssal plains.	Not described as migratory.	Feeds on fish, cephalopods, gastropods and cetacean meat.	Fish with no swim bladder

APPENDIX 4B ELASMOBRANCH CONSERVATION INFORMATION

Common Name	Latin Name	IUCN Red List	OSPAR Annex V species	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Common skate	*Dipturus batis*	Critically Endangered (Global) with decreasing population	Yes	Yes	No	No	No
Cuckoo ray	*Leucoraja naevus*	Least Concern	No	No	No	No	No
Thornback ray	*Raja clavata*	Near Threatened (Global and Europe)	Yes	No	No	No	No
Spotted ray	*Raja montagui*	Least Concern	Yes	No	No	No	No
Lesser spotted dogfish	*Scyliorhinus canicula*	Least Concern	No	No	No	No	No

Common Name	Latin Name	IUCN Red List	OSPAR Annex V species	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Spurdog	*Squalus acanthias*	Vulnerable (Global), Endangered (Europe)	Yes	Yes	No	No	No
Leafscale gulper shark	*Centrophorus squamosus*	Endangered (Global), Endangered (Europe)	Yes	Yes	No	No	No
Gulper shark	*Centrophorus granulosus*	Endangered (Global), Critically Endangered (Europe)	Yes	Yes	No	No	No
Portuguese Dogfish	*Centroscymnus coelolepis*	Near Threatened (Global), Endangered (Europe)	Yes	Yes	No	No	No

APPENDIX 4C ADDITIONAL DEMERSAL FISH ECOLOGICAL INFORMATION

Common name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
Atlantic cod	*Gadus morhua*	Spawning occurs in winter and beginning of spring	Juveniles prefer shallower waters (10-30 m) with	Migrate between spawning, feeding and overwintering	Omnivorous, feeding on mostly fish and invertebrates	Fish with a swim bladder

Common name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
			complex habitats than adults (up to 600 m)	areas, journeys of <200 km		involved in hearing
Witch flounder	*Glyptocephalus cynoglossus*	In Irish Sea, spawns March-May	Inhabits soft mud bottoms at depths of 45-366 m	None reported	Feeds on crustaceans, polychaetes, brittle stars and fish	Data deficient
Megrim	*Lepidorhombus whiffiagonis*	Unknown, though spawning occurs in deep waters off west of British Isles	Occurs at depths 100-700 m, over soft bottoms	Not reported	Feeds on small bottom-living fishes, cephalopods and crustaceans	Fish with no swim bladder
Dab	*Limanda limanda*	Spawning occurs in spring and early summer in British waters	Mostly found over sandy ground at depths of 20-40 m, sometimes up to 150 m. Young live inshore	Adults migrate inshore from deeper water in the warmer summer months	Opportunistic feeder, though mainly on crustaceans and small fish	Fish with no swim bladder
Anglerfish	*Lophius piscatorius*	Spawning occurs between January-June	Occur at depths from coast up to 1,000 m, on sandy and muddy bottoms. May also be found on rocky bottoms	Migrate between inshore and offshore spawning grounds	Feeds mostly on fish that it lures	Data deficient
Haddock	*Melanogrammus aeglefinus*	Spawning takes place from March to May	Found over rock, sand gravel or shells, at depths of 40-300 m	None reported for UK waters	Feeds on variety of benthic organisms, including crustaceans, molluscs and teleosts	Fish with a swim bladder involved in hearing
Whiting	*Merlangius merlangus*	Spawning occurs January-September	Depth range 10-200 m, most commonly 30-100 m, over mud	Individuals migrate to open sea after first year	Feed on a range of benthic prey	Fish with a swim bladder

Common name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
			and gravel bottoms mostly, but also on sand and rock			involved in hearing
European hake	*Merluccius merluccius*	Spawning occurs April-December, with a peak in February-March	Found usually between 30-1075 m, normally 70-400 m	Diurnal; off bottom during day, on bottom at night	Feed mainly on fish, with young feeding on small crustaceans	Data deficient
Blue Whiting	*Micromesistius poutassou*	Spawns late winter - early spring	Peagic, found commonly at depths of 300-400 m but can reach 1000 m	Daily vertical migrations	Feeds primarily on small crustaceans, but large individuals will take small fish and cephalopods	Fish with a swim bladder involved in hearing
Lemon sole	*Microstomus kitt*	The timing of spawning is related to a temperature threshold	Found on stony bottoms at depths 20-200 m	None reported	Feeds on invertebrates, primarily polychaetes	Fish with no swim bladder
Ling	*Molva molva*	Spawn in spring	Occurs mostly in deep water (100-400 m) over rocky bottoms	Unknown	Feeds on large fish and invertebrates	Fish with a swim bladder involved in hearing
European flounder	*Platichthys flesus*	Spawns in spring in deeper, warmer waters	Found on muddy or sandy substrates in shallow water. Tolerant of marine, brackish and freshwater environments	Migrates to saltwater to spawn	Feeds on benthic fauna, including small fishes and invertebrates	Fish with no swim bladder
Plaice	*Pleuronectes platessa*	Spawn mostly between January-March in well-defined spawning grounds	Occurs on mud and sandy bottoms, from intertidal to about 100 m depth	Migrate for spawning activity	Feed mainly on thin-shelled molluscs and polychaetes. Active at night	Fish with no swim bladder

Common name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
			(increase in water depth with age)			
Pollock	*Pollachius pollachius*	Spawn in the late winter to spring	Found from nearshore to 200 m, over hard bottoms	Larger individuals move to more open sea. May take spawning migrations	Major predator of young cod	Fish with a swim bladder involved in hearing
Saithe	*Pollachius virens*	Unknown	Occurs up to 350 m	Enters coastal waters in spring and returns to deeper waters in winter	Adults feed on other fish, whereas small fish feed primarily on crustaceans	Fish with a swim bladder involved in hearing
Turbot	*Scophthalmus maximus*	Spawning season is April-August	Most common on sandy, rocky or mixed bottoms. Depth range 20-70 m	None reported	Feeds mostly on benthic fish and less on crustaceans and bivalves	Fish with no swim bladder
Brill	*Scophthalmus rhombus*	Spawning occurs in first half of year, varies by location	Live on sandy or mixed bottoms up to 50 m	Adults found more offshore than juveniles	Feed on benthic fish and crustaceans	Data deficient
Dover sole	*Solea solea*	The timing of spawning is related to a temperature threshold	Found on stony bottoms at depths 20-200 m	None reported	Feeds on invertebrates, primarily polychaetes	Fish with no swim bladder
Norway pout	*Trisopterus esmarkii*	Not reported.	Mostly found at depths between 100 and 200 m on and over muddy seabeds.	Migrates for spawning between the Shetland Islands and Norway. Major spawning grounds in Northwest Scotland.	Feeds on planktonic crustaceans, small fish, eggs and larvae.	Possesses swim bladder.
Sandeel spp.	Ammodytidae spp.,	Spawning usually occurs in winter.	Found on and within well oxygenated	Do not partake in migrations.	Feeds on phytoplankton and zooplankton.	Fish with no swim bladder

Common name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
			substrates and buried in sandy sediments.		Sandeel are an umbrella species, essential in the food chain, supporting apex predators such as pinniped seals and seabirds.	
Long rough dab	*Hippoglossoides platessoides*	None reported	Found on soft sediments at depths between 90 and 250 m.	None reported	Feeds on invertebrates and small fish.	Fish with no swim bladder
Halibut	*Hippoglossus hippoglossus*	Spawning occurs between December and April at depths between 300 and 700 m.	Benthic but occasionally pelagic	None reported	Feeds on other fish, cephalopods, crustaceans and other benthic species.	Fish with no swim bladder
Conger eel	*Conger conger*	Individuals spawn once in their lifetime during the summer months in the deep sea at depths between 2,000 and 3,000 m.	Found at depths between 0 m and 1171 m on rocky and sandy bottoms.	Moves to the deep sea to lay eggs.	Feeds on fish, crustaceans and cephalopods.	Fish with a swim bladder involved in hearing
Gurnards	Triglidae spp.	Not reported	Usually found at depths between 15 and 400 m over sand, gravel and rocks.	Not reported	Feeds on benthic crustaceans, invertebrates and benthic fish.	Fish with a swim bladder involved in hearing
Blue ling	*Molva dypterygia*	Not reported	Found at depths between 150 and 1,000 m on muddy bottoms.	Not reported	Feeds on crustaceans and benthic fish.	Possesses swim bladder.

Common name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
Orange roughy	*Hoplostethus atlanticus*	Synchronous annual spawners which form dense spawning aggregations around sea hills and slopes.	Found at depths between 180 and 1809 m at continental slopes, ocean ridges and sea mounts.	Not reported	Feed on prawns, fish, squid and amphipods.	Possesses swim bladder.
Round-nose grenadier	*Coryphaenoides rupestris*	Not reported	Found at depths between 180 and 2600 m,	Not reported	Feeds on fish and invertebrates including pelagic crustaceans.	Possesses swim bladder.

APPENDIX 4D DEMERSAL FISH CONSERVATION INFORMATION

Common Name	Latin Name	IUCN Red List	OSPAR Annex V species	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Atlantic cod	*Gadus morhua*	Vulnerable (Global), Least Concern (Europe)	Yes	Yes	No	No	Yes
Witch flounder	*Glyptocephalus cynoglossus*	Least Concern	No	Yes	No	No	Yes
Megrim	*Lepidorhombus whiffiagonis*	Data deficient (Global and Europe)	Yes	Yes	Yes	No	Yes

Common Name	Latin Name	IUCN Red List	OSPAR Annex V species	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Dab	*Limanda limanda*	Least Concern	No	No	No	No	No
Anglerfish	*Lophius piscatorius*	Least Concern	No	Yes	No	No	Yes
Haddock	*Melanogrammus aeglefinus*	Least Concern	No	No	No	No	No
Whiting	*Merlangius merlangus*	Near Threatened (Global), Vulnerable (Europe)	No	No	No	No	No
European hake	*Merluccius merluccius*	Least Concern	No	Yes	No	No	Yes
Blue Whiting	*Micromesistius poutassou*	Least Concern	No	Yes	No	No	No
Lemon sole	*Microstomus kitt*	Data deficient	No	No	No	No	No
Ling	*Molva molva*	Least Concern	No	No	No	No	No
European flounder	*Platichthys flesus*	Least Concern	No	No	No	No	No
Plaice	*Pleuronectes platessa*	Least Concern	No	No	No	No	No

Common Name	Latin Name	IUCN Red List	OSPAR Annex V species	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Pollock	*Pollachius pollachius*	Least Concern	No	Yes	No	No	Yes
Saithe	*Pollachius virens*	Least Concern	No	No	No	No	No
Turbot	*Scophthalmus maximus*	Least Concern	No	No	No	No	No
Brill	*Scophthalmus rhombus*	Least Concern	No	No	No	No	No
Dover sole	*Solea solea*	Least Concern	No	No	No	No	No
Norway pout	*Trisopterus esmarkii*	Least Concern	No	No	No	No	No
Sandeel spp.	Ammodytidae spp.,	Least Concern	No	Yes	No	No	No
Long rough dab	*Hippoglossoides platessoides*	Endangered	No	No	No	No	No
Halibut	*Hippoglossus hippoglossus*	Endangered	No	Yes	No	No	No
Conger eel	*Conger conger*	Least Concern	No	No	No	No	No
Gurnards	Triglidae spp.	Least Concern	No	No	No	No	No
Blue ling	*Molva dypterygia*	Least Concern (Global),	No	Yes	No	No	No

Common Name	Latin Name	IUCN Red List	OSPAR Annex V species	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
		Vulnerable (Europe)					
Orange roughy	*Hoplostethus atlanticus*	Vulnerable	Yes	Yes	No	No	No
Round-nose grenadier	*Coryphaenoides rupestris*	Critically Endangered	No	Yes	No	No	No

APPENDIX 4E ADDITIONAL PELAGIC FISH ECOLOGICAL INFORMATION

Common Name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
Atlantic herring	*Clupea harengus*	Comes to coastal areas to spawn. Both autumn and winter-spawning stock present	Occupy the water column from surface to 200 m depth	Comes to coastal areas to spawn	Feed mostly on small shrimps and copepods, with occasional filter-feeding	Fish with a swim bladder involved in hearing
Atlantic mackerel	*Scomber scombrus*	Spawning occurs during summer	Widely distributed on coastal shelves up to 200 m depth	Migrate in winter and early spring to spawning areas (inshore); spawn in summer; migration to post-spawning feeding grounds	Filter-feeders on zooplankton, such as small fish and prawns	Data deficient

Common Name	**Latin Name**	**Seasonality**	**Habitat Association**	**Migration**	**Predator-prey relationships**	**Hearing Group**
				and overwinter areas		
European sprat	*Sprattus sprattus*	Spawn throughout the year, though primarily in spring and summer	Occurs in the water column at depths of 10-150 m	Shows strong migrations between winter feeding and summer spawning grounds. Diurnal migrations through the water column	Feeds on planktonic crustaceans	Fish with a swim bladder involved in hearing
Atlantic horse mackerel	*Trachurus trachurus*	Spawning occurs in early spring for the "West stock"	Found on continental shelves (frequently over sandy bottoms) up to 500 m depth	Following spawning the stock migrates north to southern Norway/northern North Sea	Feeds on crustaceans, cephalopods and fish	Data deficient

APPENDIX 4F PELAGIC FISH CONSERVATION INFORMATION

Common Name	Latin Name	IUCN Red List	OSPAR Annex V species	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Atlantic herring	*Clupea harengus*	Least Concern	No	Yes	No	No	Yes
Atlantic mackerel	*Scomber scombrus*	Least Concern	No	Yes	No	No	Yes
European sprat	*Sprattus sprattus*	Least Concern	No	No	No	No	No
Atlantic horse mackerel	*Trachurus trachurus*	Vulnerable (Global), Least Concern (Europe)	No	Yes	No	No	Yes

APPENDIX 4G ADDITIONAL SHELLFISH ECOLOGICAL INFORMATION

Common Name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships
Ocean quahog	*Arctica islandica*	Spawn once per year in summer or autumn months	Sandy sea beds	N/A	Filter feeders, that may act as a source of food for demersal species
Norway lobster	*Nephrops norvegicus*	Spawn in summer and autumn	Inhabits muddy bottoms, in waters 20-800 m deep, though usually 200-600 m	None reported	Nocturnally feeds on detritus, crustaceans and worms

APPENDIX 4H SHELLFISH CONSERVATION INFORMATION

Common Name	Latin Name	IUCN Red List	OSPAR Annex V species	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Ocean quahog	*Arctica islandica*	Not assessed	Yes	No	No	No	No
Norway lobster	*Nephrops norvegicus*	Least Concern	No	No	No	No	No

APPENDIX 4I ADDITIONAL MIGRATORY FISH ECOLOGICAL INFORMATION

Common Name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
Allis shad	*Alosa alosa*	Shad remain in the freshwater environment for a short period, usually a few months. Juveniles migrate downstream in April-May.	A suitable estuarine habitat is likely to be very important for shad, both for passage of adults and as a nursery ground for juveniles.	Shad spend 3-4 years in marine environments, specifically in estuarine areas. They return to freshwater in April-May to spawn.	Shad species feed primarily on plankton as juveniles, and small crustaceans and fish in later life stages.	Fish with a swim bladder involved in hearing
Twaite shad	*Alosa fallax*	Shad remain in the freshwater environment for a short period, usually a few months. Juveniles migrate downstream in April-May.	A suitable estuarine habitat is likely to be very important for shad, both for passage of adults and as a nursery ground for juveniles.	Shad spend 3-4 years in marine environments, specifically in estuarine areas. They return to freshwater in April-May to spawn.	Shad species feed primarily on plankton as juveniles, and small crustaceans and fish in later life stages.	Fish with a swim bladder involved in hearing
European eel	*Anguilla anguilla*	European eels spend most of their life cycle in the freshwater environment. Downstream migration is from	Both juvenile and adult eels are found throughout the water column. Depth selected can vary with time of day; tagged adult	European eel spawn in the Sargasso Sea with larvae drifting to Europe on the Gulf Stream. Following this they morph	European eel diet comprises primarily fish, mollusc and crustaceans whilst in the marine environment.	Fish with a swim bladder involved in hearing

Common Name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
		August to December (as silver eels)	eels swim in shallow warm waters at night and then make a deep dive to 1,000 m where they remain for the day before ascending again. The purpose of the dive may be for predator avoidance.	into glass eels and enter rivers from January-June. After between an average of 5-20 years of freshwater living, they travel back to the Sargasso Sea to spawn and die.	Adults do not feed on migration.	
Sea lamprey	*Petromyzon marinus*	Sea lamprey spend 3-4 years in freshwater environment. Following this, they transit to the open sea, primarily in July-September.	Metamorphosis to the adult form takes place between July and September. The time of the main migration downstream seems to vary from river to river.	Sea lamprey spend 18-24 months in marine waters. Following this, they migrate into freshwater in April-May spawning in May-June.	After metamorphosis and the downstream migration to the sea, the adults feed on fish there. They seem to feed on a wide variety of marine and anadromous fishes, including herring, salmon, cod and haddock.	Fish with no swim bladder

Common Name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
Atlantic salmon	*Salmo salar*	The seasonality of salmon species can vary by population. Spawning usually takes place between November and February. Eggs hatch in spring and with juveniles remaining in a freshwater environment for 1-4 years before entering the marine environment between April and May as smolts. They then remaining at sea for 1-4 years. In the first year at sea Atlantic salmon are known as grilse, becoming multi sea winter (MSW) salmon in subsequent years.	Atlantic salmon spawn in rivers, before migrating to the marine environment as smolt. UK populations are known to migrate north to feed. Post-smolts are thought to remain close to the surface, but they may migrate to deep-sea feeding areas, within the Norwegian Sea and Greenland.	Adults return to the freshwater environment after 1-4 years in the marine environment. During migration adults tend to remain at water depths of between 13 m and 118 m, averaging 64 m. Natal river migration peaks in late summer early autumn. Prior to upriver migration salmon spend time in brackish waters. Following the transition to freshwater adult salmon largely stop feeding, instead relying on fat reserves.	It has been hypothesised that deep dives to up to 280 m are related to feeding or predator avoidance. Based on work undertaken by Malcom et at., 2010[1], gut content analysis suggest that adult fish are often still feeding, particularly early in the year.	Fish with a swim bladder not involved in hearing

Common Name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
Brown/sea trout	*Salmo trutta*	Trout spend 1-3 years in the freshwater environment. They migrate downstream in spring/early summer (both as post-smolts and as adults).	Brown trout that migrate to and are present in the marine environment can be either post-smolts, when they are in the marine environment for the first time, or post-spawned returning adults.	Trout usually spend 1 or 2 years at sea, in coastal areas. They migrate to freshwater environments in April-June.	Brown trout in the marine environment are known as sea trout. Some post-smolts return to fresh water relatively quickly after migration to sea. There is considerable uncertainty as to the movement of sea trout after the initial few months in the marine environment. Whilst in the marine environment sea trout spend most of their time in the upper 5 m, though dives of up to 30 m are also recorded.	Fish with a swim bladder not involved in hearing

Common Name	Latin Name	Seasonality	Habitat Association	Migration	Predator-prey relationships	Hearing Group
European sea sturgeon	*Acipenser sturio*	Often enters the sea during their first summer. Males spawn every 2 years whereas females spawn every 3 – 4 years.	Present in littoral zones on substrates including rocks and sad	Migrates from rivers to the sea during their first summer and returns to freshwater environments for reproduction then returns back to the sea.	Feeds on crustaceans, molluscs, worms and small fish species.	Fish with a swim bladder not involved in hearing

APPENDIX 4J MIGRATORY FISH CONSERVATION INFORMATION

Common Name	Latin Name	IUCN Red List	OSPAR Annex V species	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Allis shad	*Alosa alosa*	Least Concern	Yes	No	Yes	Yes	Yes
Twaite shad	*Alosa fallax*	Least Concern	No	No	Yes	Yes	No
European eel	*Anguilla anguilla*	Critically Endangered (Global and Europe)	No	No	No	No	Yes

Common Name	Latin Name	IUCN Red List	OSPAR Annex V species	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Sea lamprey	*Petromyzon marinus*	Least Concern	Yes	No	No	Yes	No
Atlantic salmon	*Salmo salar*	Least Concern	Yes	No	No	Yes	Yes
Brown/sea trout	*Salmo trutta*	Least Concern	No	No	No	No	No
European sea sturgeon	*Acipenser sturio*	Critically Endangered	Yes	No	Yes	No	No

APPENDIX 5 NAVIGATIONAL RISK ASSESSMENT

AURORA PROJECT

Navigation Risk Assessment

ERM

Document No: 24-NASH-0523 | R03-00

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

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

EXECUTIVE SUMMARY

A Navigation Risk Assessment (NRA) has been undertaken in line with International Maritime Organisation's (IMO) Formal Safety Assessment (FSA) methodology for the section of the proposed Aurora Project fibre optic cable which passes within the United Kingdom (UK) territorial seas (TS). The objectives of the NRA were to:

- Provide an overview of the existing marine activities in proximity to the section of cable route;
- Consider the future vessel traffic levels in proximity to the section of cable route;
- Identify key impacts/hazards associated with the section of subsea cable;
- 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 cross the Study Area. Two of these routes are ferry routes operated by NorthLink Ferries between the Shetland Islands and Orkney/Aberdeen. Other vessel activity was mainly recorded within the west of the Study Area, to the north and south of the Aurora Project within UK TS.

Fishing activity within the Study Area mainly comprised of vessels using demersal gears. Most of the activity was observed within the east of the Study Area. Lower fishing activity was observed within the west of the Study Area. Recreational activity was generally low across the Study Area, with one route crossing the Study Area between the Shetland Islands and Fair Isle.

Based on the existing activities in proximity to the cable route, seven impacts on shipping and navigation were included in the assessment. The majority of these impacts were associated with the installation phase of the Aurora Project within UK TS, including interactions and risks associated with the cable layer. 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 16 hazards were identified. 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
EEZ	Exclusive Economic Zone
EMODNet	European Marine Observation and Data Network
ERCoP	Emergency Response Co-operation Plan
FSA	Formal Safety Assessment
GT	Gross Tonnes
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
Nm	Nautical Mile
NtM	Notice to Mariners
NRA	Navigation Risk Assessment
OREI	Offshore Renewable Energy Installation
PIANC	World Association for Waterborne Transport Infrastructure
PLB	Post-Lay Burial
PLGR	Pre-Lay Grapnel Run
PLI	Post-Lay Inspection
PRIB	Post-Repair Inspection And Burial

Abbreviation	Detail
RNLI	Royal National Lifeboat Institute
RoRo	Roll-on Roll-off
ROV	Remotely Operated Vehicle
SAR	Search and Rescue
SIRA	Simplified IALA Risk Assessment method
SOLAS	Safety of Life at Sea
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
TS	Territorial Seas
UK	United Kingdom
UNCLOS	United Nations Convention on the Law of the Sea
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 the proposed construction and operational phases of the Aurora fibre optic telecommunication cable (the Aurora Project).

The total estimated length of Aurora Project is approximately 7,230 kilometres (km), connecting landings at Manasquan in the United States and Blaabjerg 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 portion of cable passing within the UK TS between Orkney and the Shetland Isles, which measures approximately 43 km in length.

1.2 OBJECTIVES

The NRA has been undertaken for the Aurora Project (within UK TS) 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 Aurora Project on shipping and navigation;
- Identify and assess potential cumulative and in-combination effects;
- Undertake an NRA that identifies and assesses hazards during construction, 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 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 MCA's 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. Annex 4 provides hydrography guidelines, whilst Annex 5 contains guidance on requirements, guidance and operational considerations for search and rescue and emergency response.

Additional guidance used to inform the NRA include the Maritime and Coastguard Agency's (MCA) Marine Guidance Note (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 5.3**. 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 4.3**. 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 4.3**. 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 MSC-MEPC.2/Circ.12/Rev.2. 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 all identified impacts of the Aurora Project (within the UK TS) 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.**

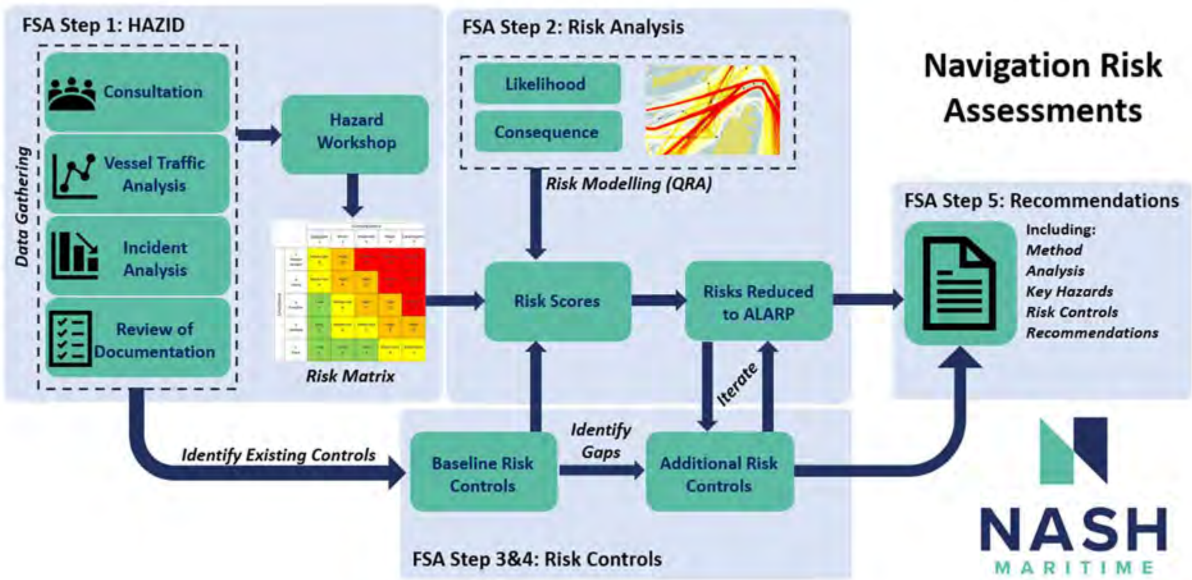

Figure 1: NRA Methodology.

3.2 SHIPPING AND NAVIGATION STUDY AREA

The shipping and navigation study area (hereafter referred to as the Study Area) is shown in **Figure 2** and comprises an area of 5 nm surrounding the Aurora Project within UK TS. This Study Area has been used within the NRA to assess shipping patterns in proximity to the Project. The proposed shipping and navigation Study is consistent with industry best practice for NRAs.

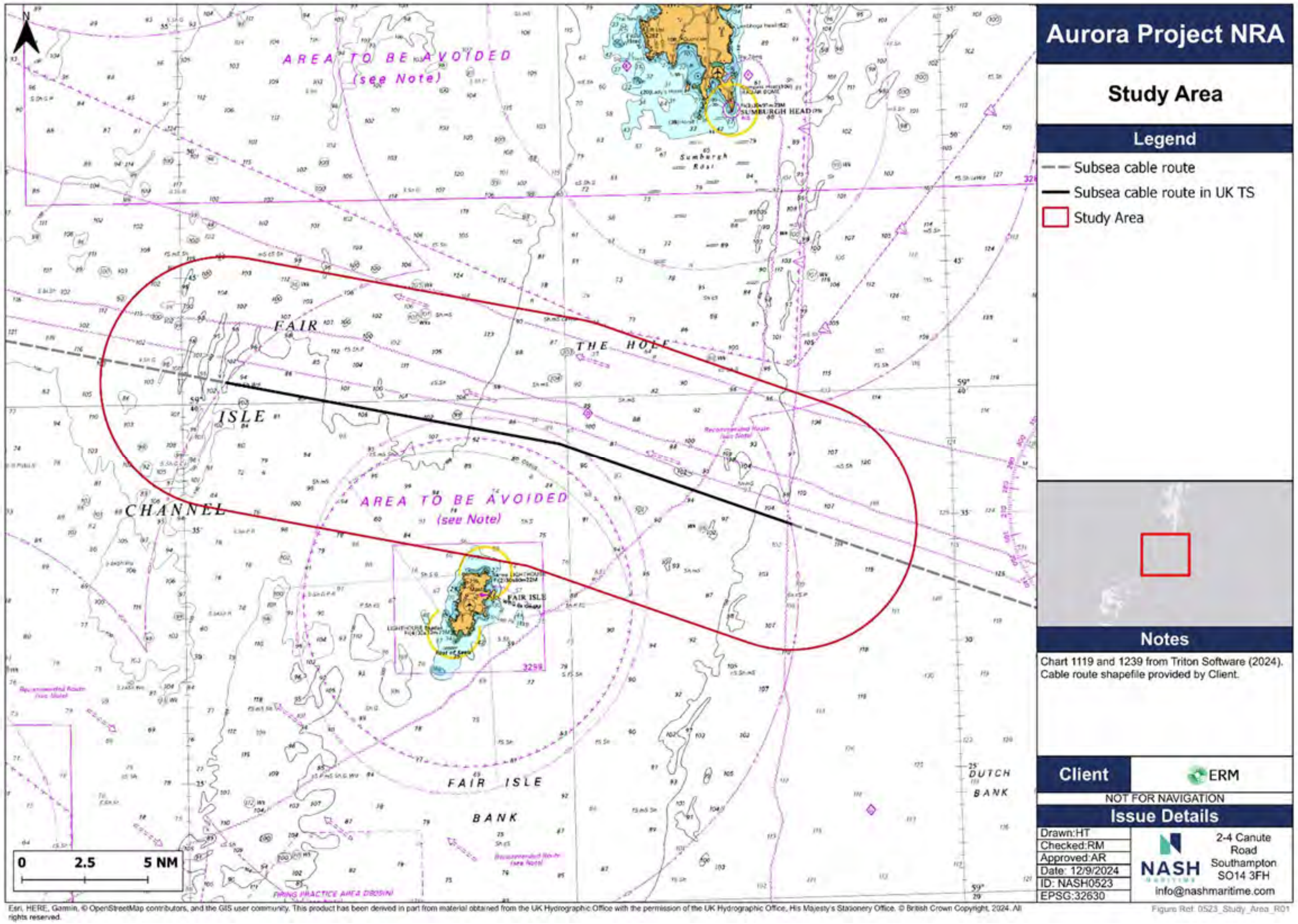

Figure 2: Study Area.

3.3 IALA RISK MANAGEMENT TOOLS

IALAs 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 NRA to help in the identification and assessment of risk. A consultation letter was sent to stakeholders on 30 August 2024. The letter was sent to the following recipients:

- Maritime and Coastguard Agency (MCA);
- Northern Lighthouse Board (NLB);
- UK Chamber of Shipping;
- Royal Yachting Association (RYA);
- NorthLink Ferries;
- Cruising Association; and
- Scottish Fishermen's Federation.

Responses were received from the NLB and the MCA, as presented in **Table 4**.

Table 3: Consultation Responses

Consultee	Response	Where addressed
NLB	We do not anticipate the proposed subsea cable to have an impact on our operations or activities during either the installation, operation or decommissioning phases. We do not foresee the subsea cable to be an undue hazard to navigation and note the mitigation measures including Notices to Mariners and chart updates. The installation (and decommissioning) phases will have the highest impact on shipping and navigation, however, with the proposed mitigation measures this should be manageable.	N/A
MCA	We note a Navigation Risk Assessment (NRA) will be undertaken for this project and the MCA will have an interest in the NRA conclusions and recommendations. The MCA would expect local consultation with marine users on the proposed works. The NRA should include a baseline study which will summarise the available background navigation data and focus on any key shipping routes and/or anchorage/disposal areas and fishing activity in the vicinity of the project. With supporting marine traffic surveys, the NRA should establish how the phases of the project are managed to a point where risk is reduced and considered to be 'as low as reasonably practicable' (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. We would like to point you in the direction of the International Maritime Organization (IMO) Formal Safety Assessment (FSA) methodology, which is the internationally recognised approach for assessing the impact to shipping and navigation users.	An NRA has been undertaken in line with the IMO's FSA (see **Section 3.3**) and is in **Section 9**. All risks were assessed as Low Risk – Broadly Acceptable, therefore all risks are considered to be ALARP (see **Section 9.5)**. The NRA has been informed by consultation (**Section 3.4.1**) and a review of navigational features (**Section 5.1**). the NRA has also been supported by vessel traffic survey using a dataset containing 12 months of recent AIS data (**Section 6.2**). The range of potential impacts on shipping and navigation users has been identified (see **Section 8**).
	We expect the area will carry a significant amount of through traffic to major ports with a number of important international shipping routes in close proximity, and a significant amount of other marine users e.g. offshore windfarms, dredging sites, ports, and crossing interconnector cables. Attention needs to be paid to changes in vessel routing, particularly in heavy weather ensuring shipping can continue to make safe passage without large-scale deviations, and any reduction in navigable depth referenced to chart datum.	A vessel analysis has been undertaken in **Section 6.2** including an identification of key shipping routes. Consideration has been given to changes in vessel routeing and it is not anticipated that these changes will make any vessel passages unsafe (see **Section 8.1** and **8.2**). It was determined that there are no impacts on heavy weather routes or reduction in navigable depth anticipated as a result of the Aurora Project.
	Cable Burial Risk Assessment (CBRA) should define the minimum depth that the cables must be buried to protect them from external influences (e.g., dropped anchors, fishing gear interaction). If cable protection measures are required e.g., rock bags or concrete mattresses, the MCA would be willing to accept a 5% reduction in	**Section 8.6** presents the impact assessment for reduction in under keel clearance. It is not anticipated that cable protection would be greater than 5%

Consultee	Response	Where addressed
	surrounding depths referenced to Chart Datum. Where this is not achievable, the applicant must discuss further with the MCA.	reduction in chart datum due to the range of water depths along the cable route within UK TS.
	The MCA would welcome any survey data being submitted as third-party data to the UK Hydrographic Office (UKHO) for the update of nautical charts and publications to improve safety. Further information can be found in MGN 654 Annex 4 supporting document titled ‘Hydrographic Guidelines for Offshore Developers’, available on our website: https://www.gov.uk/guidance/offshore-renewable-energy-installations-impact-on-shipping . We would like to highlight the need to provide the data in either GSF or CARIS format and that Total Vertical and Horizontal Uncertainty (TVU & THU) calculations are provided.	Relevant embedded mitigation (including promulgation of information, marking and charting, and surveys) is listed in **Section 4.3**.
	Please do keep the MCA posted (via navigationsafety@mcga.gov.uk) on any further consultation as this project progresses through the consenting process. You will also need to inform / consult any relevant port or harbour authorities within proximity of the proposed cable route and they have jurisdiction and responsibilities for safe navigation within their waters.	The MCA will be kept up to date, and consultation with relevant port and harbour authorities in proximity to the Aurora Project will be undertaken throughout the planning and consenting process.

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 2023;
- Marine Management Organisation (MMO) fishing Vessel Monitoring System (VMS) data 2020;
- 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 (1991-2022); 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 and 1239 (2024);
- Global Fishing Watch anchorage database; and
- Admiralty Sailing Directions: NP52 (2022).

4. PROJECT OVERVIEW

4.1 INSTALLATION

Route clearance will be undertaken for the Aurora Project prior to installation, in areas where out of service subsea cables are present. No such areas have been identified for the section of the Aurora Project within the UK TS.

A pre-lay grapnel run (PLGR) will be carried out immediately prior to installation, at all points along the route where burial is planned. This is intended to clear seabed surface debris such as wires, hawsers, discarded fishing gear which may be in the path of the subsea cable. The grapnel activity will not be conducted in rocky areas where no subsea cable burial is feasible, or where in-service subsea cables are crossed by the Aurora Project.

The subsea cable will be installed from a purpose-built installation vessel equipped with a towed sea plough, along with a mobile remotely operated vehicle (ROV) and/or diver capability. The exact installation vessel has not yet been identified. The vessel will be entirely self-sufficient for the duration of the installation operations. In water depths of less than 1,000 metres (m) the installation vessel will simultaneously lay and bury the subsea cable to a target depth of 2.0 m, where feasible, using a plough.

The average ploughing installation speed would be 0.3 knots (14.4 km per day). The rate may be amended to suit the topography of the seabed or any operational complexity. Based on this speed, it is anticipated that the section of the Aurora Project within UK TS can be installed in approximately 11 days (three days for route clearance and PLGR, five days for main subsea cable installation and three days for post-lay inspection (PLI) and post-lay burial (PLB).

PLI may be carried out following the main ploughing installation to verify the subsea cable burial condition. The subsea cable on the seabed would be inspected using an ROV with on-board cameras and detectors to identify anomalies and areas that may require further burial and to measure burial depth. The ROV may also be used to carry out subsea cable burial in places where the plough was not suitable to be used, for example 500 m either side of a pipeline, or if unplanned plough skips were required during installation. During PLB, a tracked ROV will use seawater jetting tools to bury the subsea cable. A narrow trench approximately 0.2 m wide will be created for the subsea cable to lie in, with a target burial depth of 2.0 m

4.2 OPERATION AND MAINTENANCE

The subsea cable is intended to operate with no regular maintenance throughout the projected 25-year lifespan. However, should a problem be detected, analysis may conclude that repair of the subsea cable is required to replace a damaged or faulty portion. A repair vessel would be deployed and an ROV or electrodes used to determine the location of the fault. Once located, the subsea cable would be retrieved to the vessel by grapnels and then cut. The cut section will be recovered on board the repair vessel and retained for disposal when onshore.

Following testing, the faulty portion of the subsea cable would be removed, and a new cable segment joined to one end of the subsea cable. The two ends of the subsea cable would be re-joined and then lowered back into position on the seabed. If necessary, post-repair inspection and burial (PRIB) may be carried out following any subsea cable repairs to bury the repaired cable.

4.3 EMBEDDED MITIGATION

Embedded mitigations during the Aurora Project installation and maintenance activities within the UK TS are presented in **Table 4**.

Table 4: Embedded Mitigation for the Aurora Project within UK TS.

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 United Kingdom Hydrographic Office (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.
Cable burial	The cable will be buried where feasible to a target depth of 2 m, to avoid interaction with fishing gear and vessel anchors.
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.
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.
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.
Guard Vessels	Guard vessels may be used to ensure adherence with advisory safe passing distances to mitigate impacts which pose a risk to surface navigation.
Surveys	As part of the installation activities, post-lay inspection and burial will be undertaken.

5. DESCRIPTION OF THE MARINE ENVIRONMENT

5.1 NAVIGATIONAL FEATURES AND EXISTING INFRASTRUCTURE

The key navigational features identified in the vicinity of the Study Area are presented in **Figure 3**. 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 just outside of the Study Area, is the primary harbour on Fair Isle and is used predominantly by fishing vessels and ferries. North Haven is located 7.3 nm south of the Aurora Project within UK TS.

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 Area. The Admiralty Sailing Directions indicate that vessels may anchor at North Haven pier. This anchorage lies in a depth of 4m with a seabed of rocks and stones, and is suitable only for small vessels.

5.1.3 Subsea Infrastructure

Five subsea cables are located within the Study Area, the closest of which passes 0.6 nm north of the section of Aurora Project within UK TS. The Shetland HVDC link was installed during 2023/2024 and became fully commissioned in August 2024. Nautical charts have not been updated to reflect this yet. The Shetland HVDC link crossed the Aurora Project within UK TS.

5.1.4 Practice and Exercise Areas

There is a firing practice area 16 nm south of the Aurora Project within UK TS.

5.1.5 IMO Features, Routeing Measures and Reporting Schemes

There are three areas to be avoided in proximity to the section of Aurora Project within UK TS. One of these is around the Shetland Islands, whilst the others are located around Fair Isle and the Orkney Islands. The closest is around Fair Isle, 0.3 nm south.

- **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 5000 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 5000 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 Other Navigational Features

There is an area of caution 6 nm north of the section of Aurora Project within UK TS, related to shipping movements. 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.

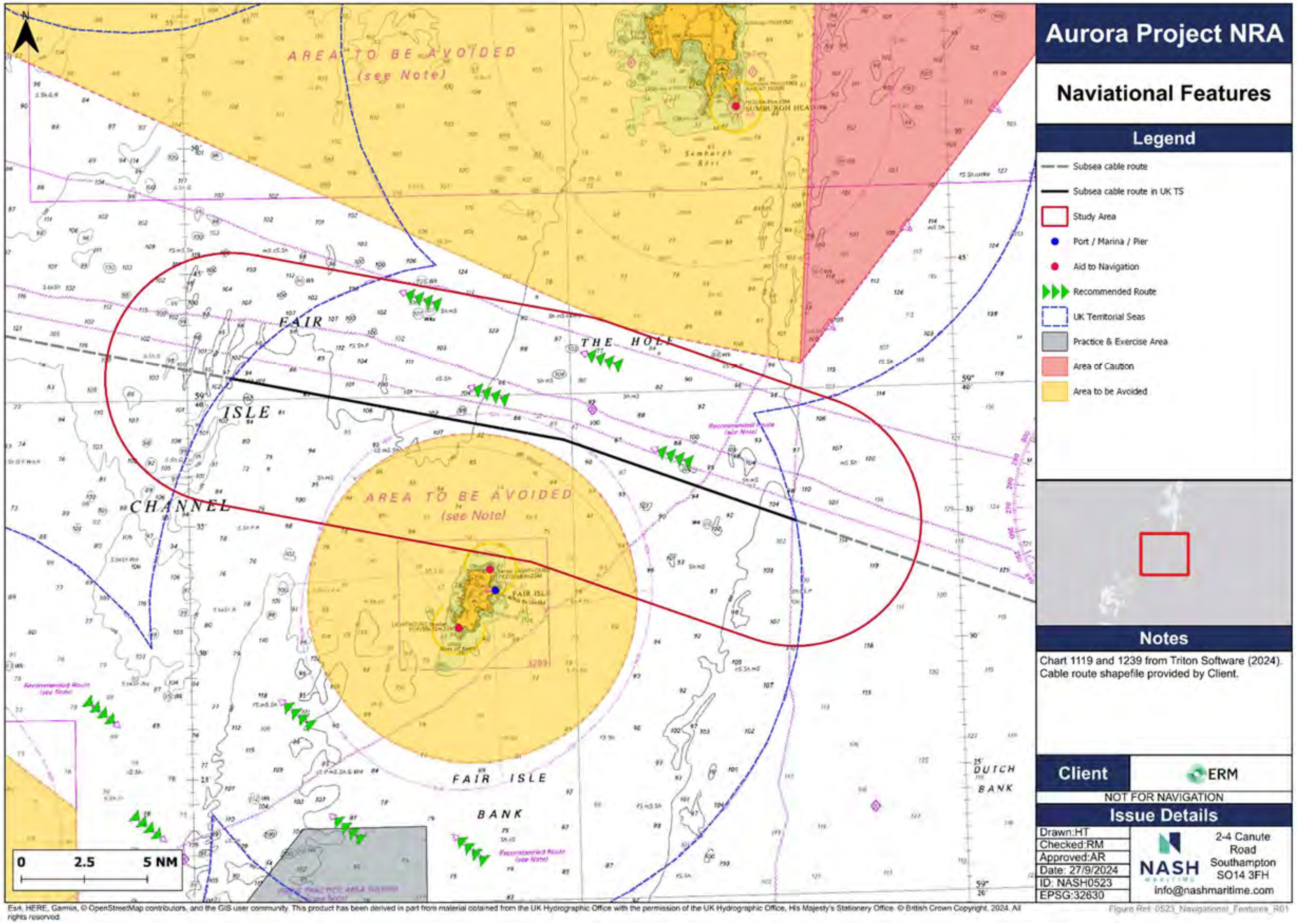

Figure 3: Navigational Features.

5.2 METOCEAN DATA

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

5.2.1 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%.

5.2.2 Tide

Tidal information is displayed on nautical charts for each point marked with a tidal diamond. Tidal diamond D is the closest to the section of Aurora Project within UK TS, the details of which are displayed in **Table 5**. The tidal patterns generally move in an east/west direction at relatively low speeds.

Table 5: Tidal Data for Tidal Diamond D (chart 1119).

Hours		Direction	Rate at Spring tide	Rate at Neap tide
Before High Water	6	306	2.3	0.9
	5	313	1.4	0.6
	4	015	0.8	0.3
	3	070	1.1	0.4
	2	095	1.8	0.7
	1	111	2.4	1.0
High Water		123	2.3	0.9
After High Water	1	142	1.7	0.7
	2	190	1.0	0.4
	3	245	1.1	0.4
	4	278	1.7	0.7
	5	295	2.1	0.8
	6	302	2.4	1.0

5.2.3 Visibility

In proximity to Fair Isle, fog affects visibility approximately 51 days per year.

5.3 EMERGENCY RESPONSE RESOURCES

The closest search and rescue (SAR) helicopter base to the section of the Aurora Project within the UK TS is located at Sumburgh, located 15.9 nm north. The closest RNLI station is at Lerwick, located 33 nm from section of cable. Other nearby RNLI stations include Aith, Kirkwall, Stromness and Longhope. Lerwick RNLI station utilise a Severn class all-weather lifeboat.

6. EXISTING MARITIME ACTIVITIES

6.1 INTRODUCTION

A description of existing marine activities in the Study Area is presented based on 2023 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 has been highlighted where relevant in each section.

6.2 VESSEL TRAFFIC ANALYSIS

6.2.1 Overview

Annualised vessel traffic density is presented in **Figure 4**, which presents the number of vessel transits through each grid cell during 2023, shows the following:

- Two high density routes were observed crossing the Aurora Project within UK TS to and from the Shetland Islands;
- A medium-high density route was observed between Fair Isle and the Shetland Islands;
- Medium density route observed within the north of the Study Area, crossing the high density routes to and from the Shetland Islands; and
- Hotspots were observed within the west of the Study Area associated with the installation of the Shetland HVDC link.

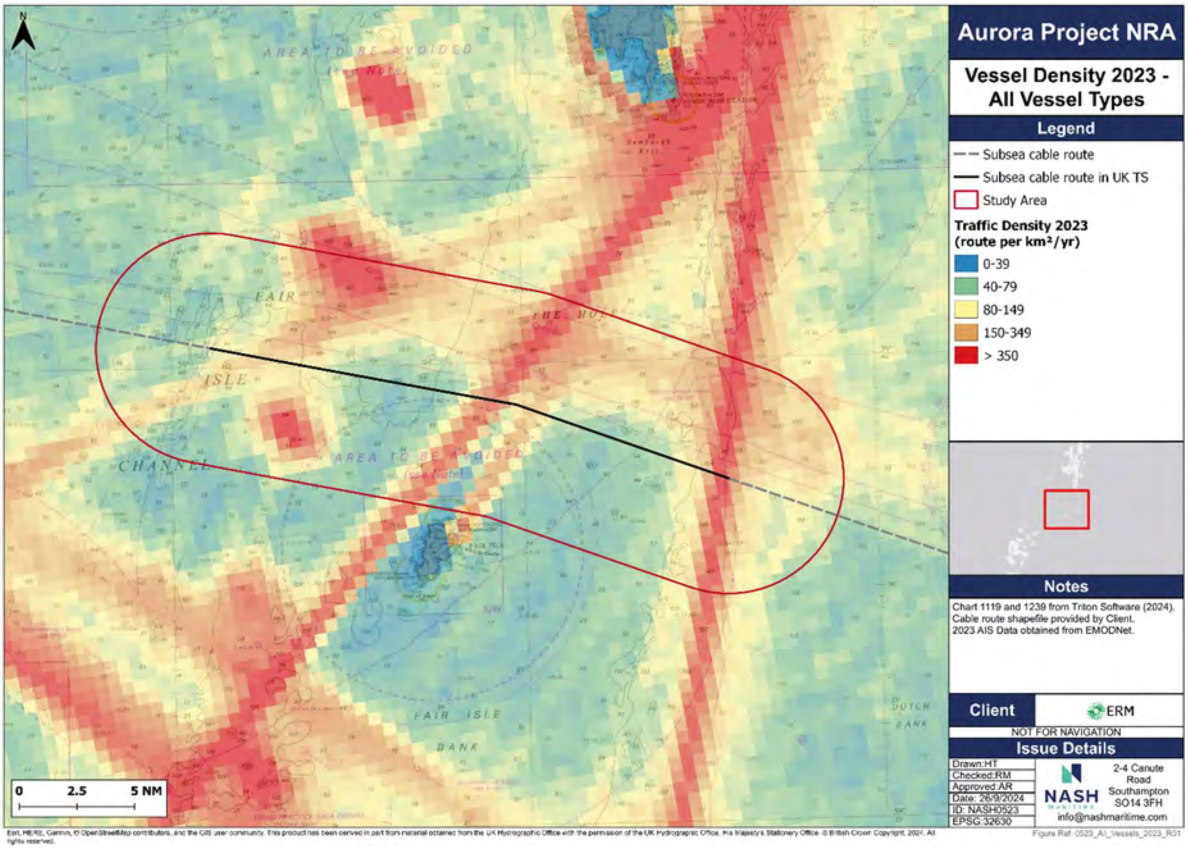

Figure 4: Vessels Density 2023 (All Vessel Types).

6.2.2 Cargo Vessels

The vessel density heat map for cargo vessels in 2023 is presented in **Figure 5**. Three distinct routes were observed crossing the Aurora Project within UK TS to and from the Shetland Islands, the busiest of which was recorded within the east of the Study Area. The busiest route had approximately 250 vessel transits in 2023.

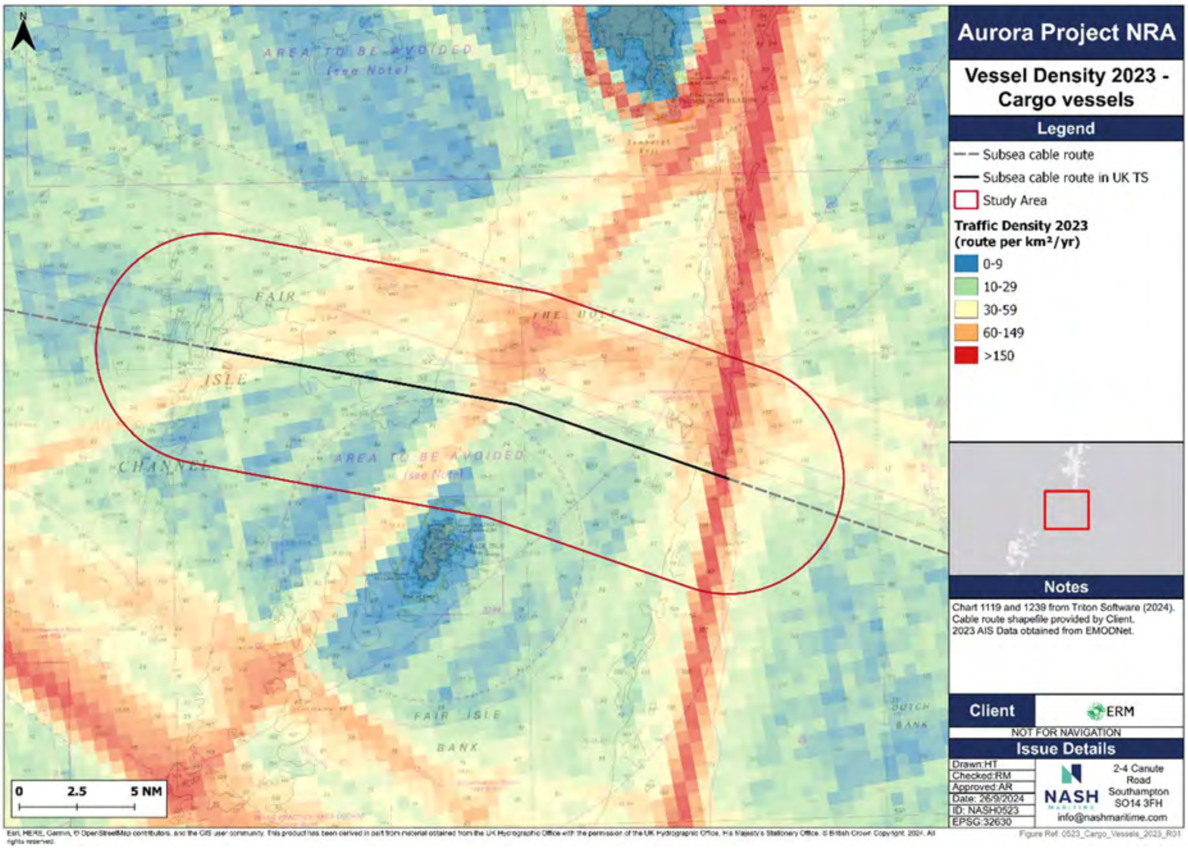

Figure 5: Vessel Density 2023 (Cargo Vessels).

6.2.3 Tankers

The vessel density heat map for tankers in 2023 is presented in **Figure 6**. Two main tanker routes were observed passing southeast of the Study Area. A medium density tanker route was observed passing within the east of the Study Area, as well as within the north of the Study Area. Approximately 120 vessels transited this route in 2023.

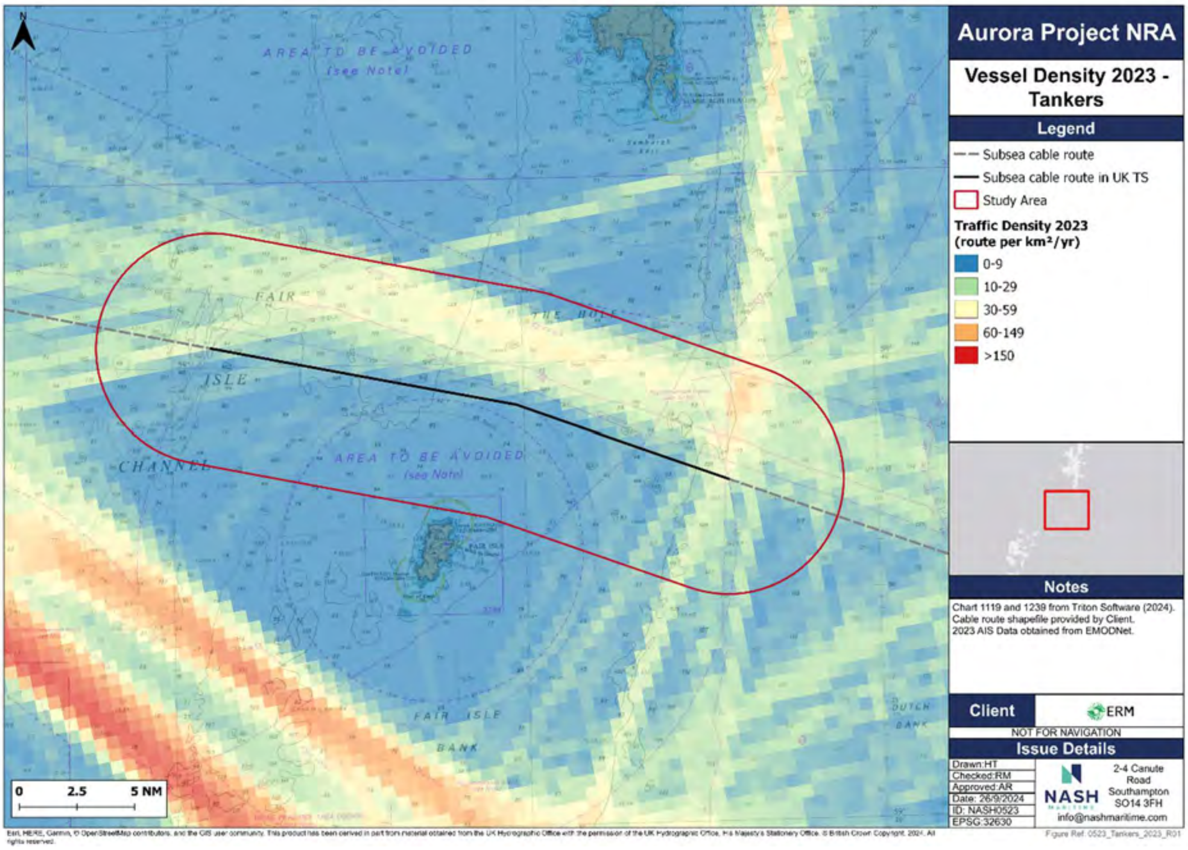

Figure 6: Vessel Density 2023 (Tankers).

6.2.4 Passenger Vessels

The vessel density heat map for passenger vessels in 2023 is presented in **Figure 7**. Three high density routes were observed passing through the Study Area. One route is a ferry route operated between Fair Isle and the Shetland Islands. The other two are ferry routes between the Shetland Islands and Orkney/Aberdeen, 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 6**.

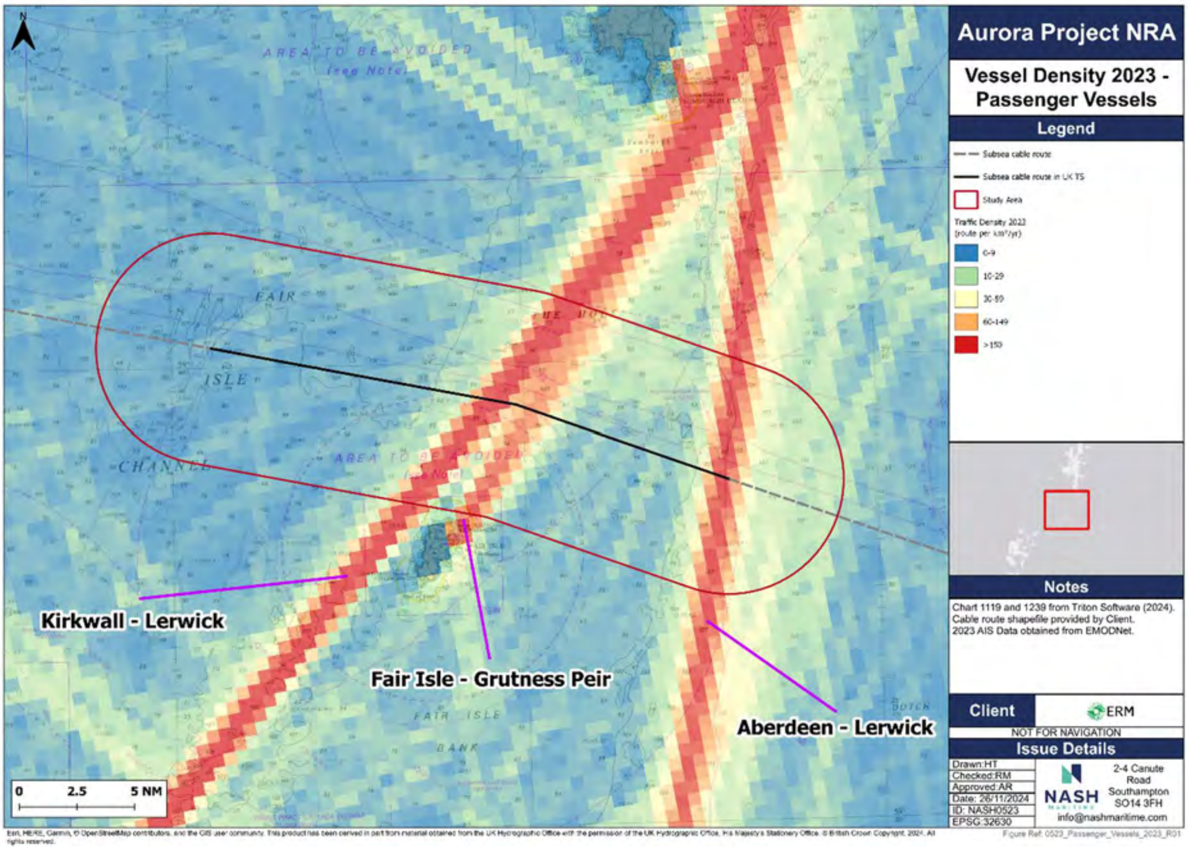

Figure 7: Vessel Density 2023 (Passenger Vessels).

Table 6: Ferry Crossings based on 2024 Timetable.

Operator	Timetable	Route	Crossings per week
NorthLink	1 Apr– 31 Oct	Aberdeen-Lerwick	7
		Kirkwall-Lerwick	7
	1 Nov – 31 Mar	Aberdeen-Lerwick	9
		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 (2019) is presented in **Figure 8**. Recreational vessel activity was generally low throughout the Study Area, however a medium density route was observed between the Shetland Islands and Fair Isle. It is noted that recreational activity may be underrepresented due to AIS broadcasting requirements mandated for vessels over 15 m in length only.

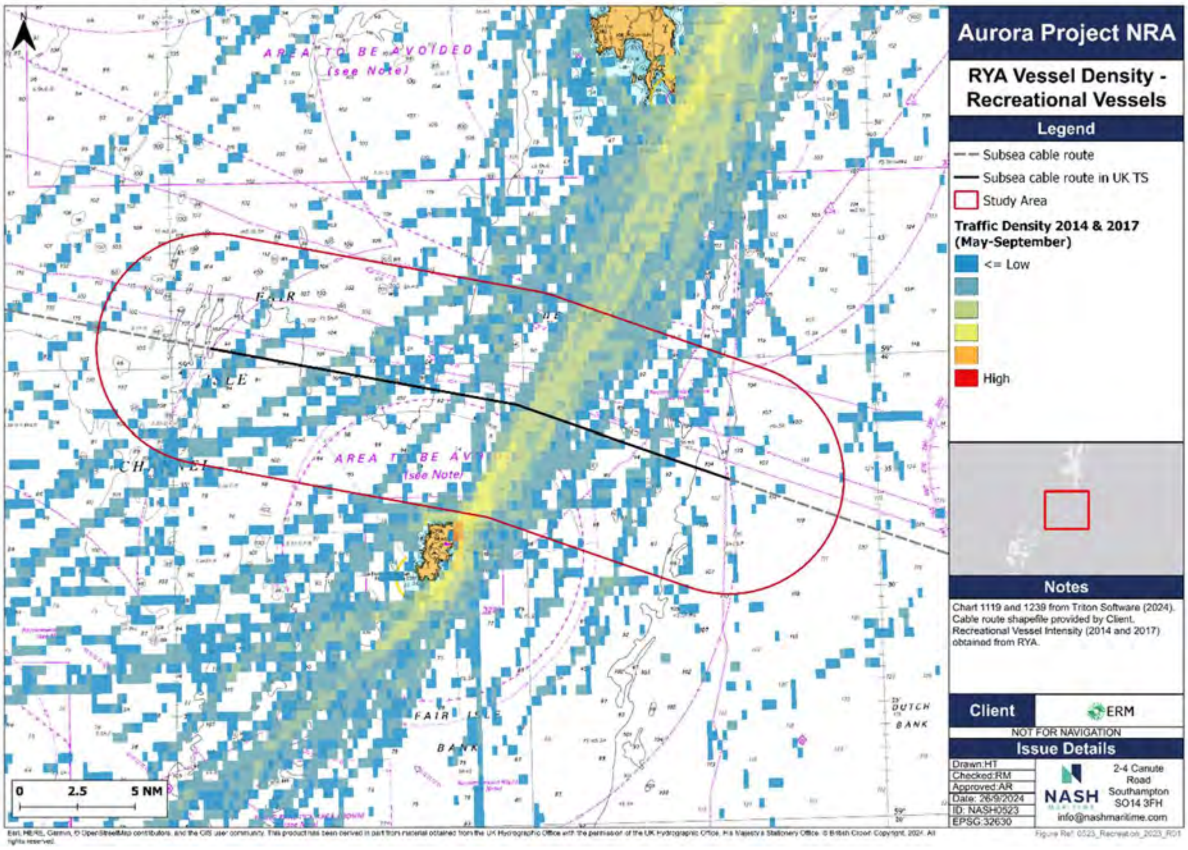

Figure 8: Vessel Density 2014 and 2017 (Recreational Vessels).

6.2.6 Fishing Vessels

The AIS vessel density heat map for fishing vessels in 2023 is presented in **Figure 9**. One fishing vessel route was observed crossing within the west of the Study Area. Approximately 120 vessels transited this route in 2023.Within the Study Area itself, three areas of medium-high density fishing activity were observed. Some high density hotspots were observed north and south outside of the Study Area, however it is likely that these were vessels undertaking guard vessel activities for the Shetland HVDC link.

The vessel density of fishing vessels within the MMO VMS dataset for 2020 is presented in **Figure 10**. This generally aligns with the 2023 heat map which showed fishing activity predominantly in the east of the Study Area and some less dense activity within the west of the Study Area. The VMS data showed that for the cells intersecting the Study Area, 95% of vessels recorded used demersal gears, particularly bottom otter trawls, pair trawls, otter twin trawls and Scottish seines.

It is noted that fishing activity may be underrepresented due to AIS broadcasting requirements mandated for vessels over 15 m in length only. The VMS data also shows data only for those vessels over 15 m in length.

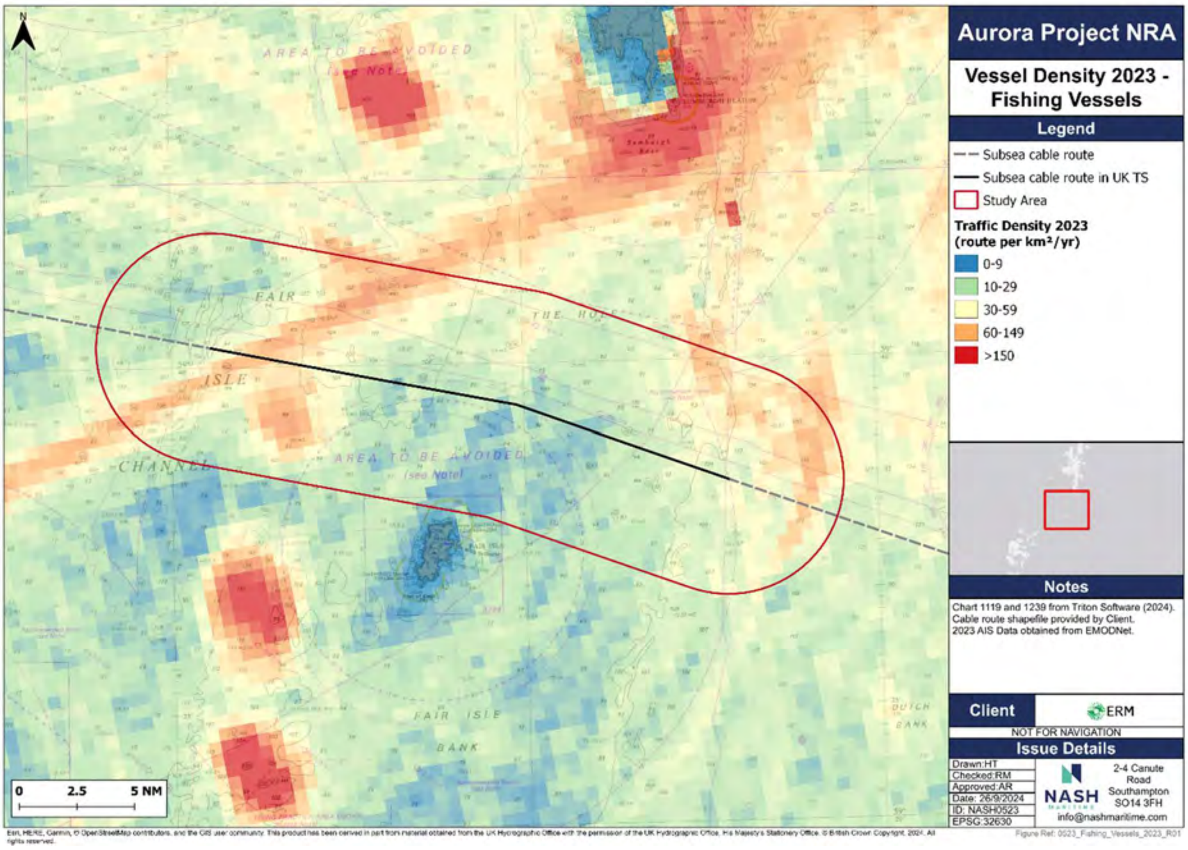

Figure 9: Vessel Density 2023 (Fishing Vessels).

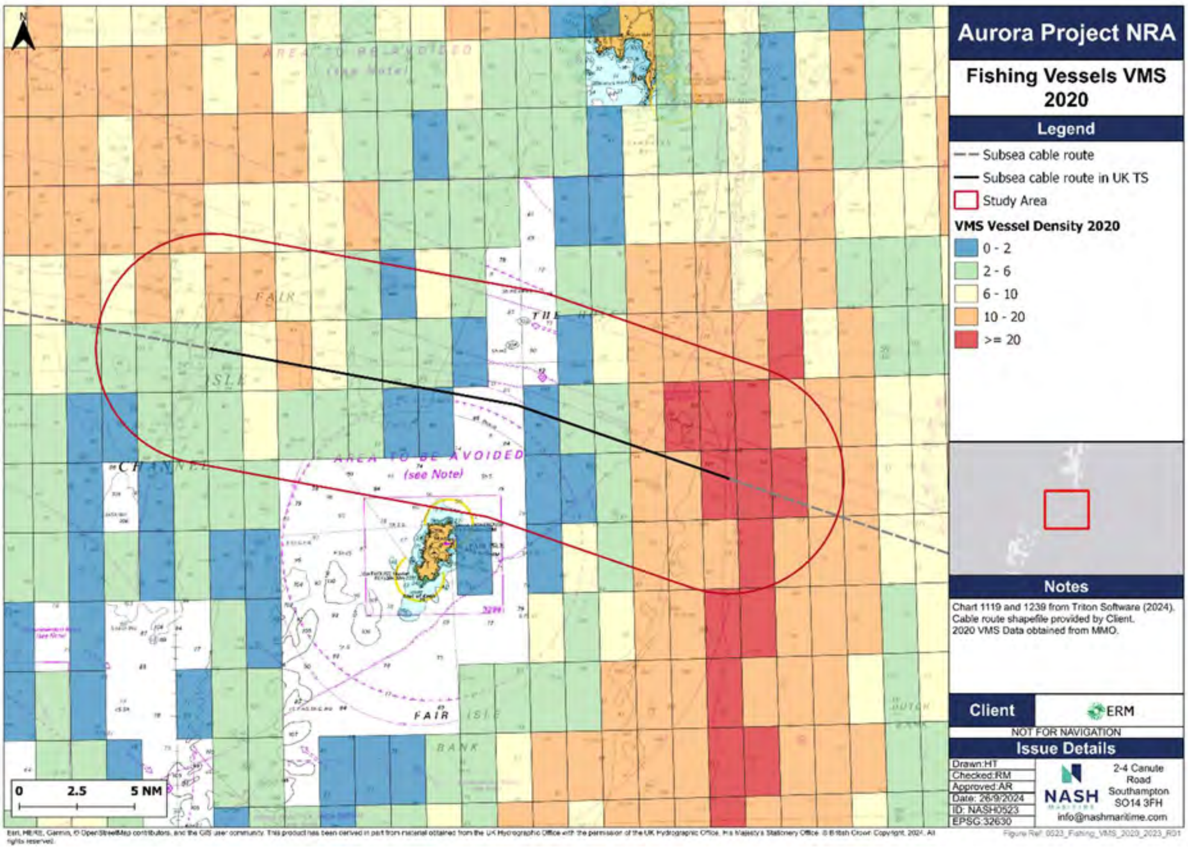

Figure 10: Fishing Vessel VMS Density (2020).

6.2.7 Other Vessels

The vessel density heat map for other vessels in 2023 is presented in **Figure 11**. 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 Area in general. Two high density hotspots of activity were observed within the west of the Study Area, associated with the installation activities for the Shetland HVDC link.

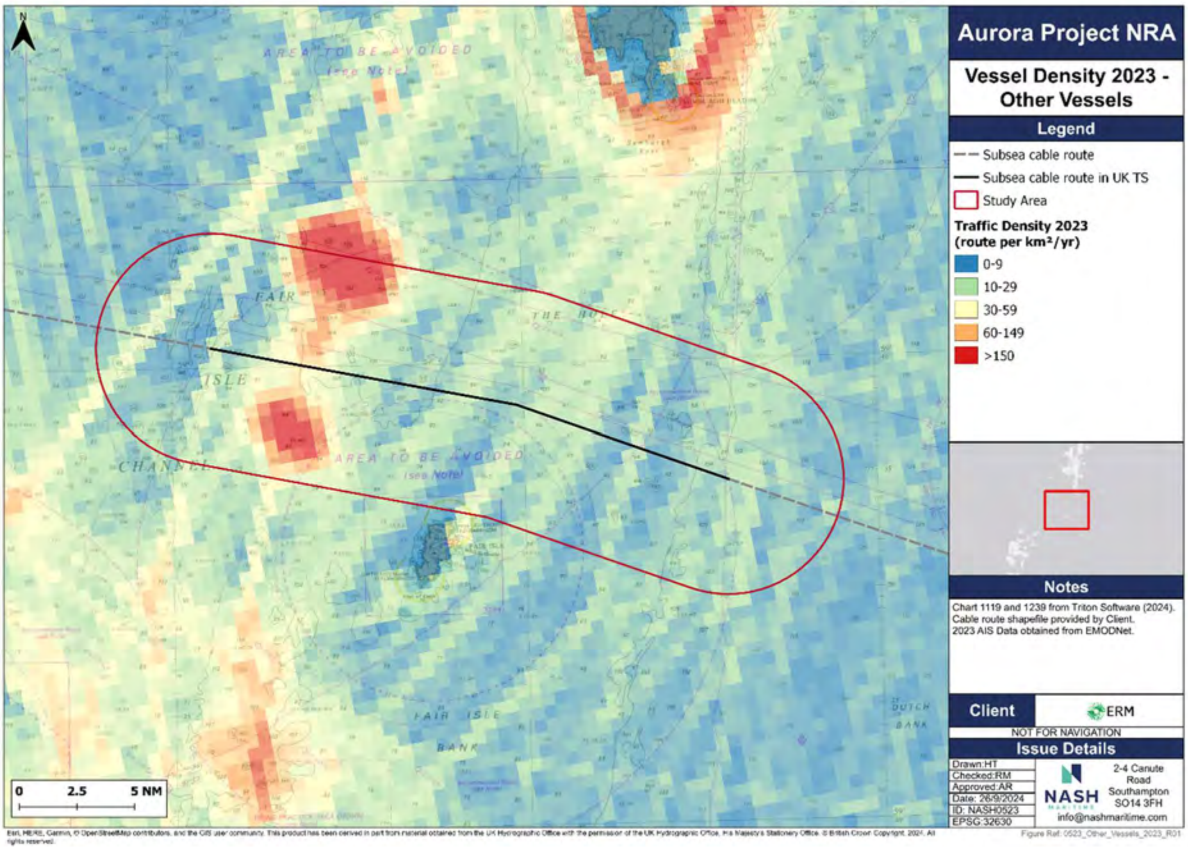

Figure 11: Vessel Density 2023 (Other Vessels).

6.3 HISTORICAL MARITIME INCIDENTS

Maritime incidents recorded in the Study Area between the MAIB (1991-2022) 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 12**. The majority of incidents were recorded close to shore and around Fair Isle and the south of the Shetland Islands. A total of 10 incidents took place within the Study Area, which are summarised in **Table 7**.

The most frequent incident category from the MAIB and RNLI data within the Study Area was personal injury and the most common vessel type involved in incidents was fishing. There were no instances of collision within the Study Area.

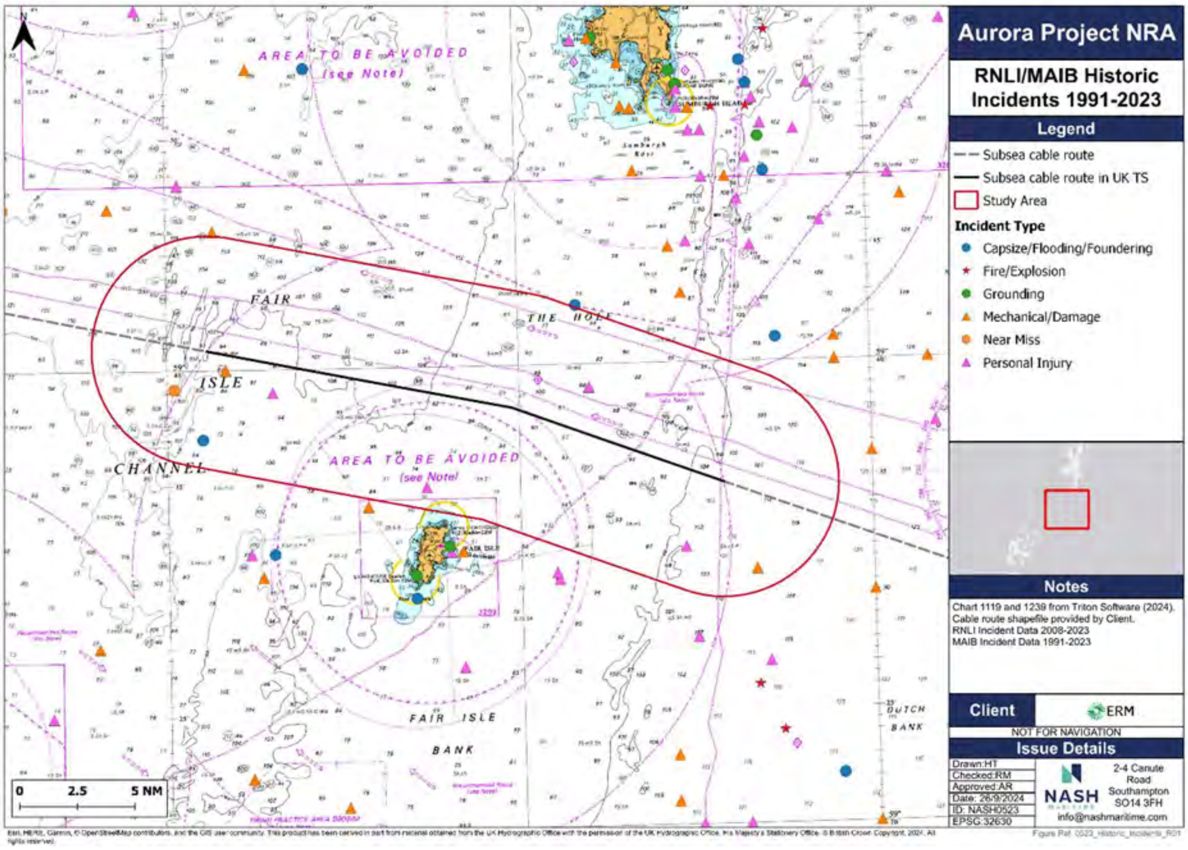

Figure 12: MAIB and RNLI Historical Incidents (1991-2023).

Table 7: MAIB and RNLI Incidents within the Study Area (1991-2023).

Incident Type	Vessel Type	Year of Occurrence
Mechanical/Damage	Fishing	1992
Personal Injury	Fishing	1994
Capsize/Flooding/Foundering	Fishing	1996
Mechanical/Damage	Fishing	1998
Personal Injury	Passenger	2006
Personal Injury	Cargo	2008
Mechanical/Damage	Passenger	2009
Personal Injury	Fishing	2010
Personal Injury	Fishing	2013
Near Miss	Passenger	2020

7. FUTURE TRAFFIC BASELINE

7.1 INTRODUCTION

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

7.2 COMMERCIAL TRAFFIC

DfT data on UK port trade is presented in **Figure 13** 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.

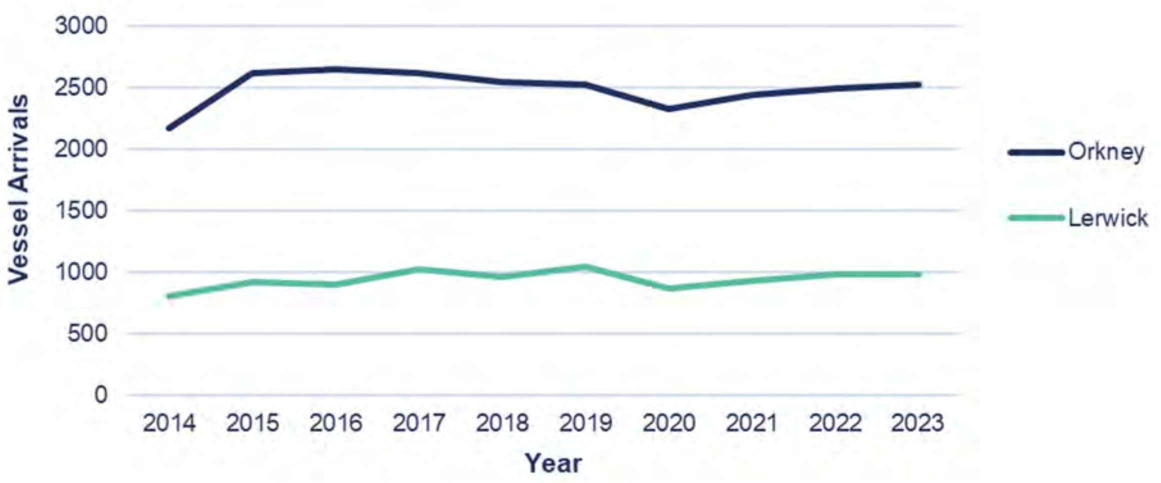

Figure 13: Port Arrivals 2014-2023 Lerwick and Orkney (DfT, 2024).

Figure 14 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.

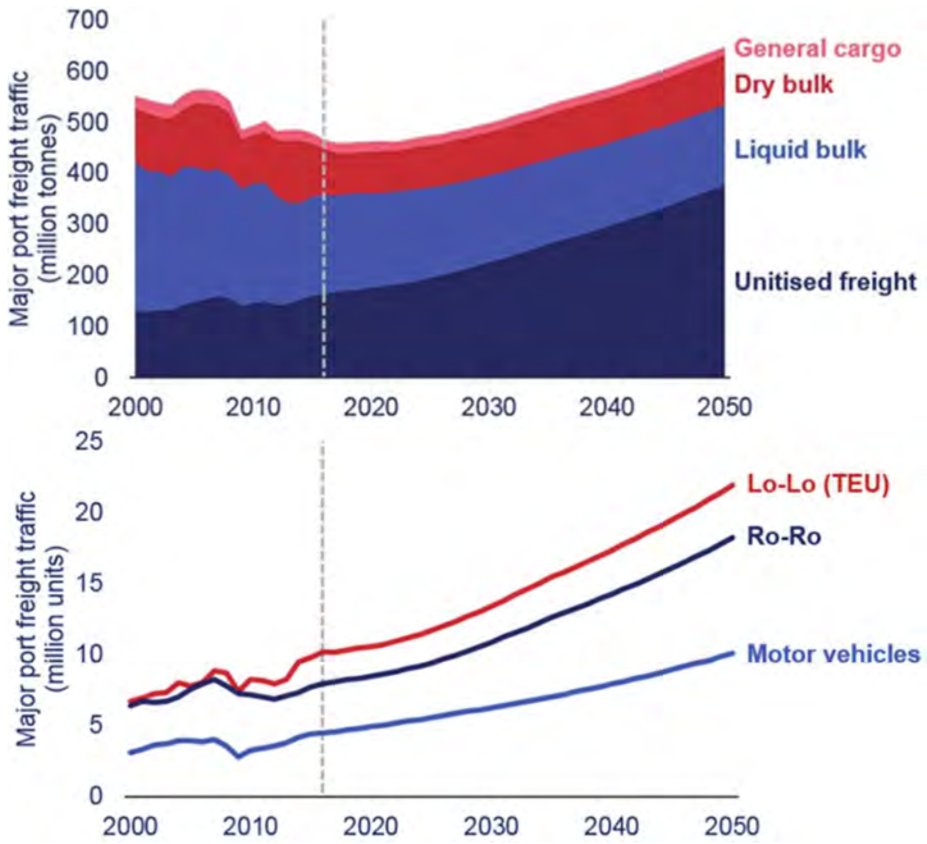

Figure 14: UK port freight Projections (DfT, 2019).

7.3 FERRIES

NorthLink Ferries were the principal ferry operator recorded within the Study Area. 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 15**. 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 69% increase in cars transported was observed.

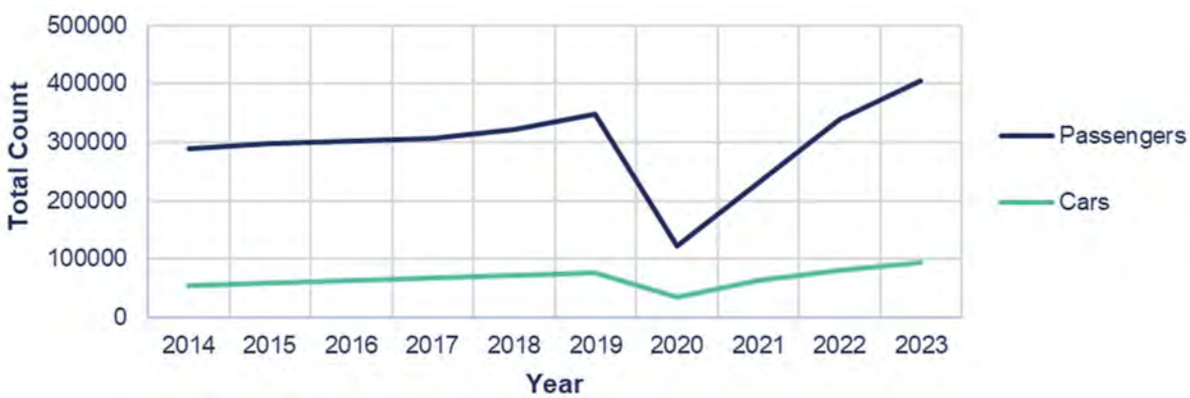

Figure 15:Passenger and Car Totals transported per Year (2014-2023) (source: northlinkferries.co.uk).

During Q2 2023, NorthLink Ferries increased the frequency of transits on their route between Scrabster and Stromness due to increased demand[1]. 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 there is a five-year transition period, whereby 25% of the EU quote for British waters will be transferred to the UK fishing fleet by 2025.

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 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 8**. Five 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 8: 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 vessels 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 to military exercises	Military exercises in the vicinity of the cable route could be disrupted.	Out	The Study Area does not overlap any military practice areas. The closest firing practice area is located 16 nm from

ID	Potential Impact	Description	Scoped In / Out	Reason if Scoped Out
				the Aurora Project within UK TS.
10	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.
11	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.	Out	There are no oil or gas fields located in proximity to the Study Area.
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 construction phase it is expected that commercial vessels and ferries may be required to reroute due to the presence of cable laying vessels and the requested safe passing distance. Cable laying vessels are typically slow and limited in manoeuvrability during installation. As outlined in **Section 4.1**, the cable installation vessel will move at a speed of approximately 0.3 knots during the cable installation.

Two main ferry routes operated by NorthLink Ferries were observed within the vessel traffic analysis running between Aberdeen/Kirkwall and Lerwick. Cargo vessels also transited the Study Area with three routes observed crossing the Aurora Project within UK TS. Two medium density tanker routes were recorded within the Study Area. The majority of passenger vessels, cargo vessels and tankers were recorded transiting to/from Shetland utilising similar routes.

Whilst deviations may be required to route around cable laying activities, it is likely that these deviations will only be less than a minute given the low spatial footprint of these activities and the slow speed of the installation vessels, minor amendments can be made by approaching vessels in advance to pass clear of the cable laying vessel. Given the available searoom around the cable route, there is anticipated to be only a slight impact on commercial shipping routeing. Any impacts will be of a temporary nature during the cable laying / installation process which is anticipated to take up to 11 days within the UK TS.

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

8.2 POTENTIAL IMPACT TO SMALL CRAFT ROUTEING AND ACTIVITIES

During the installation of the cable, it is expected that small craft may be required to alter their route due to the presence of the cable laying vessel and safe passing distance. One main recreational vessel route was observed within the Study Area. (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 installation of marine cabling will not disrupt recreational activity within coastal waters, given its distance from the shore. Occasional offshore cruisers may encounter the cable layer, but it is noted there is significant sea room around the cable layer for recreational craft to pass clear. Embedded mitigations such as circulation of information (e.g. NtMs) as well as the presence of guard vessels will notify sea users of construction 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 Aurora Project, with the exception of during maintenance activities which will be temporary and localised to the site needing repaired.

8.3 POTENTIAL IMPACT ON VESSEL TO VESSEL COLLISION RISK

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

Cable layers 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. Due to their smaller size and manoeuvrability in comparison, guard vessels are considered to pose a lesser risk of collision than that of the cable laying vessels. Given the volume of traffic, distance between the cable route 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 cable layer would cause 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 crossing the section of Aurora Project within UK TS. As with the risk of a passing vessel colliding with an installation vessel, it is considered that there is adequate searoom should a vessel be required to undertake collision avoidance actions.

It is expected that the majority of vessels will be aware of the cable installation works prior to encountering the project vessels through embedded mitigation measures, which include circulation of information via NtMs 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 searoom is available along the section of cable route should collision avoidance action be required.

There are no anticipated changes to vessel routeing post-installation of the Aurora Project, hence there is no expected impact on vessel to vessel collision risk.

8.4 POTENTIAL IMPACT ON EMERGENCY RESPONSE, SEARCH AND RESCUE

During the installation phase, the presence of the cable layer and guard vessels has the potential to inhibit search and rescue operations should an incident occur in close proximity to installation activities and the requested safe passing distance for passing vessels. There is also potential for an increased need for emergency response should an accident occur aboard the cable layer or ancillary vessels. The closest RNLI base is located at Lerwick, 33 nm away. 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 vicinity of the Aurora Project within UK TS has experienced a relatively low rate of accidents in recent years. The most common incident type within the Study Area was personal injury and the most commonly involved vessel type was fishing. 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 cable installation. It is possible that in the event of a nearby maritime incident, an installation vessel or guard 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 cable.

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

Subsea cables 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 cable. There are no designated or customary anchorages in the shipping and navigation Study Area. 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 cable would pose a risk to the vessel and the most likely outcome would be cable damage.

Fishing activity was observed within the Study Area (see **Section 6.2.6**). Within the VMS data, 95% of vessels 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. The subsea cables will be marked on nautical charts to ensure fishermen are informed of their presence.

During operation and maintenance, the subsea cables will be buried or protected where burial is not feasible. Cable snagging is more likely where cables are exposed during the installation process, however the embedded mitigation measures include the use of guard vessels and circulation of information via NtMs to make vessels aware of installation works.

8.6 POTENTIAL IMPACT ON UNDER KEEL CLEARANCE

Subsea cables have the potential to increase the risk of grounding by reducing the depth of water through the introduction of subsea cable protection post-installation. A reduction in under keel clearance primarily affects nearshore areas as the reduction in clearance is not as critical within deeper waters. A review of nautical chart 1119 showed that the Aurora Project within UK TS is to be situates in water depths ranging from 83 m to 106 m. The Aurora Project within UK TS will be buried where feasible.

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.*"

Given the depths of water, it is not anticipated that under keel clearance would be compromised.

8.7 POTENTIAL IMPACT ON ACCESS TO PORTS AND HARBOURS

There may be a disruption to port arrivals/departures due to the presence of installation vessels operating in close proximity. The closest harbour to the Aurra Project within UK TS is at North Haven on Fair Isle. The approaches to North Haven are considered to be unobstructed by the cable activities, given that the cable route is 7.3 nm from the harbour and there is adequate searoom around the cable installation activities. Installation of the cable is a temporary activity, and the impact is expected to be minimal when taking into account the embedded mitigation measures, which include Notice to Mariners (see **Section 4.3**).

The impacts during decommissioning activities are likely to be similar to those during construction. There are no anticipated impacts to ports and harbours post-installation of the Aurora Project within UK TS.

8.8 POTENTIAL IMPACT TO Recognised Sea Lanes Essential to International Navigation

There are IMO adopted recommended routes within the study area north and south of Fair Isle. The Aurora Project within UK TS lies 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 searoom north of the Aurora Project within UK TS for these vessels to pass safely.

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: HAZID:** 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 Aurora Project within UK TS cable system, 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 9**) and consequence (**Table 10**) 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 9: 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 10: 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.
4	Serious	Fatality	£1million-£10million	Tier 2 regional assistance required	National negative publicity. Prolonged closure or restrictions to ports/OWFs/

Rank	Description	People	Property	Environment	Definition
					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 11**). 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 12**.

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 11** 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 11: 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 12: 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.
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 13** presents all hazards identified, whether they were scoped in/out, and if scoped out, an explanation.

Table 13: Identified Hazards

Hazard Type	Definition	Scoped In / Out	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/O&G platform, etc.)	No	The Aurora Project does 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 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 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 proximity to the Aurora Project.
Wake wash	Vessel wave wake wash effect on other vessels.	No	The presence of subsea cables 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 is not deemed to affect the risk of fire occurring on board a vessel.

Hazard Type	Definition	Scoped In / Out	Reason if Scoped Out
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 is not deemed to impact vessel motions.

The vessel types identified are shown in **Table 14**.

The NRA considers the construction (C), operation and maintenance (O), and decommissioning (D) phases of the Project. To reflect the similarity of the impacts during construction and decommissioning, these two categories were combined in all cases. Similarly, where hazards were deemed to have similar risk scores between construction and operation and maintenance, they were combined into a single hazard.

Table 14: 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	Large Project Vessels	Cable Lay Vessel
7	Small Project Vessels	Guard Vessels

Based on the Project phases, vessel types, hazard types and hazard areas, a total of 16 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
- 16 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 15 presents the nine 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 in the most likely scenario and remote in the worst-case scenario.

Table 15: Collision Hazards, Scores and Ratings

ID	Rank	Phase	Hazard title	Score	Rating
6	1	C/O/D	Collision - Large Project Vessel ICW. Ferry/Passenger	6.0	Low Risk - Broadly Acceptable
5	2	C/O/D	Collision - Large Project Vessel ICW. Cargo/Tanker	5.8	Low Risk - Broadly Acceptable
4	3	C/O/D	Collision - Small Craft ICW. Small Craft	5.8	Low Risk - Broadly Acceptable
1	4	C/O/D	Collision - Ferry/Passenger ICW. Cargo/Tanker or Ferry/Passenger	5.3	Low Risk - Broadly Acceptable
3	5	C/O/D	Collision - Small Craft ICW. Ferry/Passenger or Cargo/Tanker	5.1	Low Risk - Broadly Acceptable
9	5	C/O/D	Collision - Small Project Vessel ICW. Ferry/Passenger or Cargo/Tanker	5.1	Low Risk - Broadly Acceptable
7	5	C/O/D	Collision - Recreational or Fishing or Tug/Service or Small Project Vessel ICW. Large Project Vessel	5.1	Low Risk - Broadly Acceptable
2	5	C/O/D	Collision - Cargo/Tanker ICW. Cargo/Tanker	5.1	Low Risk - Broadly Acceptable
8	10	C/O/D	Collision - Small Craft ICW. Small Project Vessel	4.4	Low Risk - Broadly Acceptable

The highest scoring collision hazard assessed relates to a large 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 large Project vessel and a ferry or passenger vessel was deemed extremely unlikely in the most likely scenario and remote in the worst case scenario. 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 large 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 large Project vessel and a ferry or passenger vessel, with the same frequency of the hazard occurring. The lower overall hazard score for the collision between a large 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 16 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 Aurora Project within UK TS.

Table 16: Snagging Hazards, Scores and Ratings

ID	Rank	Phase	Hazard title	Score	Rating
10	9	C/O/D	Snagging - Fishing	4.5	Low Risk - Broadly Acceptable
12	11	C/O/D	Snagging - Cargo/Tanker or Ferry/Passenger	4.1	Low Risk - Broadly Acceptable
13	11	C/O/D	Snagging - Large Project Vessel	4.1	Low Risk - Broadly Acceptable
11	16	C/O/D	Snagging - Recreational or Tug/Service or Small Project Vessels	2.8	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 a single fatality, 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 unlikely to occur at the Project site, although has reportedly occurred at other subsea cables. The worst case scenario was assigned a frequency of remote to reflect that this has rarely occurred in wider industry.

9.5.4 Grounding

Table 17 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 Aurora Project within UK TS.

Table 17: Grounding Hazards, Scores and Ratings

ID	Rank	Phase	Hazard title	Score	Rating
15	13	C/O/D	Grounding - Large Project Vessel	3.4	Negligible Risk - Broadly Acceptable
16	14	C/O/D	Grounding - Ferry/Passenger or Cargo/Tanker	2.9	Negligible Risk - Broadly Acceptable
14	15	C/O/D	Grounding - Recreational or Fishing or Tug/Service or Small Project Vessel	2.8	Negligible Risk - Broadly Acceptable

The highest ranked relates to the grounding of a large 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 large 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 Aurora Project within UK TS. Existing navigational features and activities, such as anchorages and vessel routes, are included within the baseline assessment.

Following consultation and 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 Aurora Project within UK TS.

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 Aurora Project within UK TS 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 the Aurora Project within UK TS 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 the section of the Aurora Project fibre optic cable which lies within UK TS.

Vessel traffic analysis showed that a number of ferry, cargo and passenger routes cross the Study Area. Two of these routes were ferry routes operated by NorthLink Ferries between the Shetland Islands and Orkney/Aberdeen. Other vessel activity was mainly recorded within the west of the Study Area, to the north and south of the Aurora Project within UK TS.

Fishing activity within the Study Area mainly comprised of vessels using demersal gears. Most of the activity was observed within the east of the Study Area. Lower fishing activity was observed within the west of the Study Area. Recreational activity was generally low across the Study Area, with one route crossing the Study Area between the Shetland Islands 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 69% for cars. It is not anticipated that there will be any significant changes to fishing and recreational activity in proximity to the Aurora Project within UK TS.

Based on the existing activities in proximity to the cable route 12 impacts were identified, five 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 phase of the Project and were judged 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 16 hazards were identified. 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

NASH MARITIME

							Transmission Individual												
							Realistic Most Likely Scores						Realistic Worst Credible Scores						
ID	Individual Haz. Rank	Project Phase	Hazard Type	Vessel Type	Hazard Title	Realisitic Most Likely Scenario	People	Property	Environment	Business	Frequency	Realisitic Worst Credible Scenario	People	Property	Environment	Business	Frequency	Baseline Risk Score	Baseline Risk Rating
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	Multiple fatalities; Constructive Loss; Serious pollution (Tier 2); International negative publicity. Ferry out of service.	5	5	4	5	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	Single fatality; Constructive Loss; Major pollution incident (Tier 3); National negative publicity.	4	5	5	4	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	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	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	Single fatality; Loss of small craft; Moderate pollution incident (Tier 2); National negative publicity.	4	4	3	4	2	5.8	Low Risk - Broadly Acceptable
5	2	C/O/D	Collision	Large Project Vessel ICW. Cargo/Tanker	Collision - Large 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	Single fatality; Constructive Loss; Major pollution incident (Tier 3); International negative publicity.	4	5	5	5	1	5.8	Low Risk - Broadly Acceptable

ID	Individual Haz. Rank	Project Phase	Hazard Type	Vessel Type	Hazard Title	Transmission Individual														
						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	Frequency		People	Property	Environment	Business	Frequency		
6	1	C/O/D	Collision	Large Project Vessel ICW. Ferry/Passenger	Collision - Large 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	Multiple fatalities; Constructive Loss; Major pollution incident (Tier 3); Ferry out of service; International negative publicity.	5	5	5	5	1	6.0	Low Risk - Broadly Acceptable
7	5	C/O/D	Collision	Recreational or Fishing or Tug/Service or Small Project Vessel ICW. Large Project Vessel	Collision - Recreational or Fishing or Tug/Service or Small Project Vessel ICW. Large 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	Multiple fatalities; Loss of small craft; Moderate damage to large vessel; Moderate pollution incident (Tier 2); National negative publicity.	5	4	3	4	1	5.1	Low Risk - Broadly Acceptable
8	10	C/O/D	Collision	Small Craft ICW. Small Project Vessel	Collision - Small Craft ICW. Small Project Vessel	Multiple minor injuries; Moderate damage to small craft; No pollution; Widespread negative publicity.	2	2	1	3	2	Single fatality; Loss of small craft; Moderate pollution incident (Tier 2); National negative publicity.	4	4	3	4	1	4.4	Low Risk - Broadly Acceptable
9	5	C/O/D	Collision	Small Project Vessel ICW. Ferry/Passenger or Cargo/Tanker	Collision - Small Project Vessel 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	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	5.1	Low Risk - Broadly Acceptable
10	9	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	Single fatality; Loss of gear/small craft; Tier 1 pollution; Significant cable damage; National negative publicity.	4	4	2	4	1	4.5	Low Risk - Broadly Acceptable

ID	Individual Haz. Rank	Project Phase	Hazard Type	Vessel Type	Hazard Title	Transmission Individual													
						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	Frequency		People	Property	Environment	Business	Frequency		
11	16	C/O/D	Snagging	Recreational or Tug/Service or Small Project Vessels	Snagging - Recreational or Tug/Service or Small Project Vessels	Minor injuries; Minor damage to gear; No pollution; Cable inspection; Local negative publicity.	1	2	1	2	1	Single fatality; Loss of small craft; Tier 1 pollution; Significant cable damage; National negative publicity.	4	4	2	4	1	2.8	Negligible Risk - Broadly Acceptable
12	11	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	Minor injuries; Loss of the vessel's anchor Minor pollution; Cable out of service; International negative publicity.	1	2	2	5	1	4.1	Low Risk - Broadly Acceptable
13	11	C/O/D	Snagging	Large Project Vessel	Snagging - Large Project Vessel	Minor injuries; Minor damage; No pollution; Cable inspection; Local negative publicity.	1	1	1	3	2	Minor injuries; Loss of the vessel's anchor Tier 1 pollution; Cable out of service; International negative publicity.	1	2	2	5	1	4.1	Low Risk - Broadly Acceptable
14	15	C/O/D	Grounding	Recreational or Fishing or Tug/Service or Small Project Vessel	Grounding - Recreational or Fishing or Tug/Service or Small Project Vessel	Multiple minor injuries; No pollution; Cable inspection; Local negative publicity.	2	2	1	2	1	Single fatality; Loss of small craft; Tier 1 pollution; Significant cable damage; National negative publicity.	4	4	2	4	1	2.8	Negligible Risk - Broadly Acceptable
15	13	C/O/D	Grounding	Large Project Vessel	Grounding - Large Project Vessel	Multiple minor injuries; Minor damage; No pollution; Cable damage requiring repairs; Widespread negative publicity.	2	2	1	3	1	Single fatality; Significant damage to vessel; Tier 1 pollution; Significant cable damage; Cable out of service.	4	4	2	5	1	3.4	Negligible Risk - Broadly Acceptable
16	14	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	Single fatality; Significant damage to vessel; Moderate pollution (Tier 2); Significant cable damage; National negative publicity.	4	4	3	4	1	2.9	Negligible Risk - Broadly Acceptable

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+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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