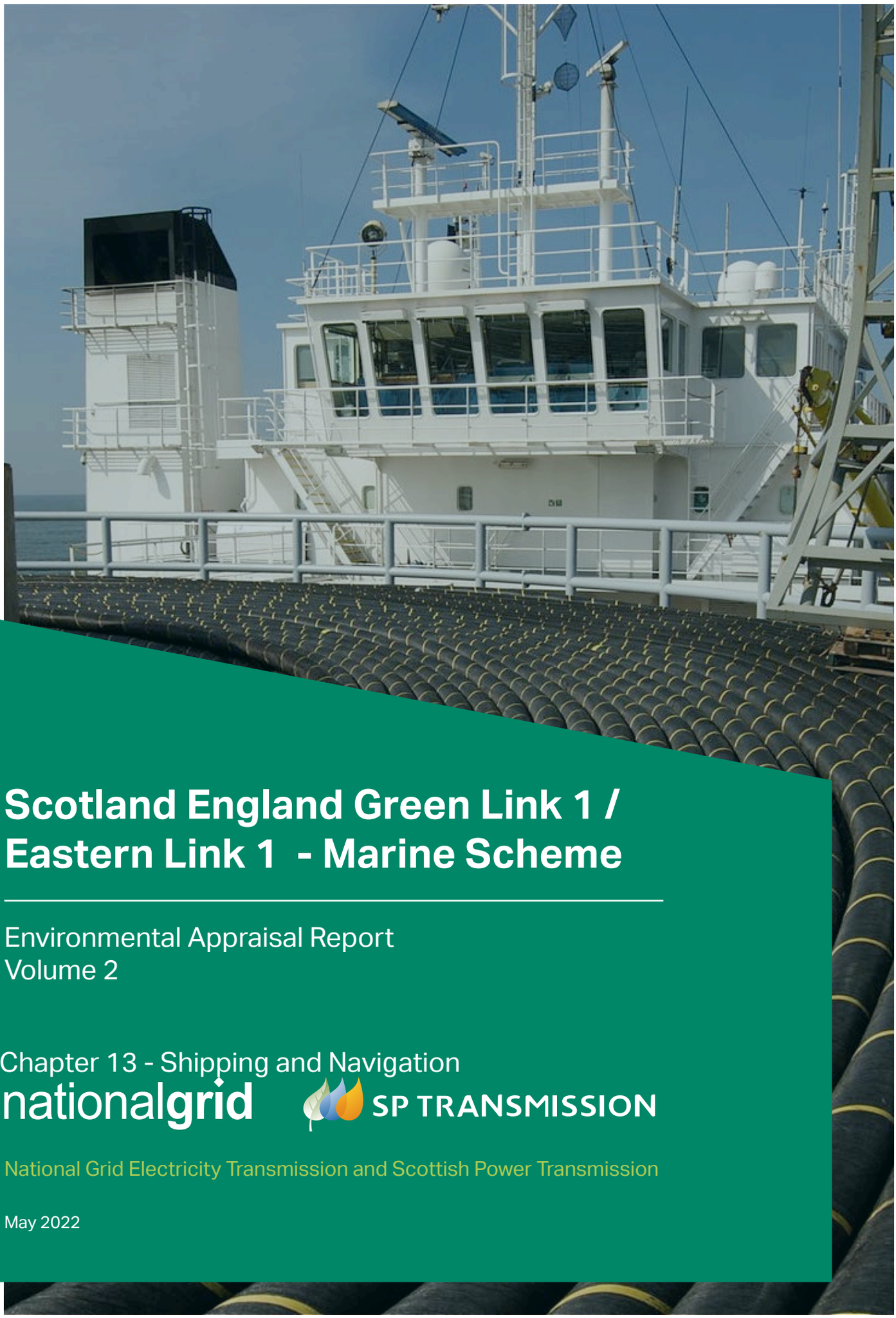

Scotland England Green Link 1 / Eastern Link 1 - Marine Scheme

Environmental Appraisal Report
Volume 2

Chapter 13 - Shipping and Navigation

nationalgrid SP TRANSMISSION

National Grid Electricity Transmission and Scottish Power Transmission

May 2022

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Scottish Power Transmission

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Wessex Archaeology (Marine Archaeology); and

Brown and May Marine Ltd (Commercial Fisheries).

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Executive Summary

This chapter of the Environmental Appraisal Report (EAR) contains an appraisal of the potential interaction of the Marine Scheme and shipping and navigation. The appraisal comprises a Navigational Risk Assessment (NRA) which addresses the impact to shipping and navigation via Formal Safety Assessment (FSA) as detailed in Section 13.4 of this EAR chapter. The appraisal identifies impacts to shipping and navigation through desktop study, stakeholder consultations, and workshop exercise. The impacts are appraised via a risk matrix framework to determine requirements for impact or risk reduction and to ultimately establish additional risk reduction measures to ensure that risks are as low as is reasonably practicable (ALARP).

As a basis for the appraisal, extensive navigational baseline data has been compiled and is presented in Section 13.5 of this EAR chapter.

The shipping and navigation study area comprises an indicative corridor of 10 Nautical Mile (NM) width encompassing the Marine Scheme. The study area is centred on the marine installation corridor centreline, which runs from Thorntonloch Beach in East Lothian, Scotland to Seaham in England.

Using the baseline data and applying the FSA methodology, the appraisal determined that the impacts identified in the stakeholder consultations, desktop and workshop exercises are either 'tolerable if ALARP' or 'Broadly Acceptable'. The 'ALARP' and 'Broadly Acceptable' assessments are based principally upon the combination of existing legislation which establishes safe practices regarding navigation in general, and fishing and anchoring in the vicinity of subsea infrastructure, and the minimization of the seabed hazard through cable burial and protections where practicable.

The potential effects of the Marine Scheme on shipping and navigation have been appraised in Section 13.6. Across all phases of the Marine Scheme, all impacts were assessed to be '**Tolerable**' or '**Broadly Acceptable'**. Following the implementation of project specific mitigation measures, identified and justified in Section 13.7, the residual impacts, from all phases of the Marine Scheme, can be considered ALARP.

The potential for interaction between the Project and other plans/projects to result in significant cumulative effects, is considered in Chapter 16: Cumulative and In-Combination Effects. The potential for cumulative shipping and navigational effects between the Marine Scheme and the English Onshore and Scottish Onshore Schemes was considered, however as there is no potential for vessels associated with Marine Scheme to be working concurrently with the HDD, these projects were excluded from further appraisal.

13. Shipping and Navigation

13.1 Introduction

This chapter of the Environmental Appraisal Report (EAR) contains an appraisal of the potential interaction of the Marine Scheme with shipping and navigation. It constitutes a full Navigational Risk Assessment (NRA), adopting appropriate NRA methodology and language in line with relevant guidance.

The Marine Scheme comprises the marine component of the Scotland England Green Link 1 (SEGL1)/ Eastern Link 1 (EL1) and extends from the Mean High Water Springs (MHWS) at the Scottish landfall on Thorntonloch beach, to the MHWS at the English landfall near Seaham. It is located within both Scottish and English territorial waters, up to 12 nautical miles (NM) from the coast. The Marine Scheme comprises a marine installation corridor of approximately 176 km length and 500 m maximum width within which cables will be installed. The marine installation corridor extends from kilometre point (KP) 0, at its landfall in Scotland, to KP 176, at its landfall in England (See Figure 1-3). The Marine Scheme activities cover the following phases: installation, operation (including maintenance and repair), and decommissioning.

Interactions between the Marine Scheme and commercial fisheries and other sea users are covered in separate chapters of this EAR. This chapter should be read in conjunction with Chapter 14: Commercial Fisheries and Chapter 15: Other Sea Users.

A description of the shipping and navigation receptor baseline, as understood through desk-based review, is presented in Section 13.5 of this EAR chapter. Potential impacts of the Marine Scheme on these receptors are appraised in Section 13.6 for the installation, operation (including maintenance and repair) and decommissioning phases of the Marine Scheme. Where appropriate, proportionate measures to avoid, mitigate or compensate for any identified adverse effects are proposed.

The potential for interaction between the Marine Scheme and other plans/projects, which may result in significant cumulative effects, is considered in Chapter 16: Cumulative and In-Combination Effects.

13.2 Legislative Context

This section outlines legislation, policy and guidance relevant to the appraisal of the potential effects on shipping and navigation associated with the installation, operation, and decommissioning of the Marine Scheme. For further information regarding the legislative context of the Marine Scheme see Chapter 3: Legislative and Policy Framework.

A number of policies and regulations aim to assure that shipping and navigation is taken into account during the planning and execution of projects within UK waters. For the Marine Scheme these include the UK Marine Policy Statement (MPS) and the UK Marine Plans, specifically the Scottish National Marine Plan (Scottish Government, 2015), and the North East Inshore and North East Offshore Marine Plan[1] (HM Govenment, 2021) have a number of relevant policies specific to shipping and navigation which are presented in EAR Volume 3 Appendix 3.1: Marine Plan Compliance Checklist**.**

A number of laws require decision makers to consider the environmental impacts of a project. Legislation relevant to the appraisal of Marine Scheme's effects on shipping and navigation is presented in EAR Volume 3 Appendix 3.2: Topic Specific Legislation.

13.2.1 Guidance

The appraisal methodology has been aligned to the following best practice guidance documents in so far as relevant for a cable project:

[1] The Marine Scheme falls entirely within the UK territorial waters (i.e. 12 NM), therefore within the Inshore portion of the North East marine area. The marine plan for the North East area has combined both inshore and offshore portions.

- IMO Revised Guidelines For Formal Safety Assessment (FSA) For Use In The IMO Rule-Making Process- MSC-MEPC.2/Circ.12/Rev.2 (9 April 2018) (IMO, 2018);
- Maritime and Coastguard Agency (MCA) MGN 654 (M+F) Offshore Renewable Energy Installations (OREI) safety response (MCA, 2021); and
- International Association of Marine Aids to Navigation (AtoN) and Lighthouse Authorities (IALA) Guideline G1162: The Marking of Offshore Man-Made Structures, Edition 1.0 (IALA, 2021).

13.3 The Study Area

The shipping and navigation study area comprises a 10 NM wide area encompassing the Marine Scheme, as illustrated in Figure 13-1 (the study area). The study area is centred on the marine installation corridor, which runs from Thorntonloch Beach in East Lothian, Scotland to Seaham in England. The marine installation corridor is approximately 176 km long; approximately the first 38 km of the corridor is within Scottish waters and the remaining corridor (from KP 38 to KP 176) is within English waters.

13.4 Approach to Appraisal and Data Sources

13.4.1 Appraisal Methodology

13.4.1.1 Overview

The shipping and navigation chapter represents a full NRA, adhering to both MCA guidelines on NRA and IMO guidelines on FSA. Consequently, it varies from the methodology used elsewhere in this EAR (see Chapter 4: Approach to Environmental Appraisal). Specific details of the approach adopted here are set out later in this section. The identification and appraisal of effects and mitigation are based on expert judgment following widely adopted risk appraisal frameworks and informed by consultation responses from a range of stakeholders.

A non-statutory scoping report, submitted to and consulted on by the Marine Management Organisation (MMO) and Marine Scotland Licensing Operations Team (MS-LOT) in March 2021[2], identified aspects of the Marine Scheme, that have the potential to impact shipping and navigation during the installation, operation (including maintenance) and decommissioning phases.

In line with NRA methodology, this appraisal comprised three principal elements:

- Baseline Conditions – summarising navigational baseline characterisation work to establish densities and types of traffic in the marine environment;
- Stakeholder Consultation – range of stakeholder consultation activities including an hazards workshop; and
- Appraisal of Potential Impacts – presenting the outcomes of a Formal Safety Assessment (FSA).

Navigational features and patterns of vessel activity within the study area were assessed to establish baseline conditions (Section 13.5) and inform the subsequent FSA. Key features located outside of the study were also considered as required. Stakeholder consultation informed both the baseline understanding of shipping in the area and, through hazard workshops, the population and refinement of hazard logs (see section 13.4.2.2 for further consultation details). The appraisal of potential impacts (Section13.6) has identified and logged hazardous outcomes such as collision, snagging and disruption to shipping against risk categorisation, mitigation measures, and ultimately, acceptability, adhering to the FSA methodology. These are explained in further detail in the following sections. The outcome of these steps is the formulation of recommendations to inform decision-making for all relevant parties.

[2] The non-statutory Scoping Report is publicly available on https://marine.gov.scot/sites/default/files/segl_el1_marine_scoping_report_-_base_report_rev_2.0.pdf

GIS: LM Checked: JA Approved: DB

DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL
Fidra Fl(4)15M
Bass Rk Fl(3)10M
Fl.26M Saint Abb's Head Racon (T)
Holy I.
Longstone Fl.18M Farne Islands
Coquet I. Fl(3)WR.19/15M
River Tyne
Farn Deeps
Graveyard
Hartlepool Ground
0
10
20
30
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50
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70
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100
110
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130
140
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160
170

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0 10 20 km

Contains OS data © Crown Copyright and database right 2020, Esri, HERE, Garmin, FAO, NOAA, USGS

Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:550,000

nationalgrid

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PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

NOTES:

Not to be used for navigation.

TITLE

Figure 13-01
Shipping and navigation study area

REFERENCE

SEGL1_M_EAR_13-01_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

13.4.1.2 Baseline Conditions

The navigational baseline characterisation comprises the following four elements:

- Identification of key navigational features;
- Emergency response overview;
- Maritime incident analysis; and
- Marine Traffic Survey (MTS).

Key navigational features

The navigational baseline identifies key navigational features within the study area to the Marine Scheme including ports, anchorage areas, military practice areas and recreational features, as well as planned and existing offshore infrastructure.

Emergency response overview

An overview of the emergency response in the region is described, considering Royal National Lifeboat Institution (RNLI) and Search and Rescue by Helicopter (SARH) resources in proximity to the Marine Scheme.

Maritime incident analysis

Maritime incidents recorded by RNLI and SARH in the vicinity of the Marine Scheme have been reviewed. The occurrence of maritime incidents can give an indication of the general level of marine incident risk in this region, which may be relevant during the construction of the Marine Scheme.

Marine Traffic Survey

The MTS uses vessel traffic data including Automatic Identification System (AIS) and Vessel Monitoring System (VMS) data to establish baseline vessel traffic conditions in the study area, analysing such aspects as vessel type, size and status, as well as a section focussing on fishing traffic. A winter 2019-2020 season and a summer 2021 season of AIS data have been selected, and an additional summer 2019 season has been used to validate the use of summer 2021 in this appraisal. Summer 2020 data has not been used to eliminate anomalies associated with the COVID-19 pandemic. The data used in this MTS will be discussed in detail in Section 13.4.2.1.

13.4.1.3 Appraisal of Potential Impacts (through FSA)

The FSA process provides a systematic method for evaluating and controlling risk, within a structured framework. Baseline shipping patterns and navigational features along with stakeholder consultation provide the basis for establishing potential hazards (or impacts). These hazards are then characterised in their severity (or magnitude) and likelihood, which ultimately provides for risk categorisation against a risk matrix.

Additional control or mitigation measures are subsequently identified to provide a reduction in risk where they are not initially determined as being broadly acceptable. The residual risk, with additional mitigation measures considered, is then assessed to determine risk acceptability in accordance with the principles of ALARP (As Low As Reasonably Practicable). Where necessary or appropriate, cost-benefit analysis of mitigation measures is assessed to determine/justify an ALARP position. Cumulative effects considerations are also considered to ensure suitable recommendations can be made. The FSA therefore comprises the following elements:

- Hazard/Impact identification;
- Risk assessment, considering existing mitigation measures;
- Identification of additional risk mitigation measures and resulting residual risk;
- Cost-benefit analysis; and
- Cumulative effects.

Hazard/Impact Identification

Taking into account the components and activities of the Marine Scheme, baseline information provided in the MTS, consultation responses and expert judgement/industry experience, a list of relevant impacts to marine navigation is compiled as a desktop exercise.

The list is captured in a table and retained as a hazard log. Hazards relating to separate Marine Scheme phases have been identified. Note that hazards have been identified according to a North-South order and in reference to KPs in both Scottish and English waters along the marine installation corridor. The potential consequences or effects of the hazards and the likelihood of the outcomes were then assessed using a risk assessment matrix.

Risk Assessment

The risk assessment process is based on a classic matrix approach. This follows the Environmental Appraisal structured approach and terminology as outlined in Chapter 4: Approach to Environmental Appraisal. However, the risk assessment categorisations also directly reflect the UK Health and Safety Executive principles of ALARP and align with NRA terminology. Additionally, the approach is consistent with relevant marine guidance from the International Maritime Organisation (IMO, 2018) and the UK Maritime Coastguard Agency (MCA, 2021). Each hazard/impact is individually evaluated against specific criteria and assigned categories for 'severity of consequence' (Magnitude) as presented in Table 13-1 and 'frequency of occurrence' (Likelihood) as presented in Table 13-2. The risk matrix which combines them is included in Table 13-3.

The assessment of risk has been conducted in consideration of the embedded mitigation as detailed in Section 0.

Table 13-1: Severity of consequence of hazard/ impact criteria

Severity / Magnitude	Description
High	• Loss of a crew member, or multiple serious injuries • Major/Severe damage to infrastructure or vessel
Medium	• Serious injury to person • Notable damage to infrastructure or vessel
Low	• Minor injury(s) to person • Minor/Local damage to equipment or vessel
Negligible	• No significant operational impacts

Table 13-2: Likelihood / Frequency criteria

Frequency /Likelihood	Criteria Description
Remote	Never occurred during Company's activities but has been known to occur in the wider industry
Unlikely	Has occurred in Company's activities in the past but as an isolated incident under exceptional circumstance.
Occasional	Has occurred on more than one occasion during Company's activities in the past
Likely	Occurs regularly during Company's activities

The likelihood and consequence categories are combined for each hazard/impact using the risk matrix shown in Table 13-3, which is used to derive a risk tolerability level of either Unacceptable, Tolerable or Broadly Acceptable, with unacceptable or tolerable risks being considered to be significant in Environmental Appraisal terms. Definitions of each risk tolerability level are provided in Table 13-4 below.

Table 13-3: Risk Matrix

Frequency/ Likelihood	Likely	Broadly Acceptable	Tolerable	Unacceptable	Unacceptable
	Occasional	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Unlikely	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Remote	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
		Negligible	Low	Medium	High
	Severity of Consequence / Magnitude				

Table 13-4: Tolerability Definitions

Tolerability	Definition
Broadly Acceptable (Low Risk - not significant)	Generally regarded as acceptable and adequately controlled. At these risk levels the opportunity for further reduction is limited.
Tolerable if ALARP (Moderate Risk - significant)	Typical of the risks from activities which people are prepared to tolerate to secure benefits. There is however an expectation that such risks are properly assessed, appropriate mitigation measures are in place, residual risks are as low as reasonably practicable (ALARP) and that risks are periodically reviewed to monitor if further controls are appropriate.
Unacceptable (High Risk - significant)	Generally regarded as unacceptable whatever the level of benefit associated with the activity. Significant risk mitigation or design modification required to reduce to tolerable (ALARP).

Identification of Additional Mitigation Measures

Where risks are assessed as being unacceptable or tolerable (significant) after factoring in the embedded mitigation measures already identified, further additional risk mitigation measures are identified and considered.

Cost-Benefit Analysis

In order to formulate recommendations for decision-making, any additional risk mitigation measures identified are subjected to a qualitative cost-benefit comparison in order to justify the measure and establish a residual risk categorisation and basic ALARP position.

Risk Assessment Table

The risk assessment outputs have been captured in a table such that the hazards and impacts for each of the Marine Scheme phases and the relevant embedded mitigation measures and any additional mitigation measures identified, are captured to provide an auditable hazards and effects register.

Cumulative Effects

Cumulative effects and future case will be included by review of future projects potentially affecting or influencing the study area and the wider general area and assumption of a general increase in traffic density.

A list of potential cumulative projects and activities has been compiled and includes windfarm extensions and offshore industry activities in the North Sea. Each hazard/impact has been qualitatively reviewed against the potential direct and indirect cumulative effects from any of the projects listed as well as general increases in traffic density.

Any issues have been captured, and further risk mitigation measures considered where deemed appropriate. It is noted that as a subsea cable, no surface infrastructure will remain following installation therefore no lasting cumulative effect at sea surface is foreseen.

Cumulative and in-combination effects are discussed more widely within Chapter 16: Cumulative and In-Combination Effects.

13.4.2 Data Sources and Consultations

13.4.2.1 Data Sources

Baseline conditions have been established by undertaking a desktop review of published information and through consultation with relevant organisations. An MTS has been undertaken and involved the acquisition of detailed AIS data for the study area.

The data sources used to inform the baseline description and appraisal include:

- AIS data from 2019 and 2021 (avoiding the time period that may be most affected by the COVID-19 pandemic);
- VMS data from the MMO (2019, 2011 – 2019, 2016 – 2019);
- Marine Themes Administrative theme data (OceanWise);
- Admiralty charts for the area, including 2182B, 1191, 1407, 0152;
- Maritime incident data in the area (RNLI 2008 - 2020, SARH April 2016 – March 2021);
- The Royal Yachting Association (RYA) UK Coastal Atlas of Recreational Boating v2.1 (2019);
- Port and harbour authority websites and documentation (2021);
- Sailing Directions North Sea (West) Pilot (UKHO, 2018); and
- Royal Northumberland Yacht Club Sailing Directions Pilot, 6th ed (Royal Northumberland Yacht Club, 2021).

AIS Data

The IMO requires that all ships of ≥ 300 gross tonnage engaged on international voyages, cargo vessels of ≥ 500 gross tonnage not engaged on international voyages, and all passenger ships regardless of size built on or after 1 July 2002, are fitted with an AIS. All European Union (EU) registered fishing vessels of length 15 m and above are required to carry AIS equipment by EU directive. Smaller fishing vessels (below 15 m) as well as recreational craft are not required to carry AIS although a proportion does so voluntarily smaller fishing vessels are likely to be under represented in the AIS data.

AIS data has been used to assess the patterns and intensity of shipping activity in the vicinity of the marine installation corridor. The recent COVID-19 pandemic may have affected shipping activity within the study area and as such data from the period March 2020 to March 2021 may underrepresent the true level of vessel traffic. To avoid possible abnormalities in vessel activity arising from the COVID-19 pandemic, AIS data was purchased for a winter period Nov 2019 - January 2020 (inclusive) and a summer period May - July 2021 (inclusive). This period avoids the time period most impacted by the COVID-19 pandemic and therefore the analysis is at less risk of being affected by any changes in shipping activity as a result of the COVID-19 pandemic. The summer season was selected from 2021 on the recommendation of the MMO during the non-statutory scoping exercise. An additional pre-COVID summer season from 2019 was selected to validate the use of summer 2021, checking that the summer 2021 season is representative of vessel traffic and to identify patterns which could be as a result of the impact of COVID-19 or Brexit.

The data therefore spans the following time periods:

- 1/05/2019 to 31/07/2019 (summer 2019);
- 1/11/2019 to 31/01/2020 (winter 2019 – 2020 season); and
- 1/05/2021 to 31/07/2021 (summer 2021 season).

The AIS records were supplied by Marine Traffic (industry standard commercial AIS data supplier) with all standard parameters (longitude, latitude, vessel Maritime Mobile Service Identity (MMSI) number, status, speed, course, heading and timestamp) and the following additional parameters:

- Deadweight tonnage (DWT);
- Vessel length;
- Vessel draught; and
- Vessel type.

The AIS data was provided in a raw, point-based format, as well as in a format converted into vessel tracks. The tracks were subsequently clipped to the study area shown in Figure 13-1. Vessel density grids for the wider area were produced by overlaying a 1 square kilometres (km^2) hexagonal grid and determining the density of tracks within each cell. Vessel tracks were assumed to be wholly in the season or month in which the track started. Vessel speeds were calculated from the length of the track and the start and end times of that track.

VMS and Sightings Data

As mentioned above, AIS is only a requirement of larger vessels, or those carrying passengers, whereas fishing vessels <15 m length are exempt (although many carry AIS voluntarily for safety). As such, AIS data can underrepresent fishing activity. However, the EU requires that all EU, Faroese and Norwegian fishing vessels of 12 m and above are fitted with a VMS. Vessel positions are transmitted every two hours rather than every few minutes as for AIS data, so tracks cannot be readily reconstructed. Nevertheless, the data provides an informative overview of the distribution and density of fishing vessels over 12 m.

Two sets of VMS data were obtained:

- Anonymised VMS point data for the area of interest for 2019 (no information on gear type or status, but vessel speeds can be used as a proxy for vessel fishing status, albeit with an inherent level of uncertainty); and
- MMO Fishing activity for UK vessels 15 m and over by International Council for the Exploration of the Sea (ICES) statistical rectangle (this includes data about time spent fishing and gear type; 2016 - 2019).

Additionally, MMO sightings data 2011 to 2019 representing vessels sighted on surveillance flights was sourced.

Additional Data Sources

Due to the likely under representation of small recreational vessels in the AIS data, additional data sources including the RYA Coastal Atlas have been used to validate the findings of the AIS analysis. Additional analysis considers key navigational features and fishing activity. Key navigational features were extracted from additional sources of data including Admiralty charts and Admiralty Pilot (Sailing Directions) books. Maritime incident data from the RNLI, and SARH taskings data from the Department of Transport and MCA have been utilised to assess the emergency response in the region.

13.4.2.2 Summary of Consultations

Following the submission of the non-statutory scoping report earlier in the year, the MS-LOT, MMO and respective consultees and advisers had the opportunity to express their opinions and provide feedback on the proposal and EAR scope, which has been considered in this chapter.

Further details of the consultation process and associated responses are presented in Chapter 6: Consultation and Stakeholder Engagement.

Table 13-5 summarises consultation responses received from relevant statutory and non-statutory consultees in relation to shipping and navigation for the Marine Scheme and outlines how and where this has been addressed in this chapter.

Table 13-5: Scoping report consultation

Consultee	Consultee response/ comment summary	How and where addressed
Northern Lighthouse board	Northern Lighthouse Board have reviewed the Environmental Appraisal submitted by National Grid Electricity Transmission and Scottish Power Transmission and have no objection to the proposed works. At this time, NLB do not consider that a Landfall Marker Board would be required. However, this requirement would be reviewed upon submission of the Marine Licence.	Noted no action required.
Chamber of Shipping	The Chamber has reviewed the documents and is content with the intent of the NRA, Cable Burial Assessment Plan and embedded mitigations, and looks forward to seeing the NRA Risk Register and CBAP in due course. Main concerns as identified are anchor snagging risk, water depth reduction, deviation during construction and any resulting collision risk during said period. To note the CoS did not see an intended depth of burial for the cable but expects this will be covered in the CBAP.	Concerns are considered within Section 13.6: Appraisal of Potential Impacts within the risk assessment.
RYA	RYA Scotland would wish to take part in the Navigational Risk Assessment, although cable laying operations are covered by the International Regulations for Preventing Collisions at Sea, with which all seafarers are expected to be familiar. The AIS heat map in the RYA UK Coastal Atlas of Recreational Boating is the best source of information on routes taken by recreational craft in this area and I see no need to collect additional information. We estimate that about 20% of recreational craft on passage here transmit an AIS signal and feel that their tracks are typical of recreational craft in general. Vessels heading north will generally start from, or call at, the Tyne, Blyth or Amble and either follow the coast to Eyemouth, the Forth or Arbroath, or make directly for Peterhead. There are rather few anchorages in the area. The Royal Northumberland Yacht Club published the 6th edition of their Sailing Directions, Humber to Rattray Head in March 2021 and it is now the definitive guide to sailing on this coast. The Forth Yacht Clubs Association equivalent for Berwick to Inverness is in course of preparation but will not be published in time for the study.	As recommended by the RYA, the RYA UK Coastal Atlas has been used in Section 13.5.5.2: Vessel Type to inform the appraisal of recreational vessel activity in the study area. As stated in Section 13.4.2.1: Data Sources, the Royal Northumberland Yacht Club Sailing Directions (6th ed) has been consulted while writing this Chapter at the recommendation of the RYA.
RYA	Section 12.2.2 of the report notes that Eyemouth has a marina. However, this consists of a small number of pontoon berths available for visiting recreational boats within a working harbour. In recent years there have been about 290 visiting boats a year of which 70% were UK registered. In addition, there are almost 50 local boats. The Eyemouth Harbour Master can no doubt confirm and elaborate on these figures. Some of the AIS signals from pleasure craft	As recommended, Eyemouth Harbour was invited to attend consultation meetings for SEGL1. The RYA states that Eyemouth Harbour is a base for support vessels for the Neart na Gaoithe windfarm, which is noted in Section 13.5.2.1: Ports and Navigational Features.

Consultee	Consultee response/ comment summary	How and where addressed
	in Eyemouth are likely to be from local sea angling boats. Note also that Eyemouth is going to be used as a base for the support vessels for the Neart na Gaoithe windfarm.	
MMO	13.1. The MMO agrees with the proposal to conduct early stakeholder engagement with all those identified in sections 12.4.3 and 13.4.2 as well as the Cruising Association in order to assess the risks to commercial vessels, recreational activity, fishing activity and other users. For this purpose, the MMO agree the study area should be extended wider than the 1km cable corridor to the proposal of a 10 nautical mile study area.	Dedicated consultations sessions with a range of stakeholders has been undertaken, as set out in Section 13-9. There will be continued engagement with navigational stakeholders including the RYA/RYA Scotland and the CA as the project progresses.
MMO	13.2. The intent to complete a Navigation Risk Assessment (NRA) is welcomed. This should be undertaken to supply detail on the possible impact on navigational issues for both commercial and recreational craft. The NRA should address issues such as identifying traffic levels, collision risk and agreement with these stakeholders on suitable mitigation measures to reduce the risks to navigation safety to an acceptable level i.e. As Low as Reasonable Practicable (ALARP). A hazard log and risk control log should be included.	An NRA has been conducted as part of this appraisal, which studies both commercial and recreational craft, as specified in the MMO's scoping response. Section 13.6: Appraisal of Potential Impacts outlines the risk assessment.
MMO	13.3. The MMO notes under Section 12.2.3 that the Automatic Identification System AIS data used was from 2017 and that 2019 data will be purchased to inform the NRA. The MMO recognise that 2020 data will not be used to avoid "possible abnormalities in vessel activity arising from the COVID-19 pandemic", however we would suggest that more up to date data from 2021 should be considered. Furthermore, consideration should be made of regular operators navigating in the area such as ferries or other work vessels.	Discussion of AIS data in Section 13.4.2.1: Data Sources. Summer 2021 data was included in the appraisal, as 2021 data was requested.
MMO	13.4. Under section 12.4.1 reference is made to MGN 543 this is has now been updated to MGN 654 and should be used as the most up to date guidance. Additional information on risk assessment methodology can be found in the MCA publication "Methodology for Assessing Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREI)".	The reference has been updated to MGN 654.
MMO	13.5. In relation to Electromagnetic deviation on ships' compasses, the MMO would be willing to accept a three-degree deviation for 95% of the cable route. For the remaining 5% of the cable route no more than five degrees will be attained. The MMO would however expect a deviation survey post the cable being laid; this will confirm conformity with the consent condition. This data must be provided to the UKHO via a hydrographic note (H102), as they may want a precautionary notation on the appropriate Admiralty Charts	Section 13.6.4.6: Interference with marine navigational equipment considers interference on marine navigation due to EMFs.

Consultee	Consultee response/ comment summary	How and where addressed
MMO	13.6. Attention should be paid to cabling routes and burial depth for which a Burial Protection Index study should be completed and, subject to the traffic volumes, an anchor penetration study may be necessary. The MMO welcome the intent to bury the cable and would expect to see further details included within the NRA. Any consented cable protection works must ensure existing and future safe navigation is not compromised, accepting a maximum of 5% reduction in surrounding depth referenced to Chart Datum.	Cable burial has been considered within Section 13.6, where relevant.
MMO	13.7. It should be noted any recovered wreck material must needed to be reported to the MCA Receiver of Wreck and any recovered wreck material must only be taken to a UK port. A significant breach of this legislation may also constitute an offence under UK law. 13.8. The cable route should not encroach on any recognised anchorage, either charted or noted in nautical publications, within the proposed consent area.	This appraisal confirms in Section 13.5.2.1: Ports and Navigational Features that the proposed consent area does not encroach on any charted anchorage. Additional mitigation recommended has been outlined within 13.6: Appraisal of Potential Impacts.
MCA	1) We note that the entire cable route is within the 12nm limits with high traffic density, in close proximity to major ports. The operation to survey, prepare, install and maintain a subsea cable can present challenges particularly if moving across high traffic areas. Section 12.4.1 of the report states that a "Navigational Risk Assessment (NRA) including Marine Traffic Survey (MTS) and Formal Safety Assessment (FSA) shall be undertaken to understand and address the effects. The NRA will form the shipping and navigation assessment chapter within the Environmental Appraisal". The MCA welcomes the applicant's intent to carry out a full NRA in accordance with the IMO Assessment Methodology to support the application, noting that shipping and navigation has been identified as a key receptor for consideration by the Environmental Appraisal, due to potential interactions between existing vessel traffic and the Marine Scheme, particularly during the installation phase. 2) The NRA should be undertaken to detail the impact on navigation for both commercial and recreational craft; including identifying traffic levels, collision risk, emergency response, lighting and marking, and mitigation measure to reduce risks to ALARP, with a detailed methodology. 3) The Scoping Report states in section 12.4.2 that "Due to the likely under representation of small fishing and recreational vessels in the AIS data, additional data sources including VMS data, the RYA Coastal Atlas, and consultation will	Concerns are considered within Section 13.6: Appraisal of Potential Impacts within the risk assessment.

Consultee	Consultee response/ comment summary	How and where addressed
	be used to validate the findings of the AIS analysis". The MCA welcomes this approach and would add consultation with local ports and harbours, and the Cruising Association to help inform this approach. 4) The NRA should detail the effects on vessel navigation and communication equipment, as well as any electromagnetic deviation on ships compasses. The MCA would be willing to accept a three degree deviation for 95% of the cable route. For the remaining 5% of the route no more than five degrees will be attained. The developer should then provide this data to the UKHO via a hydrographic note (H102), as they may want a precautionary notation on the appropriate Admiralty Charts. The MCA reserves the right to request a deviation survey of the cable route post installation. 5) Particular attention should also be paid to cabling routes and burial depth for which a Burial Protection Index study should be completed and, subject to the traffic volumes, an anchor penetration study may be necessary. Any consented cable protection works must ensure existing and future safe navigation is not compromised, accepting a maximum of 5% reduction in surrounding depth referenced to Chart Datum. Under no circumstances should depth reductions compromise safe navigation. 6) The applicant must ensure that 'the works' do not encroach on any recognised anchorage, either charted or noted in nautical publications, within the proposed consent area. 7) The application supporting information should also consider the need for any Unexploded Ordnance (UXO) Removal Works. 8) A detailed review of the NRA in support of any Marine Licence applications will be undertaken before consent is granted. This should include appropriate risk mitigation measures, to ensure the risk remains ALARP.	

In order to inform the shipping and navigation appraisal, consultation with key relevant maritime stakeholders has been undertaken to obtain supplementary information, which may not be available through the data sources outlined in Section 13.4.2.1. Two dedicated consultation sessions were held via Microsoft Teams and are detailed in Table 13-6, each comprising the following elements:

- Introduction to team and summary of NRA process;
- Marine Scheme overview;
- Navigational baseline summary; and

- Facilitated preliminary hazards assessment workshop.

Table 13-6: Shipping and Navigation stakeholder meetings

Date	Location	Attendees
17/11/2021	Microsoft Teams	Maritime and Coastguard Agency (MCA) Northern Lighthouse Board (NLB) Trinity House (TH) Chamber of Shipping (CoS)
30/11/2021	Microsoft Teams	Forth Ports Port of Tyne Tees and Hartlepool Port Authority

In addition to the above, the Royal Yachting Association (RYA), RYA Scotland and Cruising Association (CA) were provided with project information and invited to a consultation session. The RYA and RYA Scotland opted to provide a written response in lieu of a dedicated meeting. The Cruising Association have been informed of this decision and invited to provide further comment. Continuous engagement the both the RYA and CA will continue as the Marine Scheme progresses. Commercial Fisheries representatives have been consulted (see for Chapter 14: Commercial Fisheries).

Consultee input has been incorporated where appropriate into the NRA such that concerns, and impacts are recorded and associated risks are addressed/minimised.

Table 13-7 summarises additional consultation undertaken with relevant statutory and non-statutory consultees in relation to shipping and navigation for the Marine Scheme and outlines how and where this has been addressed in subsequent chapters of the EAR.

Table 13-7: Additional consultation

Consultee	ID	Consultee response/ comment	How and where addressed
MCA	SN-13	Queries about plans for bundling cable and raised concerns around compass deviation relating to EMF emissions. Reiterated MCA position on compass deviation: aim should be less than 3 degree deviation over 95% and 5 degree over 3% of route. If this cannot be achieved further discussions will be required.	Risk associated with potential magnetic compass deviation resulting from EMF emissions is assessed in Section 13.6.4.6 and presented alongside risk reduction measures / commitments to further engagement with MCA as appropriate.
MCA/TH	SN-14	Queries about landfall details and possible reductions in navigable depth. Reiterated MCA position on reductions in navigable depth i.e. reductions exceeding 5% (referenced to Chart Datum) will require specific consultation and consideration.	Risk associated with potential reductions in navigable depths is assessed in Section 13.6.4.2 and presented alongside risk reduction measures/commitments to further engagement with MCA (others) as appropriate.
NLB	SN-15	Highlighted importance of St Abbs for recreational diving.	Importance of St Abbs and Eyemouth as recreational diving bases described in Section 13.5.2.3.
CoS	SN-16	Highlighted importance of considering anchor and fishing gear penetration assessments as part of Cable Burial Risk Assessment (CBRA).	These are built into the CBRA work, which has been refenced as appropriate to inform the NRA process.
TH	SN-17	Highlighted TH position on AtoN relocation: temporary relocation may be acceptable, but not on a permanent basis.	No AToN relocation anticipated based on assessment in Section 13.6.

Consultee	ID	Consultee response/ comment	How and where addressed
TH	SN-18	Flagged updated version IALA guideline on marking of man-made structures, released December 2021, with a section on cables and pipelines. Now IALA guideline G1162 Edition 1.0	Latest IALA guidelines considered during assessment and referenced in Section 13.2.1.
Tees and Hartlepool Port Authority / Port of Tyne	SN-19	Unmanned Surface Craft (USC) servicing offshore wind sector may become more prevalent in the future, especially out of Hartlepool and Port of Tyne, where there is testing underway.	USC contribution to risk of vessel-vessel collisions assessed in Section 13.6.4.1.
Tees and Hartlepool Port Authority	SN-20	Any route deviations that force larger vessels towards the Inner Farne Isles route will be problematic, particularly in poor weather.	Sea room between the marine installation corridor and Farne Isles and route deviations assessed in Section 13.6.4.2.
Tees and Hartlepool Port Authority	SN-21	Some local ports have designated jack-up areas in addition to anchorages which may need to be considered.	All relevant navigational features within study area identified in Section 13.4.1.2, no jack-up designations present.
RYA & RYA Scotland	SN-22	RYA request that developers consider opportunities for recreational gain, but noted that the proposed landfalls provide limited opportunities due to limited access.	Not applicable in assessment, but continued engagement with local stakeholders will occur as the project progresses.
RYA & RYA Scotland	SN-23	Flagged that Durham landfall is within the General Boating Area for Tyneside/ Sunderland, which was identified as a high use area for recreational small craft of all types. Noted that AIS carriage of recreational craft will be in region of 20-30%, so AIS alone will underrepresent GBA users.	Limitations of AIS discussed in Section 13.4.2.1. RYA Coastal Atlas and consultation used to supplement.
RYA & RYA Scotland	SN-24	Bay near Scotland landfall (Thorntonloch (East Lothian)) is used on an occasional basis for windsurfing with access via beach, though there is no formal club.	Plans for HDD and small footprint of landfall make disruption unlikely. Information promulgation to wide range of marine users beyond simple NtM is embedded into project design (section 13.6.2).
RYA & RYA Scotland	SN-25	Highlighted collision with installation vessels as hazard to recreational vessels, especially in relation to the GBA.	Risk of vessel-vessel collisions considered in Section 13.6.3.1.
RYA & RYA Scotland	SN-26	Highlighted grounding due to reduction in navigable depths, particularly around landfalls, as a hazard to recreational vessels, especially in relation to the GBA. Also state that “developer should review Maritime and Coastguard Agency advice on this matter”.	Risk associated with potential reductions in navigable depths is assessed in Section 13.6.4.2 and presented alongside risk reductions measures/commitments to further engagement with MCA (others) as appropriate
RYA & RYA Scotland	SN-27	Highlighted route deviations and “navigational squeeze” leading to grounding and collisions hazards for craft in close proximity to the coast.	Risk of vessel-vessel collisions considered in Section 13.6.3.1 and navigational squeeze in Section 13.6.3.2.
RYA & RYA Scotland	SN-28	Consider that issuing Notices to Mariners (NtMs) will not in itself be sufficient and there will be a need to send NtMs to clubs,	Engagement with local stakeholders and promulgation of information

Consultee	ID	Consultee response/ comment	How and where addressed
		marinas and harbours in the vicinity of the cable landfall sites.	is embedded into project design, as set out in 13.6.2.
RYA & RYA Scotland	SN-28	Construction, particularly at cable landfalls should avoid any permanent loss of boat access (e.g. removal of access points/ routes, beach launching sites, slipways, etc.) The RYA note that temporary loss of access may be unavoidable but suggest that construction around access points and routes should not take place during peak summer recreational periods (15th June and 15th August).	No loss of access at landfall sites anticipated.
MCA/TH	SN-14	Queries about landfall details and possible reductions in navigable depth. Reiterated MCA position on water depth reductions exceeding 5%. If final designs suggest this may occur, specific discussions with MCA (and others) will be required.	Risk associated with potential reductions in navigable depths is assessed in Section 13.6.4.2 and presented alongside risk reductions measures/commitments to further engagement with MCA (others) as appropriate.

13.4.3 Data Gaps and Limitations

As noted in Section 13.4.2.1, the temporal extent of the AIS data used in this appraisal was selected to avoid the period of time considered to be most impacted by the COVID-19 pandemic. The summer 2019 season was selected as being pre-COVID, and the 2021 summer season was selected in response to the Scoping responses from the MMO and MCA. This means that the most recent winter season (Nov 2020 – Jan 2021) has not been selected for use in this Navigational Baseline, additionally there may still be some impact of the COVID-19 pandemic on the seasons of data chosen.

As also noted in Section 13.4.2.1, small fishing and recreation vessels are likely to be underestimated in AIS data. In order to mitigate this, analysis of VMS data has also been included in this chapter to capture a fuller picture of small fishing and recreation vessels. It should however be noted that VMS data does not cover vessels of < 12 m in length, and in the case of the MMO fishing activity by ICES rectangle data, does not include vessels of < 15 m in length, as mentioned previously in Section 13.4.2.1. RYA Coastal Atlas data support the study of recreational activity in the region.

13.5 Baseline Conditions

This section covers the shipping and navigation baseline for the Marine Scheme. Shipping and navigation has been identified as a key receptor for consideration by the EA, due to potential interactions between existing vessel traffic and the Marine Scheme, particularly during the installation phase. It is therefore necessary to identify and assess the potential interactions, to understand the impacts, identify possible mitigation measures and ultimately demonstrate that the Marine Scheme will not adversely affect vessel traffic.

13.5.1 Overview

The marine installation corridor for the Marine Scheme runs parallel to the east coast of the UK, south of the Firth of Forth containing some of the busiest ports in Scotland and passing a number of major industrial and fishing hubs along the Scottish and English coasts including Eyemouth Harbour, Port of Tyne, Port of Blyth, Port of Sunderland and Seaham Harbour. Additional important fishing ports are discussed in detail in Section 14.5.3.1 and include Pittenweem, Port Seton, Anstruther, and Dunbar Harbour in Scotland and Seahouses, Amble, North Shields and Hartlepool. The region also hosts recreational vessel activity, and increasingly is seeing its ports used as bases for existing offshore/marine renewables projects and for those currently under construction.

13.5.2 Key navigational features

13.5.2.1 Ports and navigational features

A chart of the main ports and harbours in the vicinity of the study area, as well as key navigational features is presented in Figure 13-2 The following navigational features have been considered:

- Anchorage areas;
- Pilot boarding;
- Navigational aids including buoys, beacons and navigation lines; and
- IMO routeing.

As Figure 13-2 shows, in Scottish waters (between approx. KP 0 and KP 37) the harbours of Dunbar and Eyemouth lie at the edge of the study area. Dunbar Harbour is located approximately 9.5 km to the northwest of the marine installation corridor at KP 0, while Eyemouth Harbour is located approximately 8.5 km (4 NM) to the south of the marine installation corridor at KP 20.

Although the Forth Ports harbour limits are outside the study area (19 km to the north-west of the marine installation corridor), Forth Ports will be a relevant harbour authority, as much shipping traffic in the wider region will route to and from their facilities within the Firth of Forth.

In English waters, the harbour limit of Seaham Harbour is approximately 0.8 km to the south of the marine installation corridor at the closest point (KP 175), with the Port of Sunderland limit lying approx. 0.8 km to the north at the closest point (KP 175). The ports authority areas of Tyne and Hartlepool do not fall within the study area, being approximately 13.5 km (7.3 NM) and 12 km (6.5 NM) away from the marine installation corridor respectively. However, as much shipping traffic in the region will route to and from these locations, intersecting with the study area, they are relevant port and harbour authorities for the Marine Scheme.

Details of the ports and harbours within the study area are given below:

- Dunbar Harbour is used for landing fish and for recreational craft (UKHO, 2018). The commercial vessels land mainly shellfish (Dunbar Harbour Trust, 2018). Vessels of up to 30 m in length and 4 m draught can be handled at high water springs but lie aground at low water (UKHO, 2018).
- Eyemouth Harbour is the base for a local fishing vessels of approximately 20 vessels (Eyemouth Harbour Trust, 2021), and can also accommodate recreational craft (UKHO, 2018). Eyemouth Harbour has seen usage by offshore wind workboats and survey vessels relating to the Firth of Forth and Tay offshore wind sites in recent years (Eyemouth Harbour Trust, 2021), as well as serving as a base for support vessels for the Neart na Gaoithe windfarm, as identified in Scoping responses from the RYA.
- The Port of Sunderland is a cargo handling port (UKHO, 2018) with deep water berths. The port has positioned itself as a potential offshore wind hub, and already supports Moray East Offshore Windfarm (Port of Sunderland, 2021).
- Seaham Harbour is a commercial port, with an inner and outer harbour contained by breakwaters, as well as an outer anchorage to the ENE with depths between 8 and 16 m (UKHO, 2018). It handles ships of up to 8,000 tonnes with a maximum length of 120 m and draught of 6.7 m (Victoria Group, 2019).

Additionally, details on ports and harbours outside of the study area, which may be relevant, are given below:

- Forth Ports operates six ports within the Firth of Forth: Grangemouth, Leith, Rosyth and the Fife ports of Burntisland, Kirkcaldy and Methil (Forth Ports, 2021). Grangemouth is Scotland's second largest port handling a range of vessels including container vessels, tankers and LPG carriers (UKHO, 2018). Its flow of cargo represents as much as 30% of Scotland's GDP (Forth Ports, 2021).
- The Port of Tyne is a busy, commercial deep-sea port, trading numerous cargoes including grain, coal, timber, oil, chemicals and aggregates. Passenger ferries and cruise ships also use the port

with additional facilities used as a base for the offshore oil and gas industry (UKHO, 2018) as well as offshore wind (Port of Tyne Authority, 2021).

- Hartlepool is a mid-sized commercial port, with facilities for platform and pipeline construction (UKHO, 2018). Hartlepool port considers itself a renewables and oil and gas hub, and currently services the Teesside Offshore Wind Farm (PD Ports, 2021).

Scoping responses from the Scottish Chamber of Shipping identify anchor snagging risk as a main concern during construction of the Marine Scheme. This appraisal confirms that there are no charted anchorage locations that intersect with the marine installation corridor in either Scottish or English waters. In Scottish waters there is an anchorage location within the study area near Eyemouth Harbour which is approximately 7.3 km away from the marine installation corridor, at KP 17. In English waters, an anchorage is located to the east of Seaham Harbour which is approximately 1.4 km away from the marine installation corridor, at KP 174. Also within the study area are two anchorage locations (3.8 km and 6.6 km from the marine installation corridor, at KP 175 and 172 respectively) and two pilot boarding locations (6.9 km and 2.9 km north of the marine installation corridor, at KP 173 and KP 171 respectively) associated with Port of Sunderland. An anchorage area 'Whiskey' associated with Tees and Hartlepool Port Authority overlaps with the study area to the south, approximately 7.6 km from the marine installation corridor at KP 171, the closest point (Figure 13-2).

In terms of aids to navigation, in Scottish waters a buoy is present approximately 3.5 km north-west of the Scottish landfall (KP 0), additionally a number of buoys and beacons are located in proximity to Eyemouth Harbour.

In English waters, there are beacons and buoys associated with Port of Sunderland and Seaham Harbour within the study area, with the closest being within the Seaham Harbour administrative harbour area, and approximately 1.6 km from the marine installation corridor, at KP 175.5.

There are no Traffic Separation Schemes (TSSs) or other routeing measures in the vicinity of the Marine Scheme study area.

13.5.2.2 Military Practice Areas

Figure 13-3 shows the military practice areas, also known as PEXA, within the region and in proximity to the marine installation corridor. There are no PEXA areas which directly overlap with the marine installation corridor, however there are a number of PEXA which overlap with the study area. In Scottish waters, X5642 and X5641 overlap the study area in the north, which are both submarine exercise areas, and practice and exercise areas (surface vessels).

In English waters, an Area of Intense Aerial Activity D323G overlaps the study area from the south-east between approximately KP 160 and KP 168 and is approximately 5.3 km from the marine installation corridor at the closest point at KP 166.

13.5.2.3 Recreation

As stated previously, AIS is not compulsory for recreational vessels and they tend to be under-represented in AIS data; however, there are alternative approaches to understand recreational usage patterns. The RYA Coastal Atlas was used to identify recreational features relevant to the study area. This includes general boating areas, clubs and other facilities (Figure 13-4). Within Scottish waters, Dunbar Harbour has two Royal Yachting Association (RYA) Training Centres and a Sailing Club whilst Eyemouth Harbour has a marina according to the RYA Coastal Atlas shown in Figure 13-4.

Recreational activity is moderately low, with some recreational traffic running along the coastline and from Eyemouth Harbour intersecting the marine installation corridor at approximately KP 7 to KP 21. Eyemouth Harbour is noted for having good facilities for recreational vessels in the Royal Northumberland Yacht Club Sailing Directions (Royal Northumberland Yacht Club, 2021).

Within English waters (from approximately KP 38 onwards), the study area runs parallel to the coastline intersecting three RYA General Boating areas between approx. 5.9 and 9 km from the marine installation corridor. The study area also crosses into a General Boating area between KP 160 and the landfall at KP 176.25. At the Port of Sunderland, there are two sailing clubs, two training centres and a marina within the harbour breakwaters. Seaham Harbour also has a marina within its breakwaters and accepts

visiting boats all year round (Royal Northumberland Yacht Club, 2021). AIS intensity shows that recreational activity is highest inshore from the study area between Warkworth (Amble) Harbour and the Port of Sunderland, crossing into the study area around the Port of Sunderland. Areas of moderate recreational activity intersect the marine installation corridor between approximately KP 159 and KP 173.

It should also be noted that in Scottish waters there are numerous extremely popular SCUBA diving sites in the area around Eyemouth and St Abbs (approximately 4 km south-west of KP 20), including nearshore sites and more remote locations accessible by dive-charter boat, with a focus on wrecks. There are a number of established wrecks for diving inshore and offshore of the marine installation corridor.

Within English waters, the Farne Islands (9 km south-west of KP 70) are a popular dive site, with boat access from Seahouses and Beadnell on the Northumberland coast.As discussed in Section 13.5.5, time of year is an important factor when it comes to the level of recreational activity that can be expected within the study area and should be considered for the Marine Scheme installation.

13.5.2.4 Other Infrastructure and Navigational Features

The following additional features which have been considered, are shown in Figure 13-5:

- Offshore wind farms and other renewable sites;
- Subsea cables;
- Aggregate areas;
- Dredge spoil disposal;
- Oil and gas infrastructure and licences; and
- Charted wrecks.

Charted wrecks are discussed in detail in Chapter 12: Marine Archaeology, and offshore infrastructure is discussed in Chapter 14: Other Sea Users. Offshore infrastructure and other features are included here from a navigational perspective.

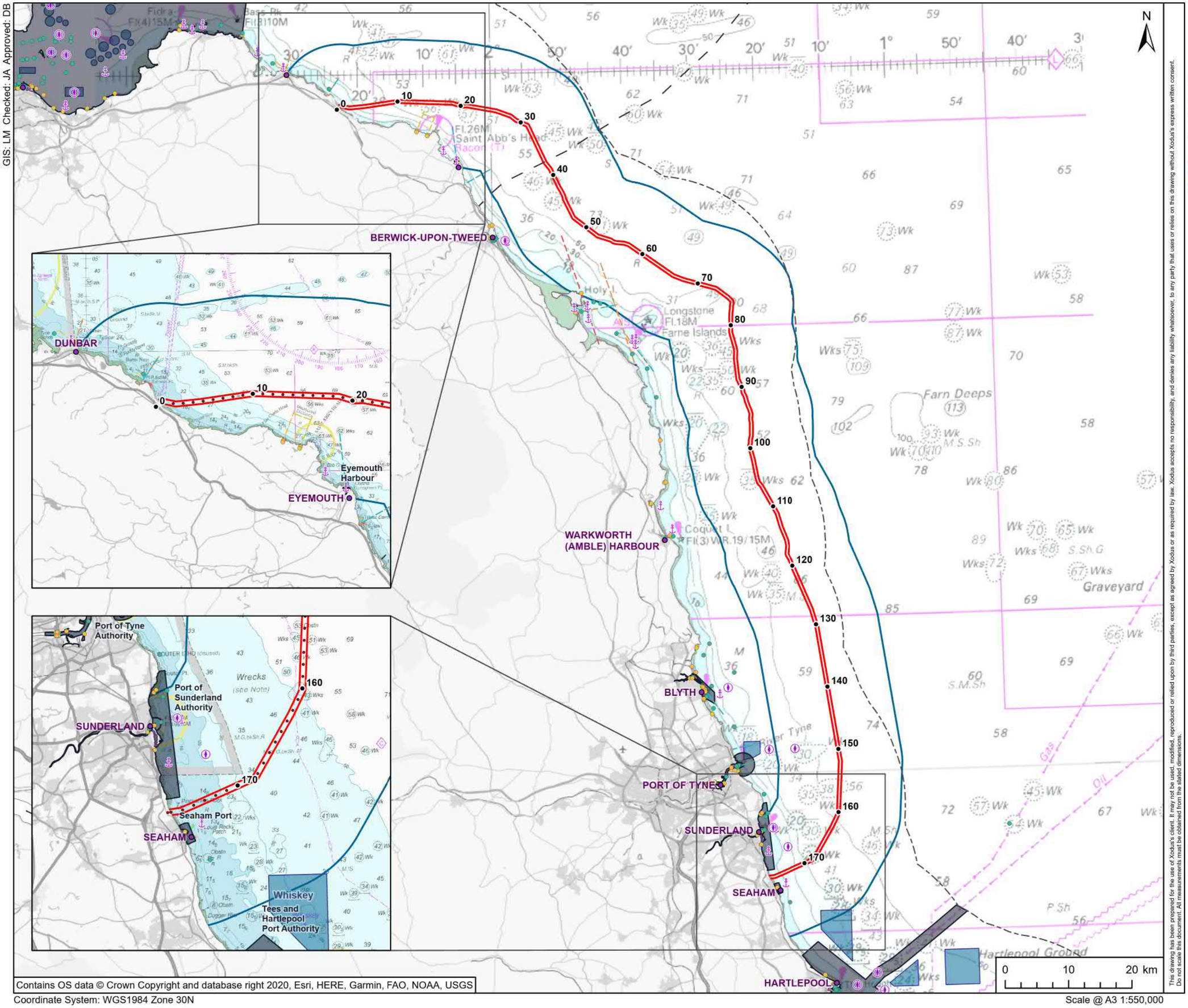
Figure 13-5 shows that within Scottish waters there is an offshore wind farm cable agreement located in close proximity (approximately 400 m) to the marine installation corridor at landfall (KP 0) which is for the Neart na Gaoithe Offshore Windfarm. The windfarm itself is located approximately 18 km north of the study area. There is also one active dredge disposal location, approx. 6.9 km from the marine installation corridor at the closest point, south-west of KP 27.

In English waters from KP 129 onwards there is an increased concentration of other infrastructure and features. The North Sea Link interconnector intersects the marine installation corridor at approximately KP 129, and two further telecom cables intersect the corridor at approximately KP 137.5 and KP 141.5 both part of the Havhingsten system. The eastern-most windfarm array of the Blyth Demonstration Site falls within the study area and is approximately 4.7 km from the marine installation corridor at the closest point at KP 137. There are four active dredge disposal sites within the study area as shown on Figure 13-5, as well as an inactive dredge disposal area that overlaps the marine installation corridor at KP 159.

UKHO Charted wrecks are located throughout the study area in both Scottish and English waters but show an increased concentration in English waters from approximately KP 140 onwards. There are nine wrecks identified which fall within the marine installation corridor, two within Scottish waters and seven within English waters one of which is classified by the UKHO as a ‘dangerous wreck’, located at approximately KP 168.

In terms of oil and gas infrastructure, there are no infrastructure or licences within the study area, as Figure 13-5 shows, but there are oil and gas licences located in English waters within 25 km to the east of the study area between KP 116 and the English landfall.

GIS: LM Checked: JA Approved: DB



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nationalgrid

SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

Navigational features

- Anchorage area
- Pilot boarding place
- Beacon
- Buoy
- Navigation line, Clearing line
- Navigation line, Leading line
- Navigation line, Transit line
- Navigation line, Undefined
- Route, Recommended, Centreline
- Route, Recommended, Track
- Harbour area (administrative)
- Dock
- Anchorage

NOTES:

Not to be used for navigation.

TITLE

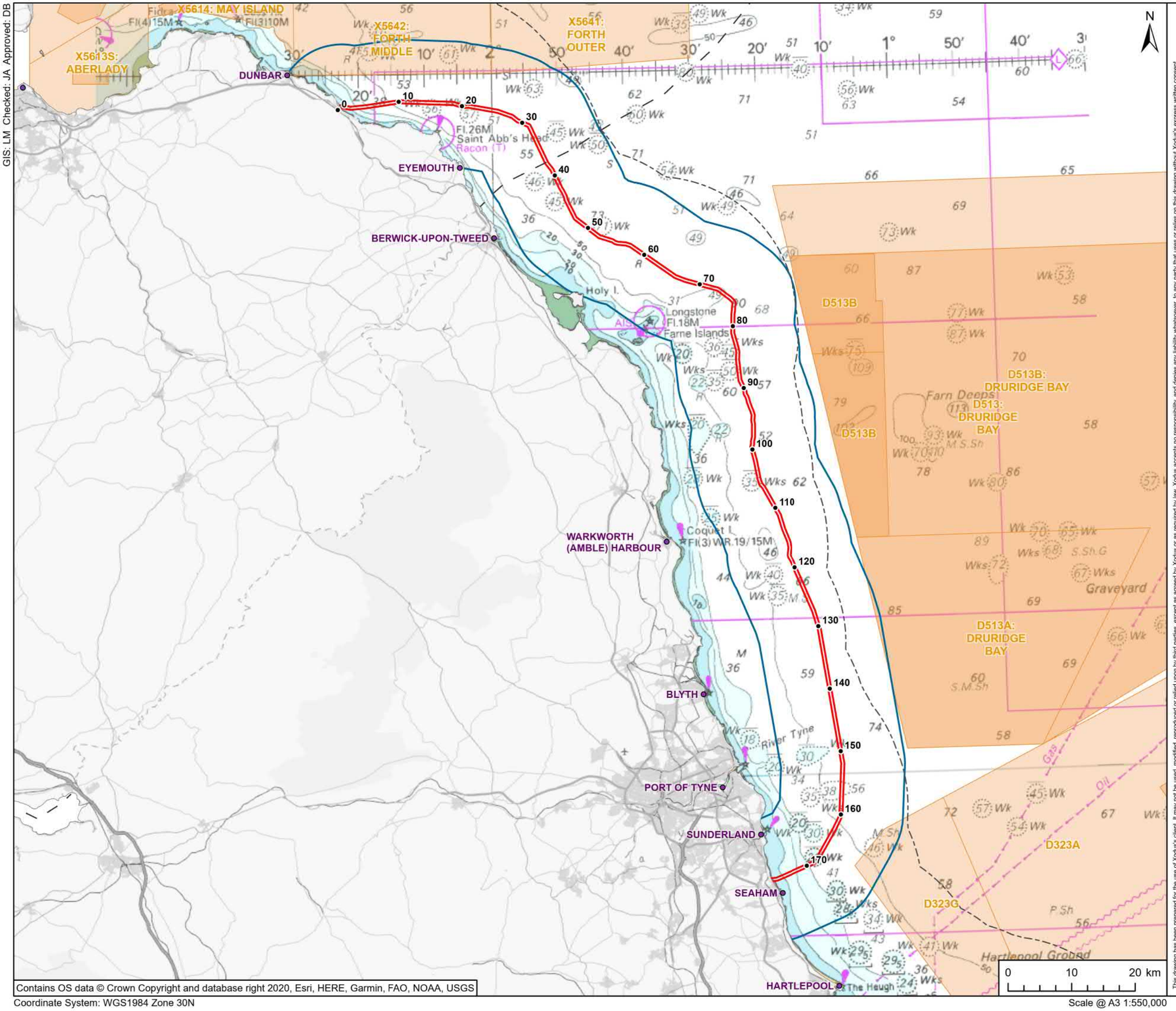
Figure 13-02
Ports and navigation

REFERENCE

SEGL1_M_EAR_13-02_v1_20211216

SHEET NUMBER	DATE
1 of 1	16/12/2021

GIS: LM Checked: JA Approved: DB



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nationalgrid

SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border
- Military practice and exercise areas (PEXA)

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TITLE

Figure 13-03
Military practice areas

REFERENCE

SEGL1_M_EAR_13-03_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

GIS: LM Checked: JA Approved: DB

DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

N

0 10 20 km

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Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:550,000

nationalgrid

SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

RYA Coastal Atlas

- Sailing Clubs
- Marinas
- Training Centres
- General Boating Areas

Mean AIS Intensity

- High
- Low

NOTES:
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UK Coastal Atlas of Recreational Boating 2.1 © Royal Yachting Association
Port and harbour limits © Crown copyright 2020 UK Hydrographic Office
Admiralty Charts © Crown copyright 2021 UK Hydrographic Office. emapsite d/l ref – 878887
Not to be used for navigation.

TITLE

Figure 13-04
Recreation

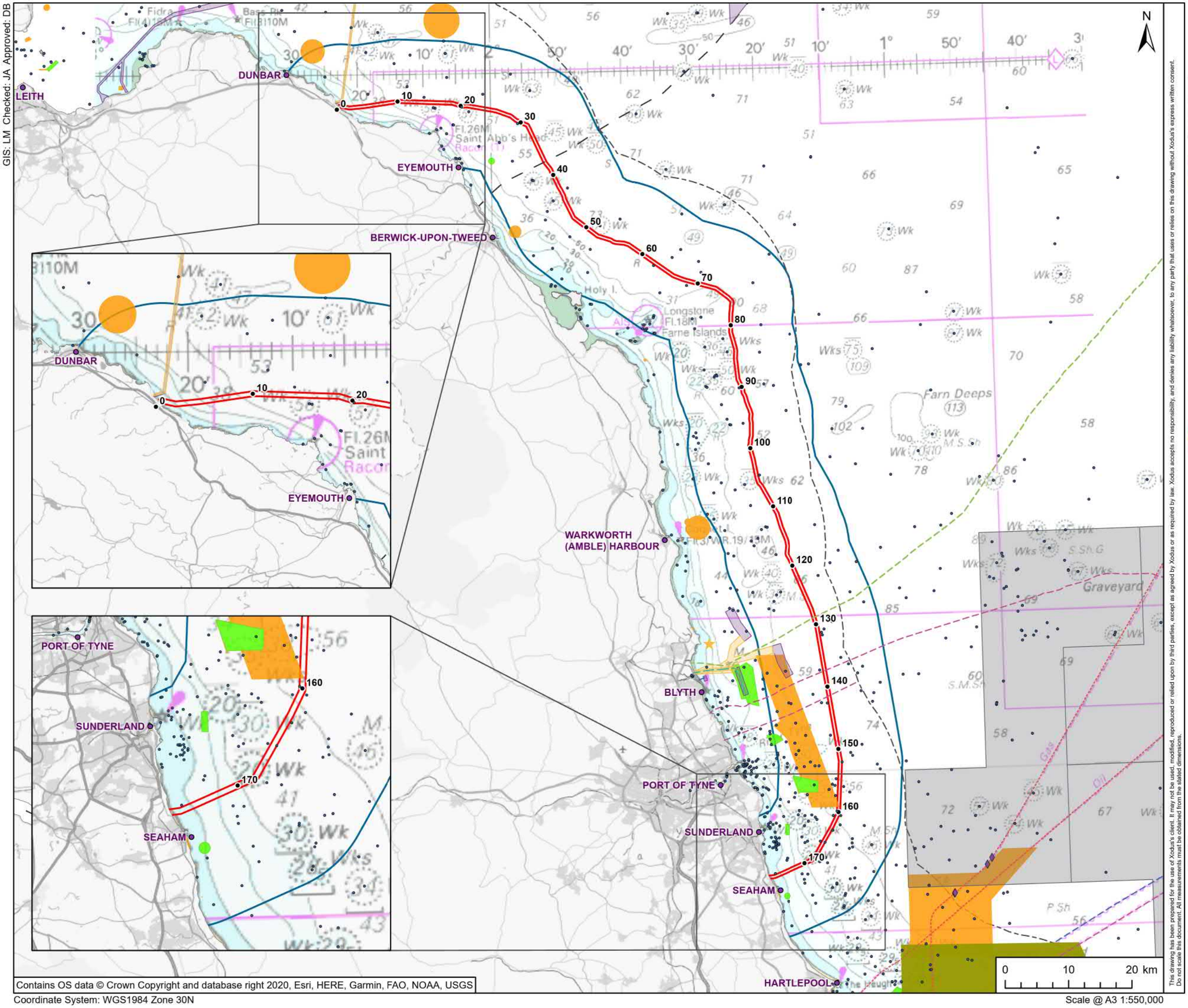
REFERENCE

SEGL1_M_EAR_13-04_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

GIS: LM Checked: JA Approved: DB



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Scale @ A3 1:550,000

nationalgrid

SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border
- Wrecks
- Offshore wind site agreements
- Offshore wind cable agreements
- Offshore minerals - Aggregates, evaporites and mining site agreements

Cables

- Power active
- Power under construction
- Telecom active
- Inactive cables

Dredge spoil dumping

- Closed
- Open

Oil and gas

- Surface infrastructure
- Subsurface infrastructure
- Pipelines
- Licences

NOTES:

Not to be used for navigation.

TITLE

Figure 13-05
Other navigational features

REFERENCE

SEGL1_M_EAR_13-05_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

13.5.3 Emergency response overview

This section considers the emergency response in the study area by the RNLI and by SARH including such data as:

- RNLI Stations (RNLI); and
- SARH bases and radii of action (Department for Transport and MCA).

13.5.3.1 RNLI

The RNLI has six regions; the study area falls within the 'Scotland' and 'North and East' RNLI regions (Figure 13-6). The RNLI has 238 stations and more than 400 lifeboats (RNLI, 2021c). There are a number of RNLI lifeboat stations within close proximity to the study area, as presented in Table 13-8 and shown in Figure 13-6. There are two lifeboat stations within the study area: Eyemouth in Scottish waters and Sunderland in English waters. Eyemouth lifeboat station operates an all-weather Trent-class lifeboat and a D class inshore lifeboat (RNLI, 2021a), and Sunderland has two inshore lifeboats, an Atlantic 85 and a D class (RNLI, 2021b). In addition to RNLI lifeboat stations, the independent St Abbs Lifeboat (formerly part of the RNLI until 2015) runs out of St Abbs Harbour (Figure 13-6) using a 900W Rigid Inflatable Boat (St Abbs Lifeboat, 2021).

Table 13-8: RNLI lifeboat stations within 25 km of study area

Station	Lifeboats	County	Division
Scotland			
Dunbar	ALB/ILB	East Lothian	Central & Shetland
Eyemouth	ALB/ILB	Scottish Borders	Central & Shetland
North Berwick	ILB	East Lothian	Central & Shetland
England			
Amble	ALB/ILB	Northumberland	North & Scot South
Berwick-Upon-Tweed	ALB/ILB	Northumberland	North & Scot South
Blyth	ILB	Northumberland	North & Scot South
Craster	ILB	Northumberland	North & Scot South
Cullercoats	ILB	Tyne and Wear	North & Scot South
Newbiggin	ILB	Northumberland	North & Scot South
Redcar	ILB	North Yorkshire	North & Scot South
Seahouses	ALB/ILB	Northumberland	North & Scot South
Tynemouth	ALB/ILB	Tyne and Wear	North & Scot South
Hartlepool	ALB/ILB	County Durham	North & Scot South
Sunderland	ILB	Tyne and Wear	North & Scot South

13.5.3.2 SARH

As part of the MCA, HM Coastguard initiates and coordinates Search and Rescue (SAR) response around the UK. Since April 2015, Bristow Search and Rescue has provided the helicopter SAR service on behalf of HM Coastguard, operating 10 helicopter bases around the UK (Bristow Group, 2021).

The study area lies between the SARH bases of Inverness to the north (approximately 205 km away at the closest point), Prestwick to the west (approximately 150 km away) and Humberside to the south (approximately 145 km away) (see Figure 13-7). The study area sits fully within the radii of action of four SARH bases (Inverness, Prestwick, Humberside and Caernarfon).

13.5.4 Maritime incidents

A review of previous marine incidents within the study area can give an indication of the general level of marine incident risk in this region, which may be relevant during the installation phase of the Marine Scheme.

This section considers such data as:

- RNLI Return to Service (launches in response to incidents); and
- SARH taskings (Department for Transport).

13.5.4.1 RNLI

The RNLI keeps a record of call-outs to marine incidents. Those in the study area between 2008 and 2020, which were deemed not to be false alarms or hoaxes, are shown in Figure 13-6.

A total of 1,524 unique incidents, were recorded between 2008 and 2020. Of those incidents, 27.9% were due to machine failure, and 86% (1,311 incidents) were within 5 km of shore.

13.5.4.2 SARH

There were 61 SARH taskings in the study area between April 2016 and March 2021 (Figure 13-7). No incidents occurred within the marine installation corridor boundaries.

13.5.5 Marine Traffic Survey

13.5.5.1 Automatic Identification System (AIS) data overview

AIS data overview and seasonality

A total of 11,435 AIS vessel tracks were recorded across the two-season study period within the study area. There were 5,723 tracks across the three summer months and 5,712 during the winter season (Table 13-9). July (2021) was the month with the most tracks at 2,224, while May (2021) was the month with the least, at 1,575, which may be due to the change in UK COVID-19 restrictions from Spring to Summer 2021. One of the main differences between the two seasons was fewer fishing vessel tracks in the summer season compared to winter, especially in May and June 2021, and there were more passenger, recreational vessels and other vessels present over the summer season than the winter (see Figure 13-8). Time of year is therefore a significant consideration for the Marine Scheme installation.

The summer and winter AIS vessel tracks densities are displayed in Figure 13-9. There are similar patterns between the two seasons, with a moderate density of vessel tracks routeing from Scottish waters from KP 10 to KP 90 in English waters, parallel to the coastline. However, in the winter season, there was a higher concentration of tracks routeing to and from the Tyne, reaching over 200 tracks per 1 km^2 across the season as they cross the marine installation corridor at approx. KP 138 to KP 161. The summer season sees higher vessel track density in Scottish waters than in the winter season (Figure 13-9), as well as higher density in proximity to Seaham Harbour.

The day on which most vessels began a journey or crossed into the study area was 22nd January 2020 (Figure 13-10), when 120 vessel tracks were recorded. Conversely, the quietest day was 24 December 2019 when only 12 vessel tracks were recorded within the study area.

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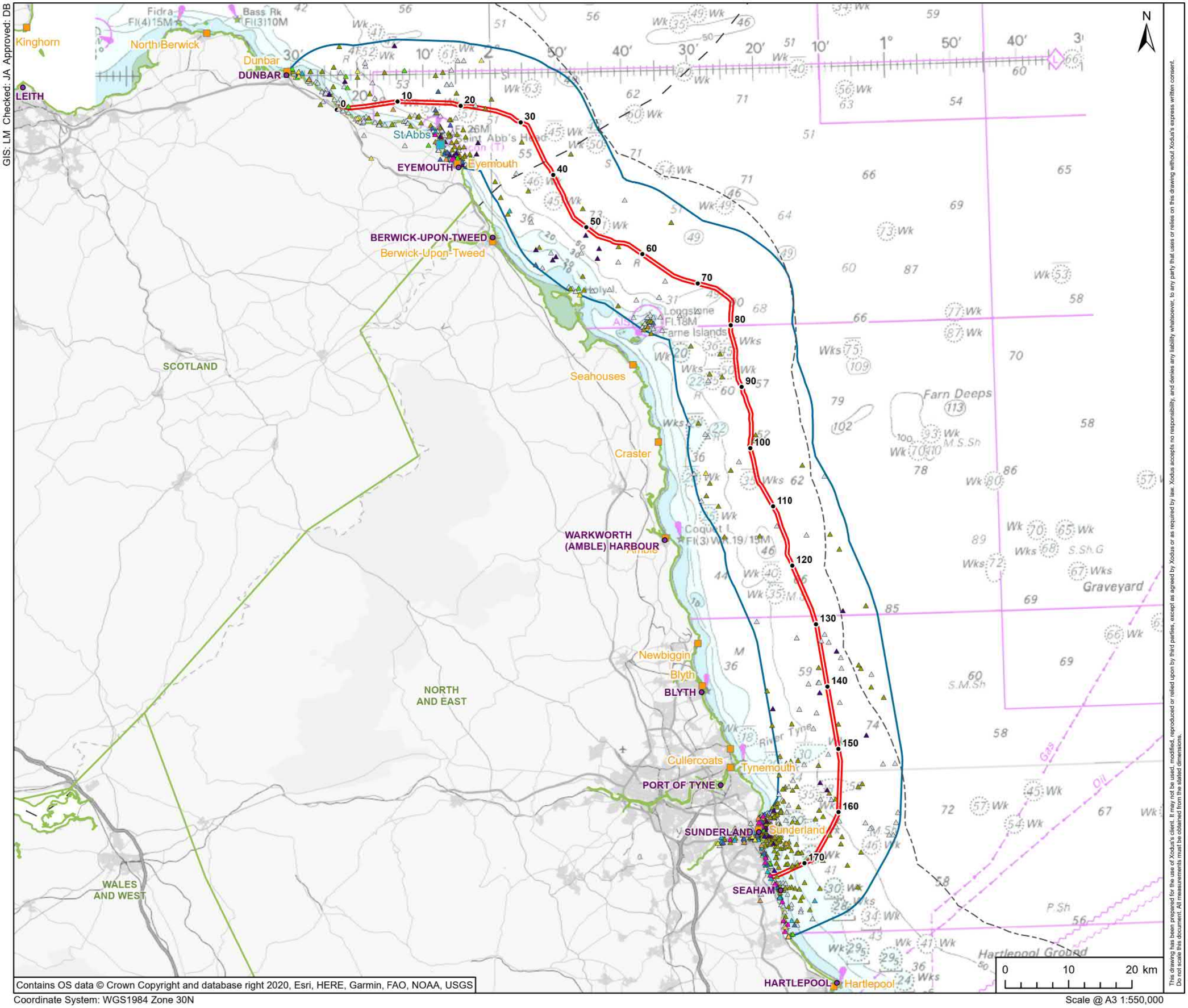

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Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:550,000

nationalgrid

SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border
- RNLI Lifeboat station
- St Abbs lifeboat station
- RNLI regions

RNLI Returns of Service (2008 - 2020)

- Machinery Failure
- Person in distress
- In danger of drowning
- Person missing
- Fouled propeller / impeller
- Injured
- Cut off by tide
- Thought to be in trouble
- Other or unknown

NOTES:

Not to be used for navigation.

TITLE

Figure 13-06
RNLI Search and Rescue

REFERENCE

SEGL1_M_EAR_13-06_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

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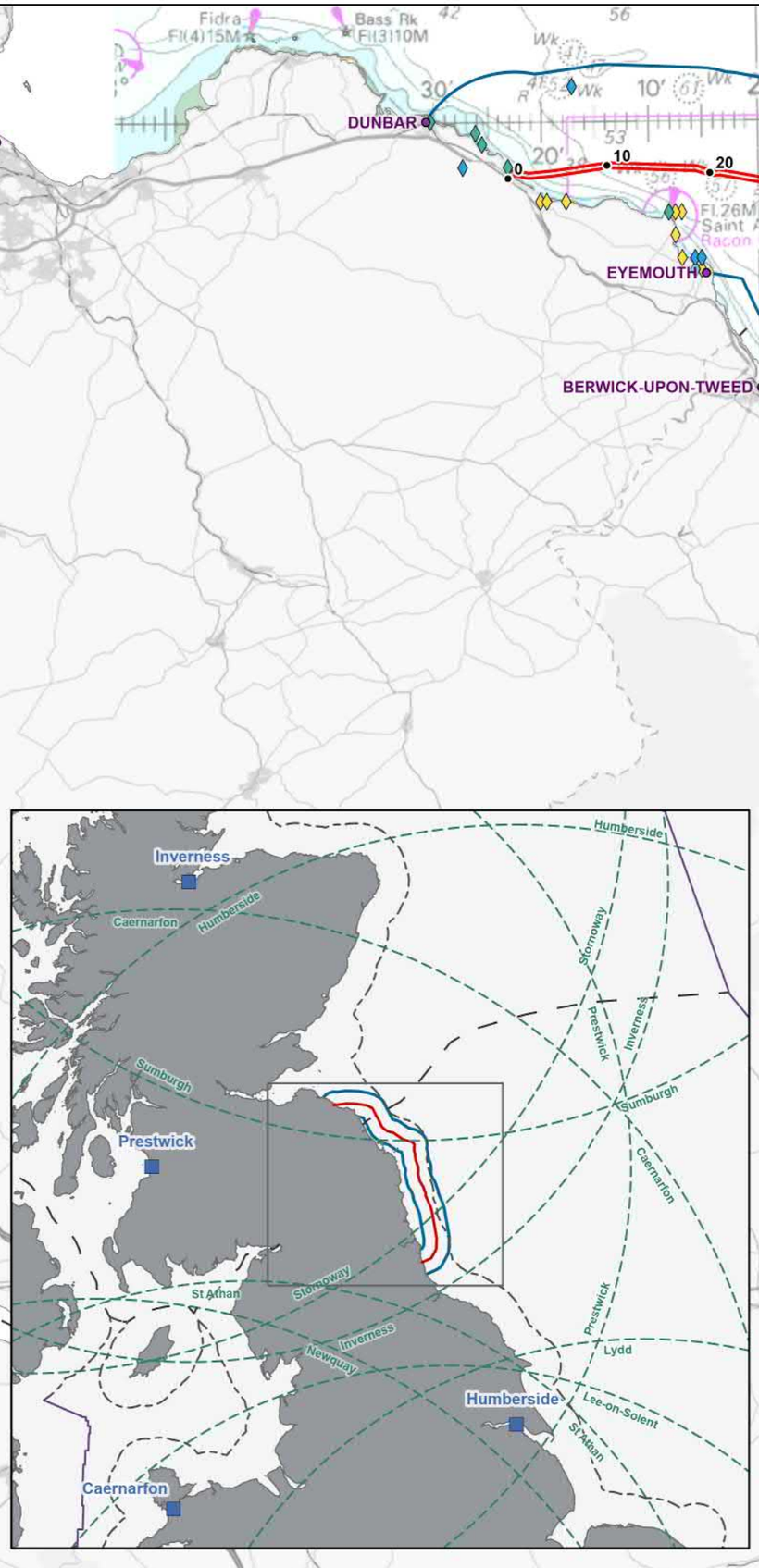

Coordinate System: WGS1984 Zone 30N

Fidra Fl(4)15M
Bass Rk Fl(3)10M
DUNBAR
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
Fl.26M
Saint Abb's Head
Racon (T)
EYEMOUTH
BERWICK-UPON-TWEED
Holy I.
Longstone
Fl.18M
Farne Islands
WARKWORTH
(AMBLE) HARBOUR
Coquet I.
Fl(3)WR.19/15M
BLYTH
River Tyne
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL
Farn Deeps
Graveyard
Hartlepool Ground
The Heugh
Gas
Oil
N
0 10 20 km

Scale @ A3 1:550,000

nationalgrid
SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border
- SARH bases
- SARH Radii of action

SARH taskings Apr 2016 to Mar 2021

- Rescue/Recovery
- Search
- Support

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SARH Department of Transport and MCA.
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TITLE

Figure 13-07
SARH

REFERENCE

SEGL1_M_EAR_13-07_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

Table 13-9: Vessel tracks per season

	Count	Average tracks per day
Summer	5,723	62.2
Winter	5,712	62.1
Total	11,435	62.1

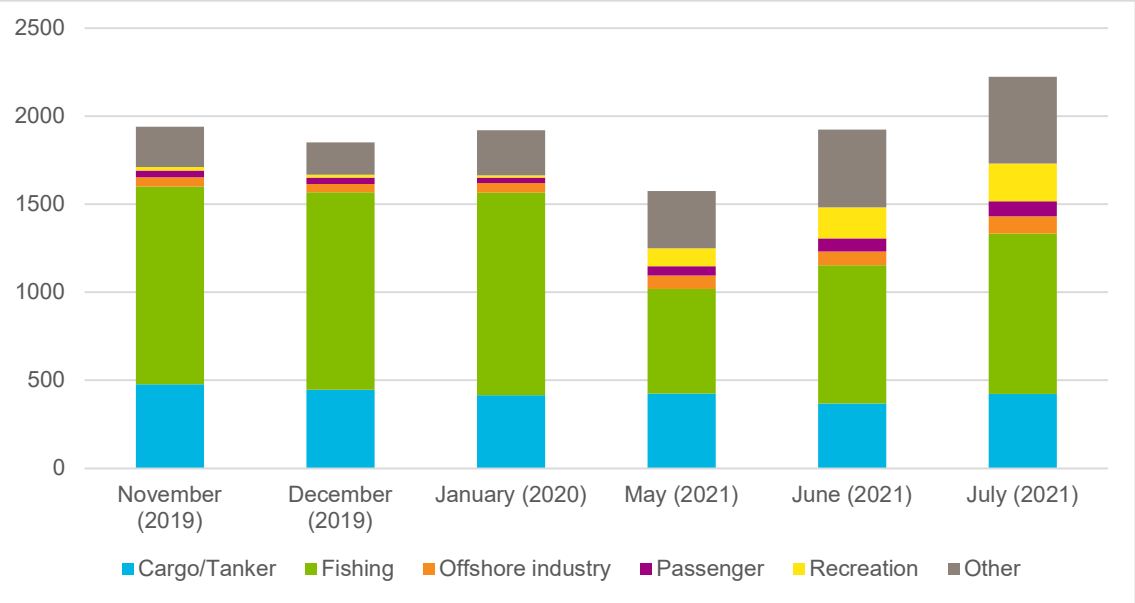

Figure 13-8: Distribution of AIS vessel tracks by month and vessel type

GIS: LM Checked: JA Approved: DB

Winter (Nov 2019 - Jan 2020)

Summer (May 2021 - July 2021)

N

DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL
TEESPORT

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

Isle of May
Berwick Bank

0 20 40 km

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Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:660,000

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PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

Seasonal vessel track density per 1sqkm

- 0 - 25
- 26 - 50
- 51 - 75
- 76 - 100
- 101 - 200
- > 200

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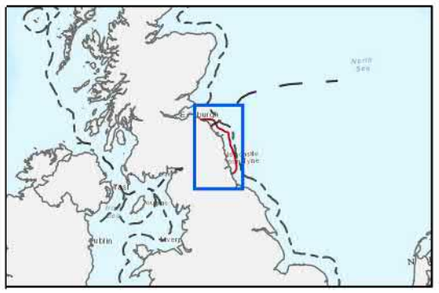

TITLE

Figure 13-09
Seasonal vessel track density

REFERENCE
SEGL1_M_EAR_13-09_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

GIS: LM Checked: JA Approved: DB

DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

N

0 10 20 km

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Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:550,000

nationalgrid

SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border
- Vessel tracks on the busiest day (22nd January 2020)

NOTES:
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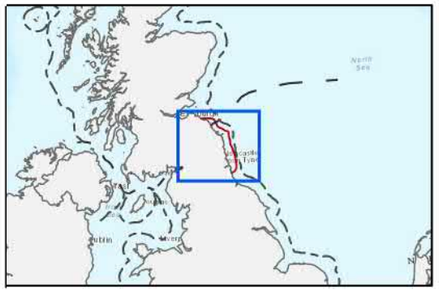


TITLE

Figure 13-10
Busiest day

REFERENCE
SEGL1_M_EAR_13-10_v1_20211215

SHEET NUMBER
1 of 1

DATE
15/12/2021

13.5.5.2 Vessel type

The most frequently recorded AIS vessel tracks in the study area were from fishing vessels with 49.7% of all tracks across the two seasons, with “cargo/tanker” and “other” vessels following at 22.3% and 16.9% of tracks respectively (Table 13-10). “Offshore industry”, “passenger” and “recreational” tracks were relatively low, at 3.6%, 2.8% and 4.7% of all tracks, respectively.

Figure 13-12 shows AIS vessel tracks classified by vessel type for the summer and winter seasons. In Scottish waters in winter, high levels of vessel activity are observed between approx. KP 10 – KP 28, this primarily results from fishing vessels working from the harbours of Dunbar and Eyemouth (potentially Nephrops trawlers and others – see Section 14.5.3.1), as well as cargo vessels and tankers transiting along the coast, to and from the Firth of Forth, in a direction broadly parallel to the marine installation corridor. In Scottish waters in summer the fishing and cargo and tanker vessels show a similar trend, although intense activity is over a wider area from approx. KP 0 to KP 28. Additionally, in summer, Figure 13-12 shows the presence of offshore vessels routeing to and from Eyemouth Harbour north-west along the coast and crossing the marine installation corridor at KP 3 to KP 5, which may relate to the installation of the export cable for Neart na Gaoithe Offshore Windfarm, which makes landfall at this location (see Figure 13-5). The summer season also sees an increase in recreational vessels in Scottish waters, with activity radiating out from Eyemouth Harbour to the north-west and south-east along the coast into English waters.

Within English waters, vessel traffic between KP 38 to KP 120 in both summer and winter seasons relates mainly to the presence of cargo and tanker vessel tracks transiting along the coast to and from the Firth of Forth. Fishing vessel tracks can be seen intersecting the marine installation corridor in both seasons, routeing to and from the ports and harbours along the English coast including Warkworth (Amble) Harbour, Port of Blyth and Port of Tyne with this activity showing greater intensity in the winter season. Summer sees higher recreational activity throughout the study area, in particular routeing to and from Port of Sunderland and Seaham Harbour and intersecting the marine installation corridor at approximately KP 169 to KP 174. The winter season sees much higher fishing activity between approx. KP 124 to KP 155 than the summer season (see Figure 13-12). Both seasons show a concentration of passenger vessel traffic crossing the marine installation corridor at approximately KP 161 and KP 162. This relates mainly to Newcastle to Ijmuiden (Netherlands) ferry vessel traffic, which is run by operator DFDS (DFDS, 2021).

Table 13-10: AIS vessel tracks by type

Vessel type	No of vessel tracks	Percentage of total
Cargo/Tanker	2,553	22.3
Fishing	5,684	49.7
Offshore industry	407	3.6
Passenger	323	2.8
Recreational	537	4.7
Other	1,931	16.9
Total	11,435	100

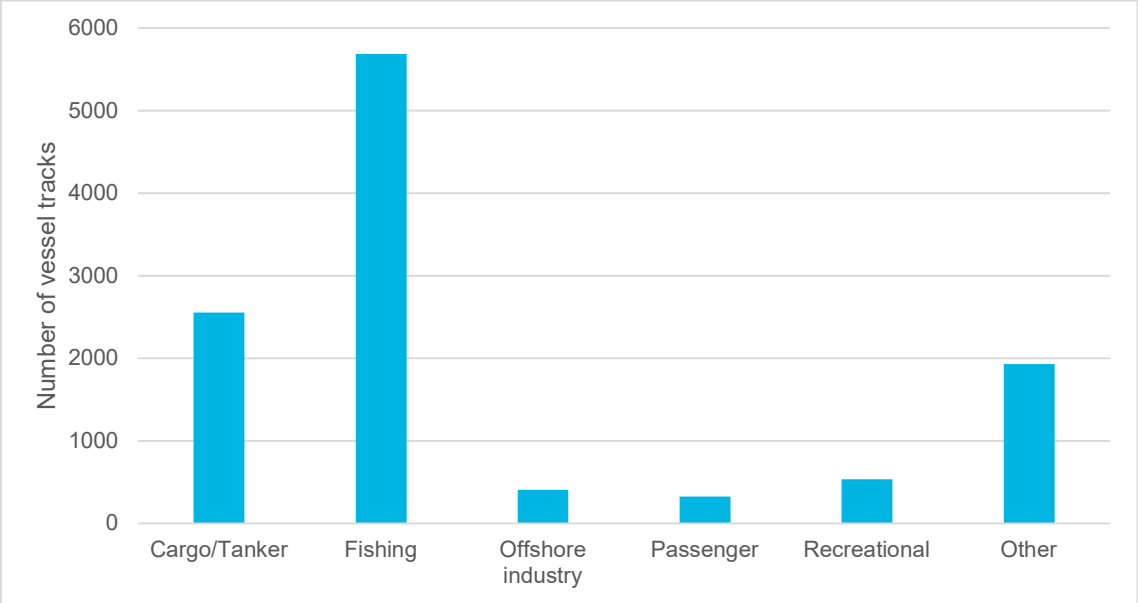


Figure 13-11: AIS vessel tracks by vessel type

The following sections describe the vessel activity across both seasons per vessel type. Fishing vessel traffic will be considered separately in Section 13.5.5.4.

Cargo vessels and tankers

As shown in Figure 13-13, high levels of cargo vessel and tanker traffic is present throughout the majority of the study area, from approximately KP 10 to KP 170, transiting to and from the Forth Ports within the Firth of Forth and along the Scottish and English coastlines. Cargo and tanker traffic can also be seen routeing to and from the Port of Tyne, Port of Sunderland and Seaham Harbour.

Passenger vessels

Passenger vessel activity is low throughout both Scottish and English waters (see Figure 13-13). In Scottish waters passenger vessel activity relating to crew transfer for the Neart na Gaoithe export cable installation transits to and from Eyemouth Harbour and its landfall at Thorntonloch Beach. At least two out of the four unique vessels responsible for these tracks, MMSI 235063646 (Celtic Voyager), 235095248 (Celtic Nomad), can be confirmed to have been working on the Neart na Gaoithe export cable installation during this period from Vessel Reports published on the project website (Neart na Gaoithe, 2021). Additionally, there is a route of passenger vessel traffic which transits from Eyemouth Harbour to south of the marine installation corridor at approx. KP 6 to 8, without crossing it (Figure 13-13). This activity is related to one vessel MMSI 235030726 (Sagittarius) which is a charter boat offering angling and sightseeing trips (CBUK, 2021). In English waters passenger vessel activity mainly relates to the regular ferry route of Newcastle – Ijmuiden, as mentioned previously in this Section.

Recreational vessels

In Scottish waters recreational vessel activity is focussed around Eyemouth Harbour, routeing north-west up the Scottish coast as well as south into English waters. Port of Tyne, Port of Sunderland and Seaham Harbour in English waters show recreational vessel activity routeing to and from their ports and harbours which intersects the marine installation corridor between approximately KP 160 and KP 174, with the highest concentration being between KP 169 to KP 174 (Figure 13-13). Additionally, recreational vessel traffic from Port of Blyth crosses the marine installation corridor at approximately KP 130.

Offshore industry vessels

Offshore industry vessel activity in Scottish waters is mainly related to installation of the Neart na Gaoithe export cable installation, transiting between Eyemouth Harbour and Thorntonloch Beach and crossing the marine installation corridor at approx. KP 3 to KP 5 (Figure 13-13). In English waters, offshore vessel activity is present through much of the study area but is highest towards the south of the study area, where offshore industry vessels can be seen travelling to and from Port of Blyth and Port of Sunderland.

Other vessels

Other vessels could include vessels such as tugs, search and rescue vessels, military operations vessels, dredgers, research / survey vessels and unknown type vessels. In Scottish waters, other type vessels show a high concentration of vessel activity between KP 2 to KP 29 (Figure 13-13). In English waters, other vessel traffic is highest between approximately KP 132 and KP 172, routeing to and from the Port of Tyne and the Port of Sunderland.

13.5.5.3 Vessel size and status

Vessel length

AIS data contains information on vessel length. As shown in Table 13-11 the majority of tracks (54%) were associated with small vessels of 1 – 50 m in length. Only 4.5% of vessel tracks were from vessels of over 150 m in length. Figure 13-14 shows that the vessel tracks associated to vessels of 1 – 50 m length were mostly fishing vessels. Recreation and offshore industry vessels are also higher represented in this length class than in other vessel length classes. Cargo and tanker vessels dominated tracks associated with vessels of between 50 – 200 m in length, with passenger vessel tracks comprising a significant portion of traffic from vessels of 150 – 200 m in length, which likely relates to the Newcastle – Ijmuiden ferry.

Table 13-11: AIS vessel tracks distributed by vessel length

Length (m)	Vessel tracks	Percentage of total
1 - 50	6,170	54
50 - 100	1,745	15.3
100 - 150	1,084	9.5
150 - 200	441	3.9
Over 200	67	0.6
Unknown	1,928	16.9
Total	11,435	100

The spatial patterns in vessel length are presented in Figure 13-15. In Scottish waters, there is a clear trend of medium and larger length vessels (over 100 m) routeing further offshore, from approx. KP 11 to the border with English territorial waters. Vessels of the largest length class (over 200 m) are present from KP 20 onwards. Smaller length class vessels (1 – 50 m) are the dominant classes closer to shore between KP 0 to KP 11. Additionally, mid-length vessels (50 - 150 m) can be seen routeing to and from Eyemouth Harbour.

Within English waters, tracks from vessels of 1 – 50 m in length are present throughout the study area. Tracks from vessels of between 150 – 200 are concentrated between KP 38 and KP 90 (Figure 13-15). Medium and smaller vessel classes then dominate until approximately KP 140, where larger vessels (150 – 200 m and over) travelling to and from the Port of Tyne can be observed. From KP 165 to approximately KP 170, vessel classes under 150 m are present, and from KP 170 to the English landfall, most vessel tracks are from vessels of under 50 m in length.

GIS: LM Checked: JA Approved: DB

Winter (Nov 2019 - Jan 2020)

Summer (May 2021 - July 2021)

N

DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL
TEESPORT
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170

Berwick Bank
Isle of May

Coordinate System: WGS1984 Zone 30N

0 20 40 km

Scale @ A3 1:660,000

nationalgrid

SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

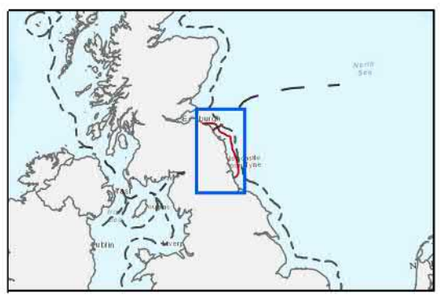
- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

Vessel tracks by vessel type

- Cargo/Tanker
- Offshore industry
- Fishing
- Passenger
- Recreational
- Other

NOTES:

Not to be used for navigation.



TITLE

Figure 13-12
Seasonal vessel tracks by vessel type

REFERENCE

SEGL1_M_EAR_13-12_v1_20211215

SHEET NUMBER	DATE
1 of 1	15/12/2021

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DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

N

0 30 60 km

Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:1,050,000

nationalgrid
SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

Vessel tracks by vessel type

- Cargo/Tanker
- Offshore industry
- Passenger
- Recreational
- Other

NOTES:

Not to be used for navigation.

TITLE

Figure 13-13
Vessel tracks by vessel type

REFERENCE

SEGL1_M_EAR_13-13_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

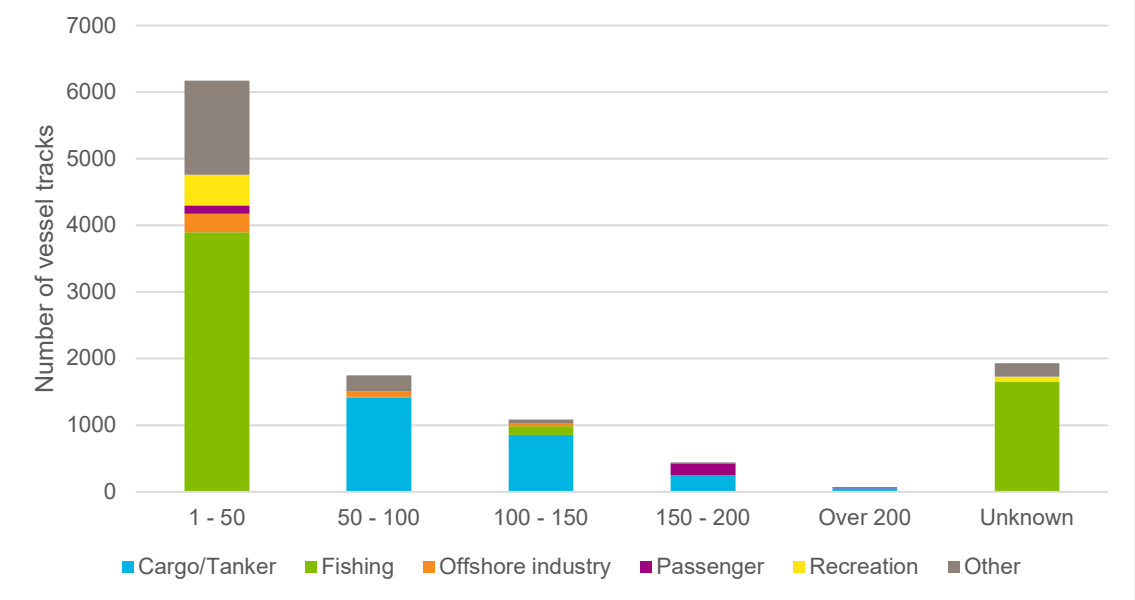

Figure 13-14: AIS vessel length by vessel type

Vessel Dead Weight Tonnage (DWT)

Dead Weight Tonnage (DWT) is an indication of vessel size as it refers to the carrying capacity of the vessel. There were 656 vessels missing DWT values in the AIS data for the study area, so a regression model was used based on the available data for each vessel type to calculate the missing values.

The distribution of AIS vessel DWT is presented in Table 13-12 and shows that 69.1% of vessel tracks in the study area fell into the 1 - 250 DWT class. The chart in Figure 13-16 shows that fishing vessels comprised the majority of vessel tracks in this class, with offshore industry and recreation vessel tracks also present. Cargo and tanker vessels dominate the other DWT classes (250 - 2,500, 2,500 – 5,000, 5,000 – 50,000).

Table 13-12: Distribution of AIS tracks (DWT)

DWT (tonnes)	Vessel tracks	Percentage of total
1 - 250	7,897	69.1
250 - 2,500	742	6.5
2,500 - 5,000	1,300	11.4
5,000 - 50,000	1,427	12.5
>50,000	69	0.6
Total	11,435	100

In terms of the spatial distribution, in Scottish waters from KP 0 to KP 11 tracks associated with vessels in the smallest DWT class dominate (see Figure 13-18). From approx. KP 11 to the border with English territorial waters tracks from vessels of over 250 DWT are present.

In English waters, high activity from tracks associated with vessels of 250 – 50,000 DWT continues until approx. KP 115 where this activity becomes less intense. From KP 143 to KP 160, tracks from vessels in the largest DWT class (over 50,000 DWT) intersect the marine installation corridor transiting to and from the Port of Tyne (Figure 13-18). From approx. KP 170 to the English landfall, tracks from vessels in the smallest DWT class 1 – 250 DWT dominate.

GIS: LM Checked: JA Approved: DB

DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

N

0 10 20 km

Scale @ A3 1:550,000

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Coordinate System: WGS1984 Zone 30N

nationalgrid

SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

Vessel length (m)

- Unknown
- ≤50 m
- ≤100 m
- ≤150 m
- ≤200 m
- Over 200 m

NOTES:

Not to be used for navigation.

TITLE

Figure 13-15
Vessel length

REFERENCE

SEGL1_M_EAR_13-15_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

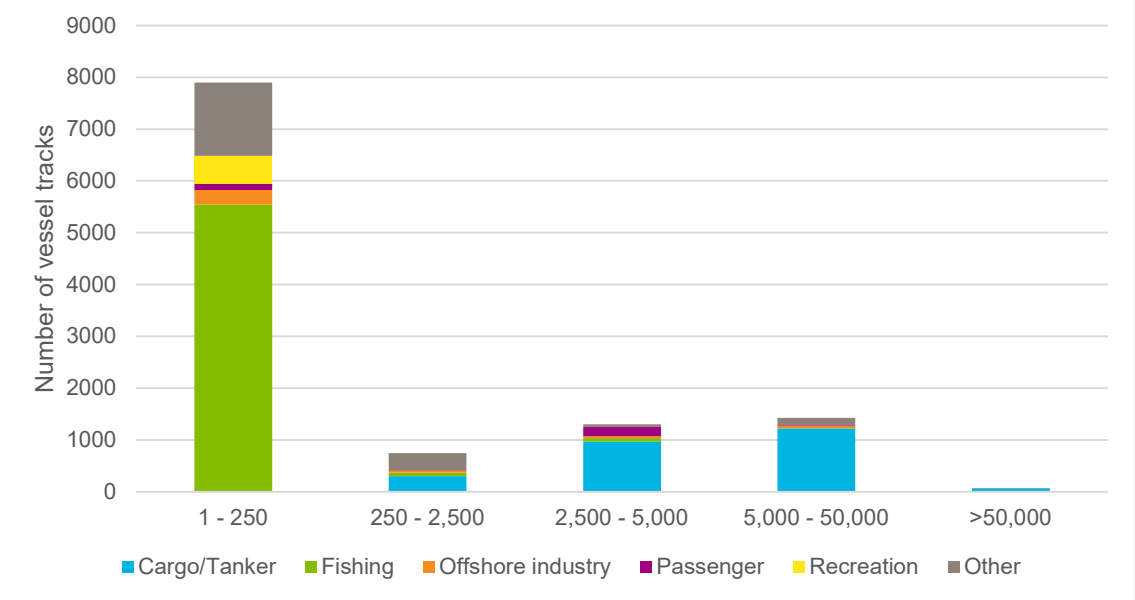

Figure 13-16: AIS vessel DWT by vessel type

Vessel draught

Vessel draught distribution within the study area is presented in Table 13-13, and shows that 16.1% of vessel tracks across the two seasons had a registered draught between 2.5 and 5 m, followed by 15.6% with draught of 5 to 7.5 m.

Figure 13-17 presents the vessel draught classes by vessel type and shows that cargo vessels and tankers were in the majority across draught classes 5 – 7.5 m and 7.5 – 10 m, and also in the 2.5 – 5 m draught class. It should be noted that the majority of vessel tracks (60.4%) did not provide this draught information.

Table 13-13: AIS vessel tracks distributed by vessel draught

Draught (m)	Vessel tracks	Percentage of total
0 - 2.5	447	3.9
2.5 - 5	1,843	16.1
5 - 7.5	1,788	15.6
7.5 - 10	334	2.9
Over 10	112	1.0
Unknown	6,911	60.4
Total	11,435	100

In terms of the spatial distribution, similar to the trend seen with vessel lengths, in Scottish waters from KP 0 to KP 11 the majority of tracks are associated with vessels in the smallest draught classes, with under 5 m draught (Figure 13-19). Tracks from vessels with draught between 5 and 10 m are present from KP 11 to the border with English waters. In English waters, tracks with a vessel draught of over 10 m route to and from the Port of Tyne and cross the marine installation corridor between approximately KP 125 and KP 163.

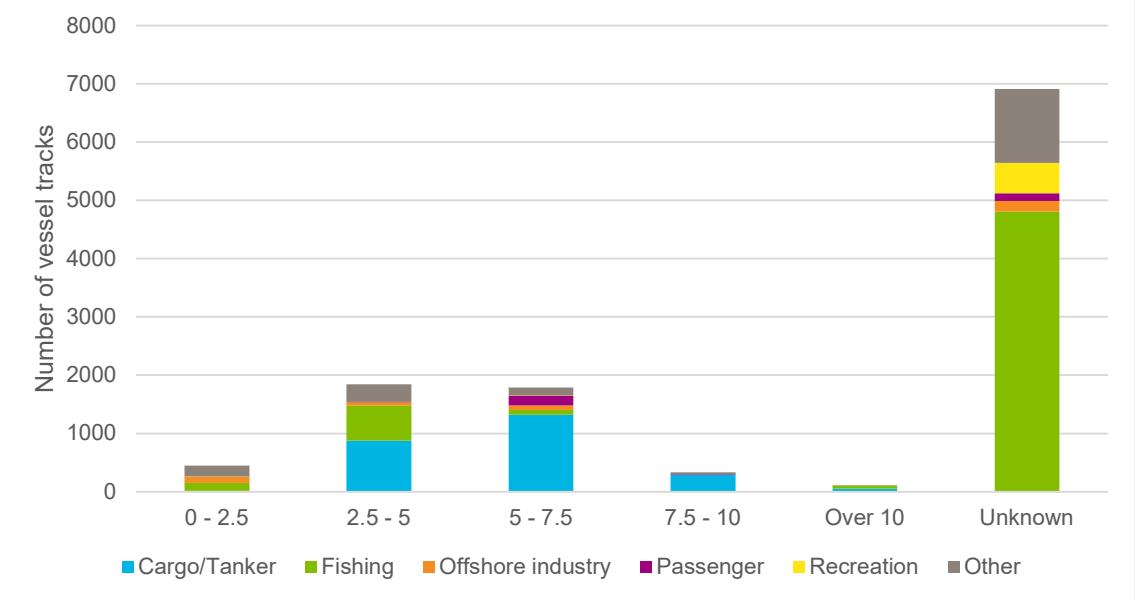

Figure 13-17: Chart showing vessel draught by vessel type

Vessels at anchor

AIS data points contain information on a vessel's status, including if it is 'at anchor'. This status is manually set by the crew and is acknowledged to be subject to human error but none the less can give an indication of presences of anchoring vessels in the study area. Points with status set to 'at anchor' were filtered by speed, distinguishing between points which had a speed of <2 knots as likely to be anchoring, and points of speed >2 knots as more likely to have been erroneously set as 'at anchor'. Figure 13-20 shows some patterns of points of >2 knots in speed arranged in lines which can be assumed to be when the status on vessels was erroneously set to 'at anchor', and so can be disregarded from this analysis.

In Scottish waters, Figure 13-20 shows a cluster of both summer and winter AIS points where vessel status was set to 'at anchor' and speed was <2 knots at KP 1 and to the north of the marine installation corridor between approx. KP 0 and KP 3. This is likely to be related to the installation of the Neart na Gaoithe Offshore Windfarm export cable (see Section 13.5.2). In English waters, the clusters of anchoring vessels in Figure 13-20 correspond to the anchorage areas described in Section 13.5.2, with the 'Whiskey' anchorage area associated with Tees and Hartlepool Port Authority to the south, approximately 7.8 km from the marine installation corridor at the closest point, as well as anchorage locations associated with the Port of Sunderland and Seaham Harbour. The anchorage location east of Seaham Harbour is the closest anchorage to the marine installation corridor, and Figure 13-20 shows that vessels using the Seaham Harbour anchorage location are approximately 250 m from the marine installation corridor at KP 173.5.

GIS: LM Checked: JA Approved: DB

DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

Fidra Fl(4)15M
Bass Rk Fl(3)10M
Farn Deeps
Graveyard
Hartlepool Ground
Gas
Oil

N

0 10 20 km

Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:550,000

nationalgrid
SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

Vessel Dead Weight Tonnage (DWT)

- ≤250
- ≤2,500
- ≤5,000
- ≤50,000
- Over 50,000

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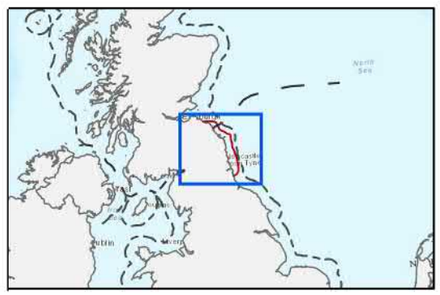

TITLE

Figure 13-18
Vessel DWT

REFERENCE
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SHEET NUMBER
1 of 1

DATE
15/12/2021

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DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

Fidra Fl(4)15M
Bass Rk Fl(3)10M
Farn Deeps
Graveyard
Hartlepool Ground
Gas
Oil

N

0 10 20 km

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Coordinate System: WGS1984 Zone 30N

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PROJECT
Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

Vessel draught registered (m)

- ≤2.5
- ≤5
- ≤7.5
- ≤10
- Over 10

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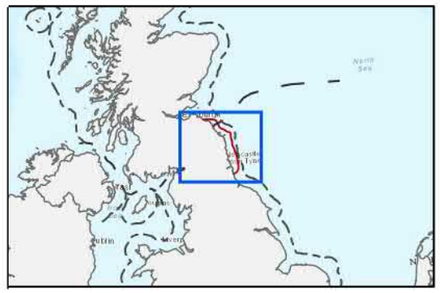

TITLE
Figure 13-19
Vessel draught

REFERENCE
SEGL1_M_EAR_13-19_v1_20211215

SHEET NUMBER
1 of 1

DATE
15/12/2021

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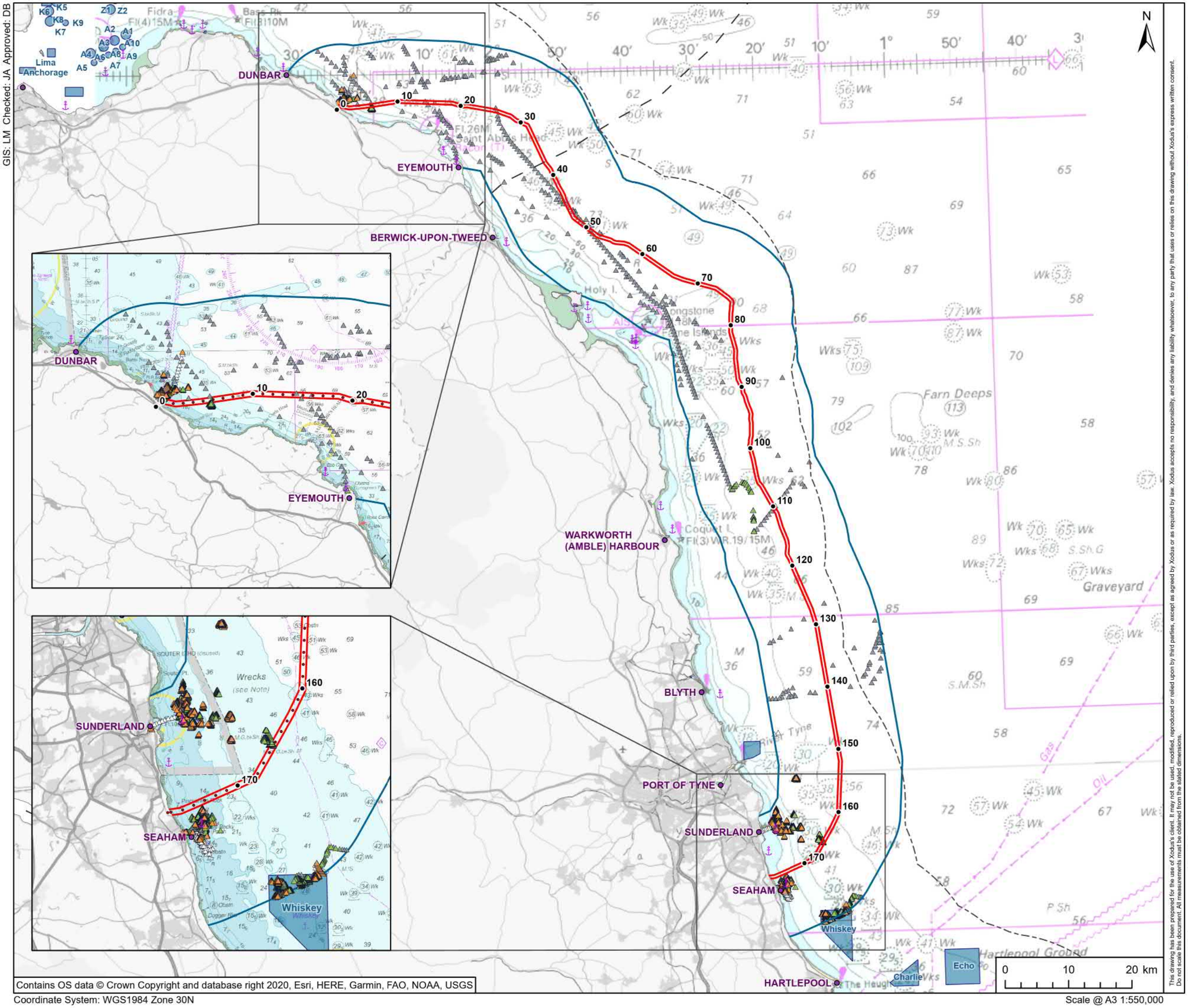

Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:550,000

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PROJECT

Scotland England Green Link 1 / Eastern Link 1

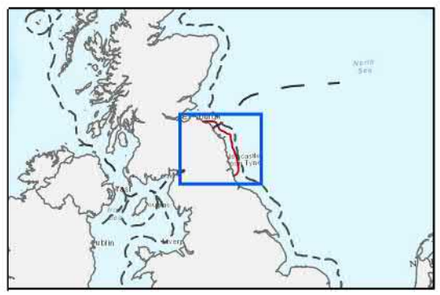
KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

Navigational features

- Anchorage area
- Anchorage
- Winter AIS points where vessel status is set to 'at anchor', speed <2 knots
- Summer AIS points where vessel status is set to 'at anchor', speed <2 knots
- Winter AIS points where vessel status is set to 'at anchor', speed >2 knots
- Summer AIS points where vessel status is set to 'at anchor', speed >2 knots

NOTES:



TITLE

Figure 13-20
Vessels at anchor

REFERENCE

SEGL1_M_EAR_13-20_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

13.5.5.4 Fishing analysis

This section presents an analysis of fishing vessels in the vicinity of the marine installation corridor, based on both AIS and VMS data. It should be noted that fishing is considered from a broad navigational perspective here. For detailed assessment of commercial fisheries baseline condition please refer to Chapter 14: Commercial Fisheries and EAR Volume 3 Appendix 14.1: Report on Baseline Consultation with Fisheries Stakeholders. It should also be noted that the AIS data used in this chapter provides detailed information on the specific trajectories of the vessels, but is likely to under-represent fishing activity, since fishing vessels under 15 m length are not obliged to carry an AIS transponder, (though many do voluntarily for safety). VMS data can provide a more comprehensive picture of fishing activity since vessels greater than 12 m are obliged to carry VMS equipment, however, the data are not publicly available in a format that allows reconstruction of trajectories, and vessels under 12 m will not be represented.

Three types of AIS vessel data have been used to gain insight into fishing activity in the study area:

- AIS fishing vessel tracks categorised by length;
- AIS fishing vessel tracks categorised by vessel subtype; and
- AIS data points with status set to “actively fishing”.

As detailed in Section 13.4.2, three additional data sources have been used to supplement the AIS data:

- Anonymised VMS point data during 2019, which has been processed to provide density information for the study area. This data provides no information on gear type or fishing status, however vessel speed can be used as a proxy for fishing status. Vessels travelling at speeds of < 6 knots (kts) are considered likely to be fishing;
- MMO sightings data 2011 to 2019 representing vessels sighted on surveillance flights; and
- Fishing activity by International Council for the Exploration of the Sea (ICES) statistical rectangle distributed by the MMO. This data includes details about time spent fishing and gear type over the period 2016 - 2019, but is aggregated within each ICES statistical rectangle, so local patterns of activity cannot readily be discerned.

Additionally, information regarding fishing activity within the region from the North Sea (West) Pilot was noted.

Fishing vessels in AIS data

Fishing vessel tracks classified by length and by fishing vessel subtype are shown in Figure 13-21. As previously noted, vessels under 15 m in length are underrepresented in this data. In Scottish waters fishing vessel tracks are present throughout the study area, with fishing vessel tracks associated with smaller vessels of under 15 m in length concentrated closer to shore and crossing the marine installation corridor between KP 1 and 3 and larger vessels of over 50 m transiting to and from Eyemouth Harbour and crossing the marine installation corridor between approximately KP 12 and KP 29. Tracks associated with mid-size fishing vessels (15 – 30 m) also cross the marine installation corridor to and from Eyemouth Harbour between KP 9 and KP 29.

Although smaller vessels of under 15 m in length are present throughout the study area in English waters, transiting to and from ports along the coastline, fishing traffic is mostly concentrated between KP 122 and KP 167. Figure 13-21 shows that this concentration of fishing traffic is due to vessels routeing to and from the Port of Tyne. Fishing vessel traffic crossing this section of the marine installation corridor includes the largest vessel length class of over 50 m in length. Between KP 167 and the English landfall there is little fishing vessel traffic seen in the AIS data.

In terms of vessel subtypes, the most common type is “fishing vessel / fishing” with 95.8% of tracks in the study area. Trawlers represented 3.9% of tracks in the study area. In Scottish waters, trawler activity was present to the north of the marine installation corridor between approximately KP 1 and KP 7 (Figure 13-21). In English waters, tracks from trawler vessels were generally concentrated routeing to and from the Port of Blyth and the Port of Tyne between approx. KP 120 and KP 162.

AIS points that are likely to represent fishing activity based on speed and/or AIS status are displayed Figure 13-22. Those points from vessels travelling at > 6 knots are assumed to be transiting rather than actively fishing. Actively fishing vessels in Scottish waters show a similar pattern in both winter and summer seasons, albeit with an increase in inshore distribution in Summer (though it is also possible this relates to increased AIS transponder carriage in the fishing vessels over time). Overall, there is presence of actively fishing vessels across the marine installation corridor between approximately KP 0 to KP 30. In English waters, actively fishing vessels were more geographically widespread in winter than in summer, with a region of high intensity of fishing intersecting the marine installation corridor between approximately KP 125 and KP 166 in the winter months, with fishing vessels routeing to and from the Port of Blyth and the Port of Tyne. The difference is particularly pronounced on the offshore side of the Marine Scheme.

VMS and sightings data points supplement

This section utilised the point VMS and sightings data to supplement the use of AIS data in studying fishing activity, using anonymised VMS points from the MMO to explore density of slow moving vessels, and 2019 vessel sightings points data from the MMO to study vessel types, as mentioned previously.

Vessel density of slow moving (< 6 kts) vessels is displayed in the left panel of Figure 13-23, giving an indication of the presence of vessels which are actively fishing. It can be assumed that those vessels travelling at more than 6 kts are not fishing and are likely to be in transit, whilst those travelling at less than 6 kts may be fishing or engaged in other activities (Lee, et al., 2010). Figure 13-23 shows greater density of vessels travelling at less than 6 kts in Scottish waters between approximately KP 1 and KP 18, and in English waters between approximately KP 120 and KP 167, lending weight to the similar pattern seen in the AIS data.

The right panel of Figure 13-22 presents MMO sightings data 2011 to 2019 representing vessels sighted on surveillance flights, classified by vessel type. The most common fishing vessel type sighted within the study area were ‘trawler’ vessels, which accounted for 25.4% of all sightings, and ‘potter/whelker’ vessels accounted for 21.4% of all sightings.

The sightings data in Scottish waters indicates the presence of a variety of types of trawlers in the region, including demersal stern trawlers, as well as scallop dredgers (Figure 13-23). In English waters, ‘potter/whelkers’ are common inshore from the marine installation corridor from approximately KP 45 to KP 120. From approximately KP 120 to KP 159, a concentration of sightings of trawlers, stern trawlers (demersal/pelagic) and demersal stern trawlers can be seen, which could be of some concern for the Marine Scheme.

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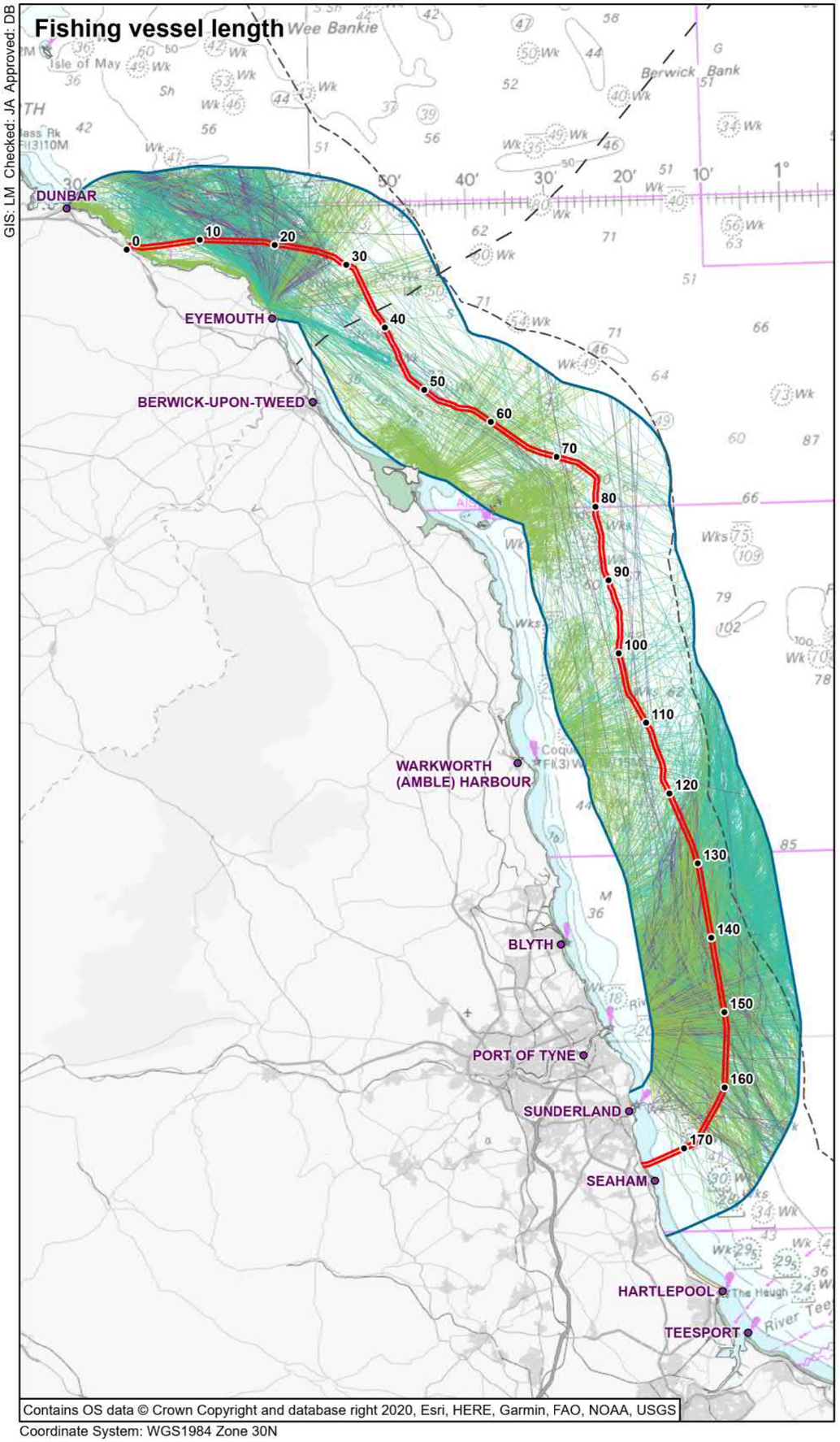
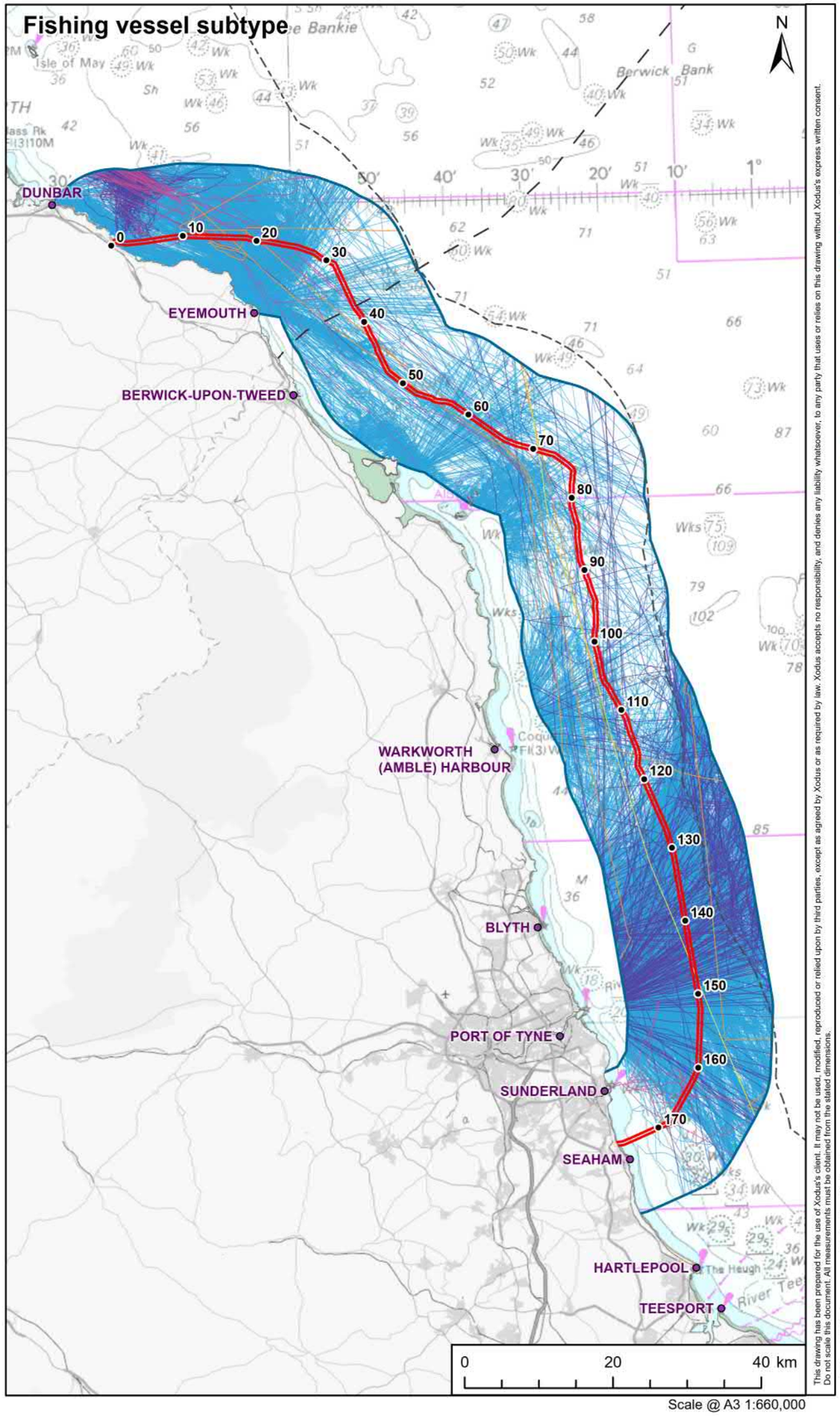
Fishing vessel length



Fishing vessel subtype



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Scale @ A3 1:660,000

nationalgrid

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PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

Fishing vessel length (m)

- < 15
- 15 - 30
- 30 - 50
- > 50

Fishing vessel subtype

- Fishing or Fishing Vessel
- Trawler
- Fishery Patrol Vessel
- Fishery Research Vessel
- Fish Carrier

NOTES:

Not to be used for navigation.

TITLE

Figure 13-21
Fishing vessels by vessel length and subtype

REFERENCE

SEGL1_M_EAR_13-21_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

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Winter (Nov 2019 - Jan 2020)

Summer (May 2021 - July 2021)

N

DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL
TEESPORT

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

Berwick Bank
Isle of May

Coordinate System: WGS1984 Zone 30N

0 20 40 km

Scale @ A3 1:660,000

nationalgrid

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PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border
- AIS points where vessel status is set to 'actively fishing', speed <6 knots (likely fishing)
- AIS points where vessel status is set to 'actively fishing', speed >6 knots (likely transiting)

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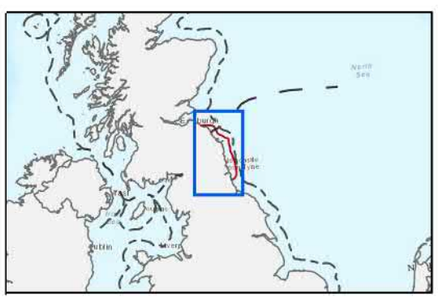

TITLE

Figure 13-22
AIS data points with status set to actively fishing by season

REFERENCE

SEGL1_M_EAR_13-22_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

VMS by ICES statistical sub-rectangle supplement

This section utilises fishing activity data available by ICES statistical sub-rectangle for four years over the period 2016 – 2019 obtained from the MMO. This data set provides summaries of fishing activity for UK commercial fishing vessels of 15 m and over in length that are deemed to have been fishing within a specified calendar year. This data has been aggregated to show the average annual time spent fishing by gear type from 2016 to 2019.

Figure 13-24 shows mean time spent fishing by demersal, pelagic and dredge gear types. Scottish waters see low levels of time spent fishing using pelagic trawl or seine, and moderate levels of time spent using dredges focussed around KP 10 and KP 30. Time spent using demersal trawl or seine is high within the study area in Scottish waters, reaching a yearly average of over 5,000 minutes (approximately 83 hours) between approximately KP 9 to KP 25.

In English waters, time spent fishing using pelagic trawl or seine was low throughout the study area. Fishing using dredges shows some areas of moderate activity between KP 38 and KP 115 but remains low beyond KP 115 to the English landfall. With demersal trawl or seine, the time spent is high between approximately. KP 123 to KP 165, reaching a yearly average of over 5,000 minutes (approximately 83 hours).

Fishing activity information from the North Sea (West) Pilot

The North Sea (West) Pilot (UKHO, 2018) notes that:

- this region is fished extensively;
- trawling is undertaken over this region throughout the year by vessels of all sizes;
- seine netting is present throughout the region; and
- potting and drifting are present throughout the region.

13.5.5.5 Summer 2021 validation

The summer 2021 season of AIS data has been cross-checked against the summer 2019 season to ensure that the summer 2021 season used as the basis for the NRA is suitably representative of vessel traffic in the region. Table 13-14 presents the difference between the numbers of vessel tracks for different vessel types between the two seasons.

It can be seen that summer 2021 shows slightly lower levels of cargo and tanker traffic compared to summer 2019 (-11%), however the vessel tracks show a similar geographic distribution in both Scottish and English waters as shown in Figure 13-25. The reduction tallies with reductions in commercial shipping resulting from the COVID-19 pandemic on a global scale, for example (Millefiori, 2021).

Fishing vessel tracks showed an increase in 2021 compared to 2019, with a broadly similar spatial distribution between the two summer seasons (Figure 13-25), albeit with apparent reductions in the geographic spread of “likely fishing” points in nearshore fisheries in English waters and the opposite on the Scottish side, the latter could possibly be a result of increased AIS carriage on smaller fishing vessels over time (Figure 13-26). The numbers of unique fishing vessels active within the study area did not significantly change between the two years, with 100 unique MMSIs present in the study area in summer 2019, and 107 in summer 2021.

GIS: LM Checked: JA Approved: DB

VMS - density of vessels travelling < 6 kn (2019)

Sightings by vessel type (2011 - 2019)

DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL
TEESPORT
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:660,000

0 20 40 km

nationalgrid
SP TRANSMISSION

PROJECT
Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
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VMS - density of vessels travelling < 6 kn (2019)

- 0
- 1
- 2 - 5
- 6 - 10
- 11 - 25
- > 25

Sightings by vessel type (9 years, 2011 - 2019)

- Trawler (all)
- Potter/whelker
- Demersal stern trawler
- Stern trawler (pelagic/demersal)
- Scallop dredger (French/Newhaven)
- Other trawler
- Other dredges (including mussel)
- Drift netter
- Unknown

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MMO 2011-2019.
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TITLE
Figure 13-23
VMS density and sightings

REFERENCE
SEGL1_M_EAR_13-23_v1_20211215

SHEET NUMBER: 1 of 1
DATE: 15/12/2021

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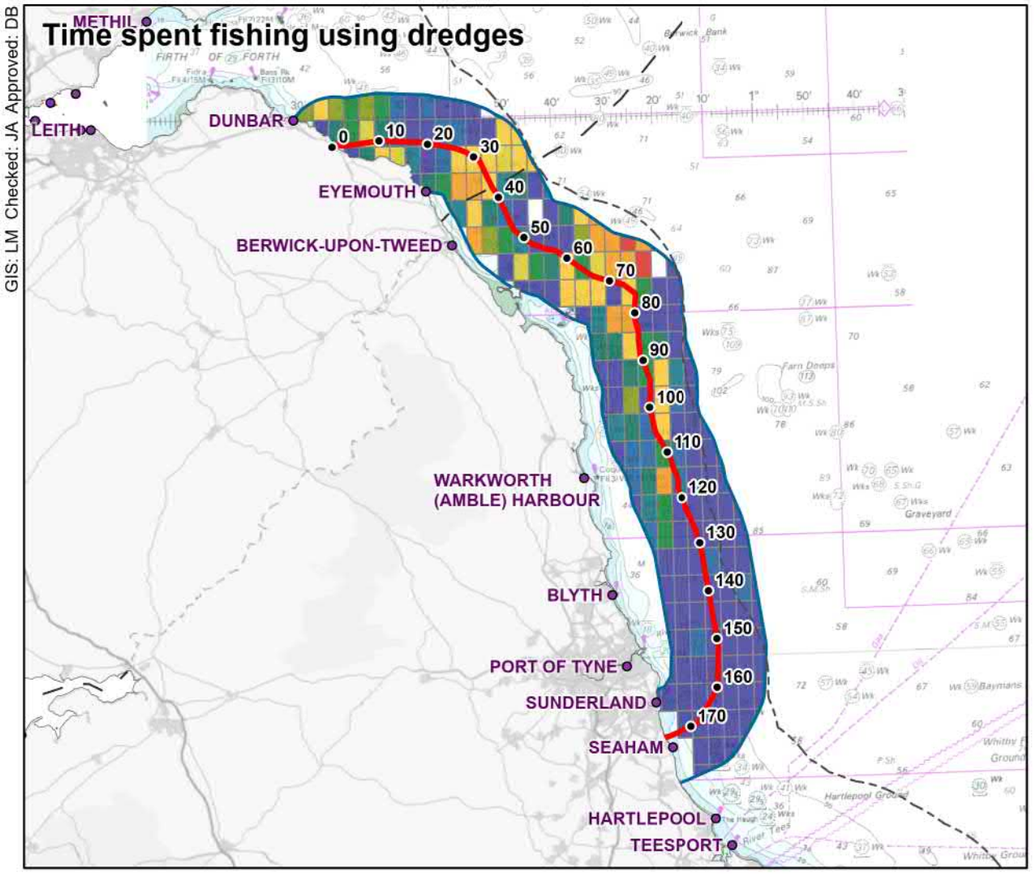
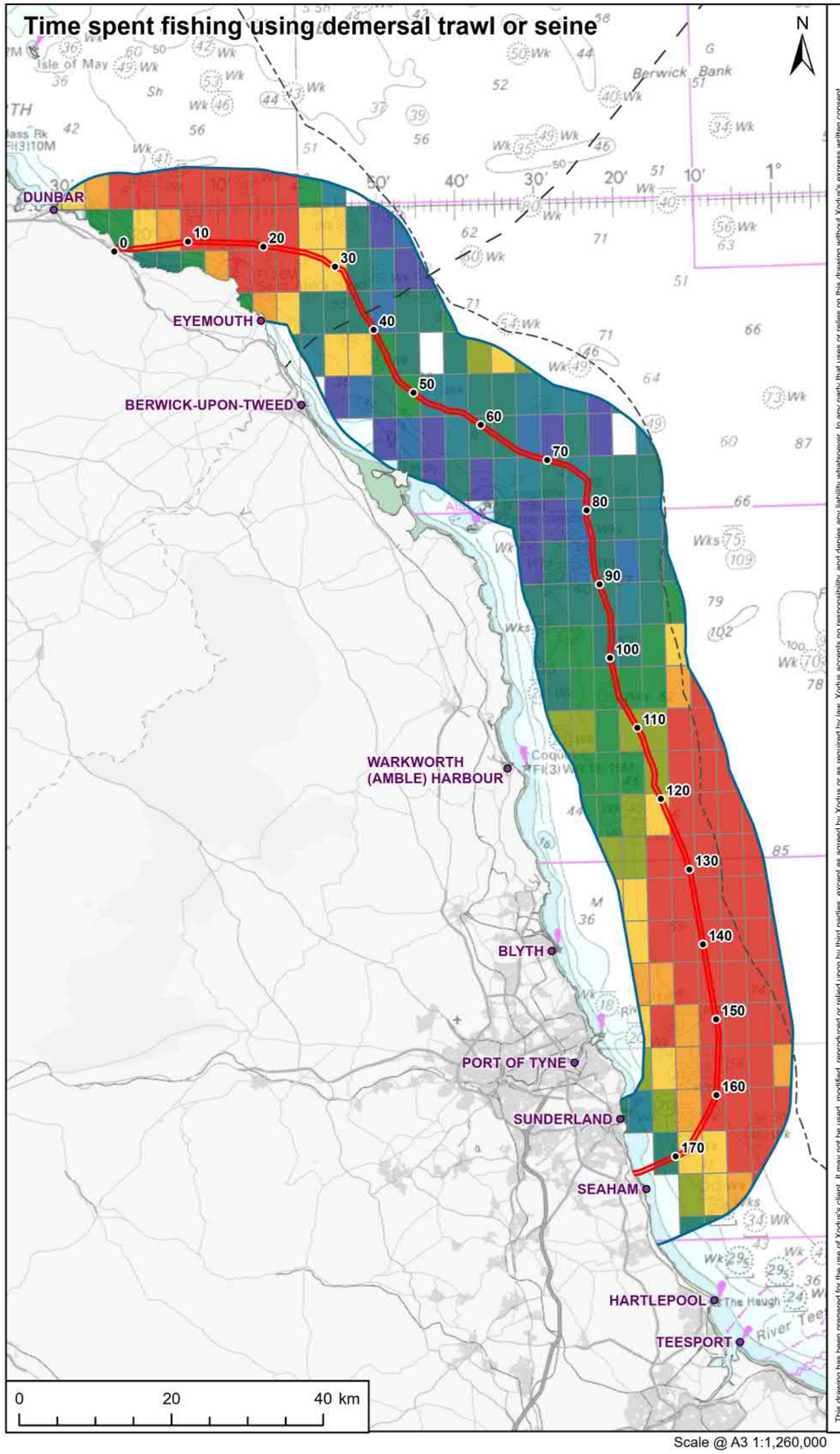
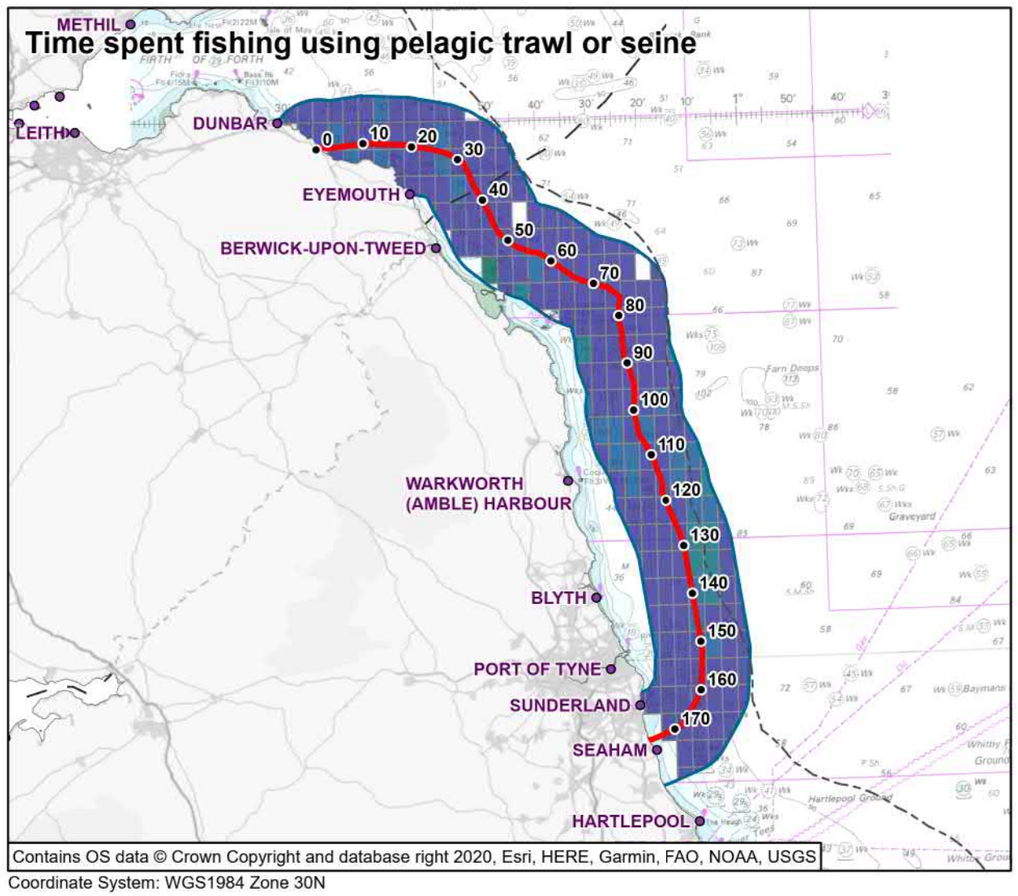
Time spent fishing using dredges



Time spent fishing using demersal trawl or seine



Time spent fishing using pelagic trawl or seine



Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:1,260,000

nationalgrid

SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
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Fishing time (minutes) by ICES subrectangle (average 2016 to 2019)

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 250
- 250 - 500
- 500 - 750
- 750 - 1,000
- 1,000 - 3,000
- 3,000 - 5,000
- > 5,000

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MMO 2016 - 2019
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TITLE

Figure 13-24
VMS by ICES sub-rectangle - fishing time by gear type

REFERENCE

SEGL1_M_EAR_13-24_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

Table 13-14: Summer 2019 and summer 2021 comparison

Vessel category	Summer 2019 tracks in study area	Summer 2021 tracks in study area	Difference in number of tracks (2019 to 2021)	Percentage change	Difference summary
Cargo/Tanker	1,371	1,216	-155	-11%	• Similar numbers of tracks, similar geographic distribution • Difference may be due to COVID-19 or Brexit effects
Fishing	1,873	2,288	+415	+22%	• Slight but apparent reduction in distribution of fishing activity offshore side of corridor between KP 120 and KP 170, slight increase inshore side • Slight reduction in distribution of inshore fisheries in English waters between Warkworth (Amble) Harbour and Berwick-Upon-Tweed • Apparent increase distribution of inshore fisheries in Scotland, potentially due to increased AIS carriage
Offshore industry	186	252	+66	+35%	• Appearance of route from Eyemouth Harbour to Neart Na Gaoithe wind farm landfall in summer 2021
Passenger	233	216	-17	-7%	• Similar level of activity
Recreational	640	491	-149	-23%	• Likely COVID-19 restrictions had suppressive effects
Other	932	1260	+328	+35%	• Similar geographic distribution
Total	5,235	5,723	+488	+9%	• Overall similar level of vessel activity in study area between the two summer seasons

Summer 2021 shows a marked increase in the presence of offshore industry traffic compared to summer 2019 (+35%) which is revealed to relate to the presence of offshore industry activity in Scottish waters routeing from Eyemouth Harbour to the Neart na Gaoithe windfarm export cable landfall at Thorntonloch Beach, a route which is absent in summer 2019 (see Figure 13-25). There is a similar increase in 'other' vessel tracks in summer 2021 compared to summer 2019, however they show a very similar spatial distribution across the study area.

Recreational vessel traffic shows a decrease in summer 2021 compared to summer 2019 (-23%), which is likely due to COVID-19 restrictions especially at the start of the season. However, as Figure 13-25 shows, this recreational activity is mainly concentrated inshore of the marine installation corridor so this difference would be unlikely to affect the Marine Scheme.

Overall, there was a similar level of vessel traffic between the two summer seasons, as the density panels in Figure 13-25 show. In Scottish waters, the density of traffic is higher in summer 2021 close to shore between KP 0 and KP 6. As a result, this season could be said to be more of a 'worst case' scenario and therefore its inclusion results in a more conservative appraisal of traffic in the study area, which is preferable. In English waters, the density of vessel activity is very similar between summer 2019 and summer 2021, showing similar spatial patterns throughout the marine installation corridor.

13.5.6 Future baseline

This shipping and navigation baseline has used current and existing information to form this appraisal. Due to uncertainties including the possible future effects of Brexit and the COVID-19 pandemic, it is

difficult to predict how this current baseline may change in terms of the magnitude and spatial distribution of shipping activity, and in terms of different types of shipping activity such as fishing or recreation. Additionally, further development of the marine region in terms of future offshore infrastructure including wind farms may affect the shipping and navigational baseline presented here. Chapter 15: Other Sea Users should be referred to understand any potential future offshore developments which may be awarded and constructed in the region.

13.6 Appraisal of Potential Impacts

The following sections comprise the appraisal of impacts to shipping and navigation. This has been conducted using NRA methodology and terminology and covers the relevant impacts captured in the impacts identification section below. Each identified impact scenario is addressed and subsequently assessed using the definitions of frequency and consequence severity against the risk matrix in Section 13.4.1. Each impact is then given a risk ranking of '**Broadly Acceptable'**, '**Tolerable'** or '**Unacceptable**' taking into account existing embedded mitigations which reduce the risk. Where appropriate, risk reduction measures (RRMs) in addition to those already taken into account are identified, and a residual risk ranking is given. The assessments are summarised in a table in each following subsection and collated in the appendices.

13.6.1 Identified Potential Impacts

Baseline information provided in the MTS, combined with consultation responses and expert judgement/industry experience, was compiled to create a list of relevant impacts to marine navigation which then subsequently informed a desktop exercise. The impacts are captured in Table 13-15 below. Each of the impacts is subsequently addressed in consideration of the existing or embedded mitigations which reduce the likelihood or severity of the identified impacts.

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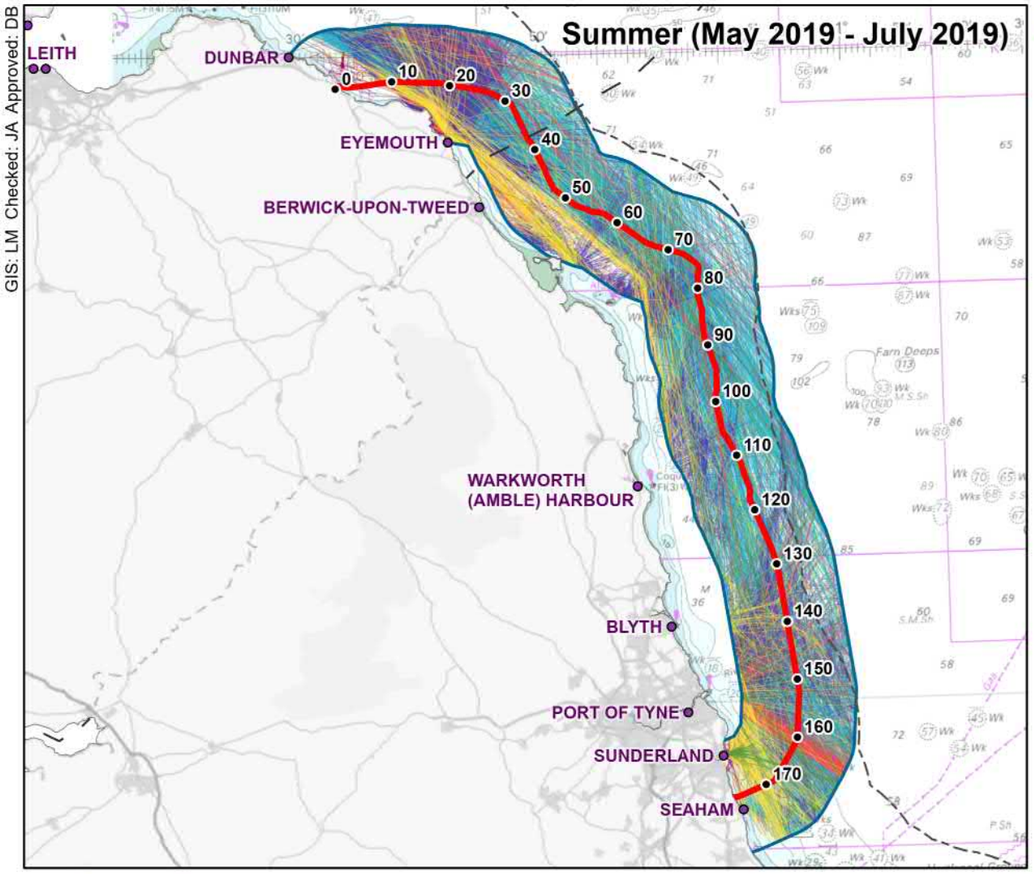
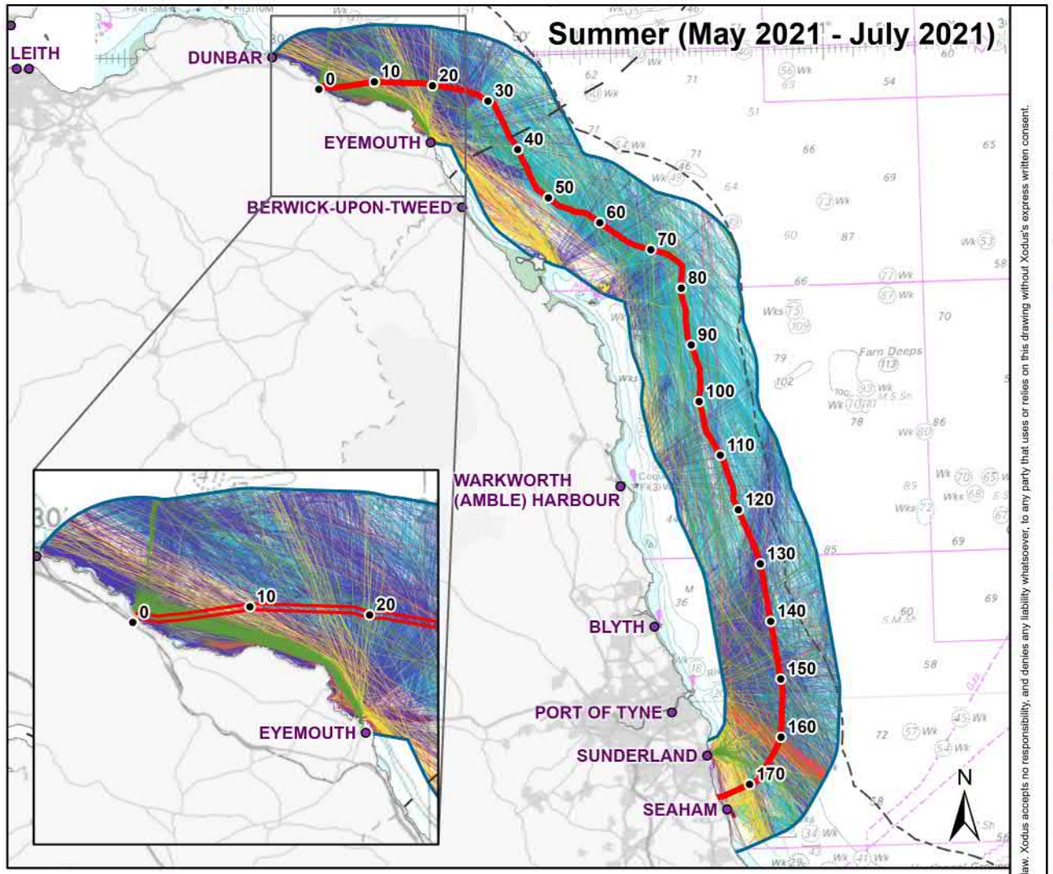
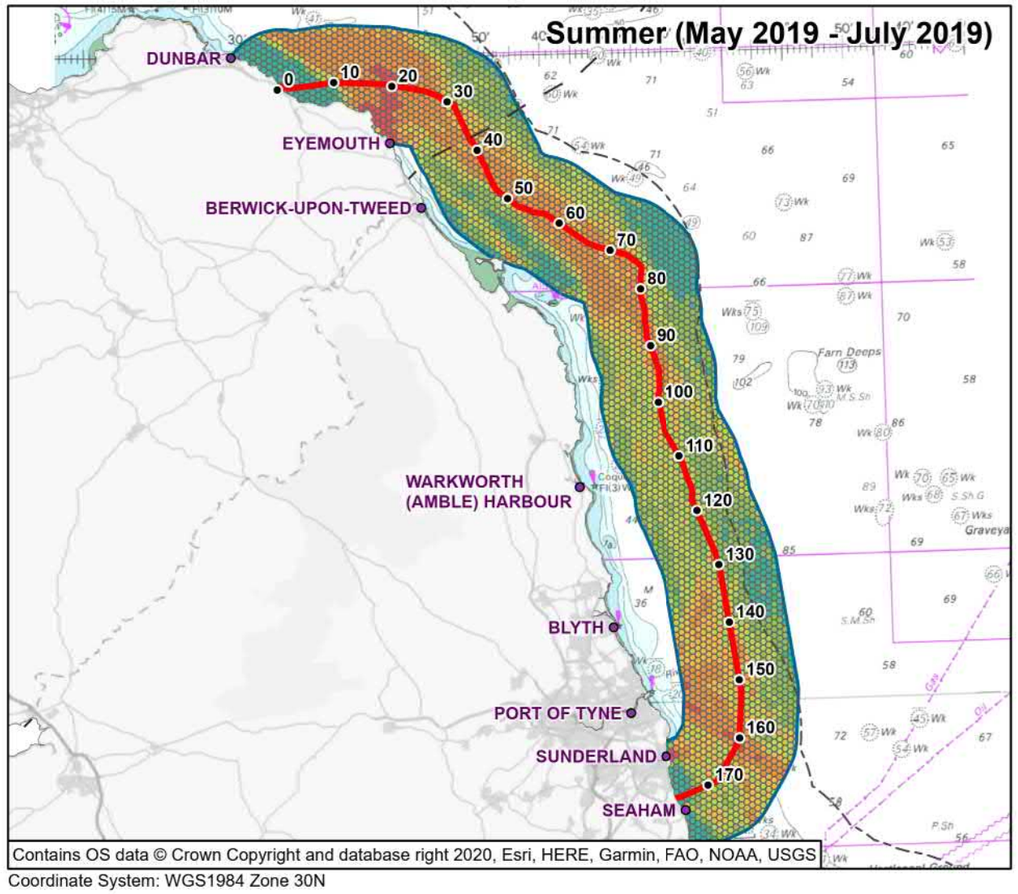
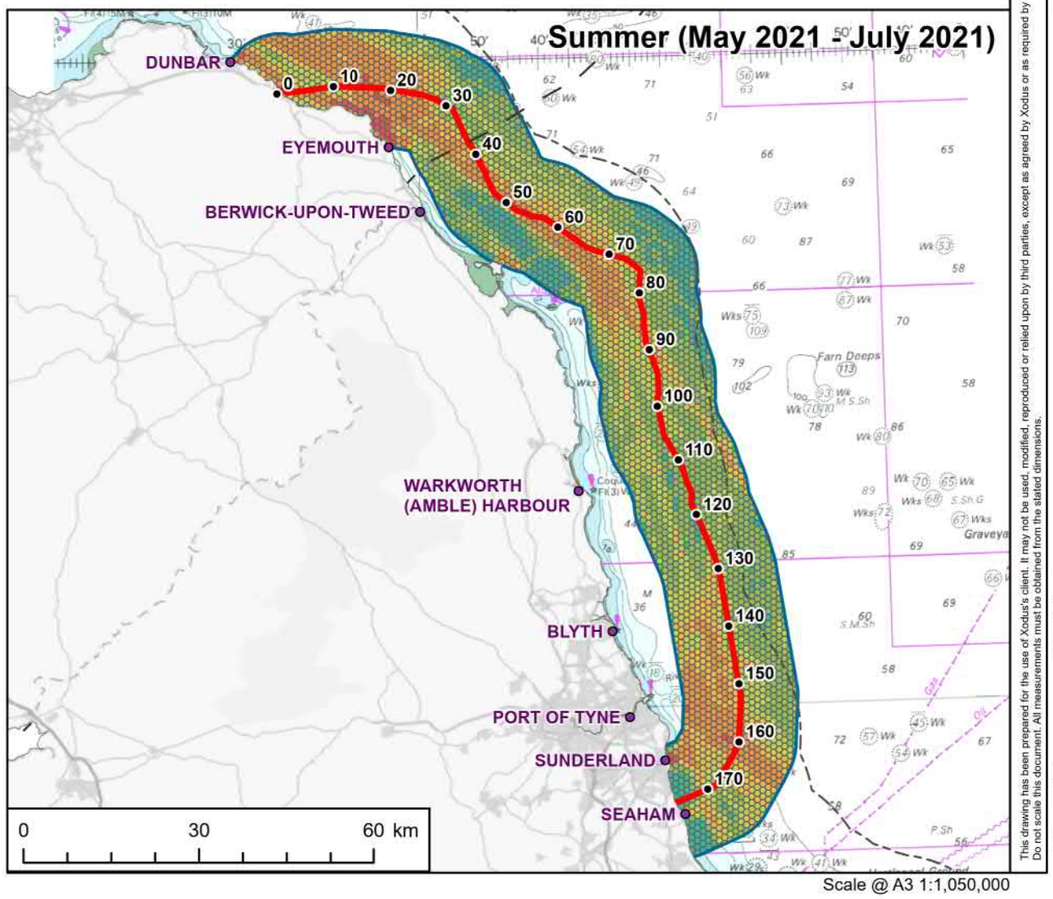








Coordinate System: WGS1984 Zone 30N

Scale @ A3 1:1,050,000

nationalgrid

SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border

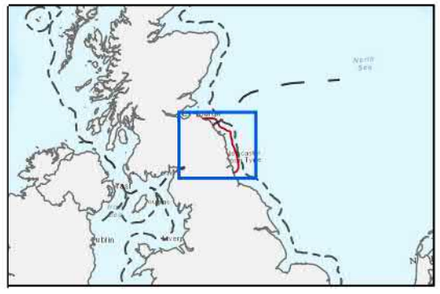
Vessel tracks by vessel type

- Cargo/Tanker
- Offshore industry
- Fishing
- Passenger
- Recreational
- Other

Seasonal vessel track density per 1sqkm

- 0 - 25
- 26 - 50
- 51 - 75
- 76 - 100
- 101 - 200
- > 200

NOTES:
World Port Index © COPYRIGHT 2019 BY THE UNITED STATES GOVERNMENT
Admiralty Charts © Crown copyright 2021 UK Hydrographic Office. emapsite d/l ref – 878887
Not to be used for navigation.



TITLE

Figure 13-25
Summer seasons comparison

REFERENCE

SEGL1_M_EAR_13-25_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

GIS: LM Checked: JA Approved: DB

Summer (May 2019 - July 2019)

Summer (May 2021 - July 2021)

DUNBAR
EYEMOUTH
BERWICK-UPON-TWEED
WARKWORTH (AMBLE) HARBOUR
BLYTH
PORT OF TYNE
SUNDERLAND
SEAHAM
HARTLEPOOL
TEESPORT
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

N

0 20 40 km

Scale @ A3 1:660,000

Coordinate System: WGS1984 Zone 30N

nationalgrid
SP TRANSMISSION

PROJECT

Scotland England Green Link 1 / Eastern Link 1

KEY

- Kilometre Point (KP)
- Marine Installation Corridor
- 10 NM Shipping and Navigation Study Area
- Port
- UK Territorial Sea Limit
- Scottish/English Water Border
- AIS points for fishing vessels with speed <6 knots (likely fishing)
- AIS points for fishing vessels with speed >6 knots (likely transiting)

NOTES:

Not to be used for navigation.

TITLE

Figure 13-26
AIS data points with status set to actively fishing - summer seasons

REFERENCE

SEGL1_M_EAR_13-26_v1_20211215

SHEET NUMBER: 1 of 1

DATE: 15/12/2021

Table 13-15: Impact Summary

Phase	Activities	Sub Activity	Potential Impact
Installation	Pre-Installation	Survey	Vessel-to-vessel collision
		Sea Trials	Vessel-to-vessel collision
	Cable Installation	Route Clearance	Vessel-to-vessel collision
		Cable Laying and Burial	Vessel-to-vessel collision
			Deviation from established and identified vessel routes and areas
			Interaction with vessel anchors and anchoring activity
			Interaction with fishing gear
Operation (including maintenance and repair)	In-situ cable	Survey	Vessel-to-vessel collision
		Maintenance Activities	Vessel-to-vessel collision
			Deviation from established and identified vessel routes and areas
			Interaction with vessel anchors and anchoring activity
			Interaction with fishing gear
			Reduction in under keel clearance
			EMF results in magnetic compass deviation
Decommissioning			Comparable to Installation

13.6.2 Embedded Mitigation

Table 13-16 contains a list of identified existing or embedded mitigations identified as ameliorating each identified impact from the list above. Commercial shipping is a heavily regulated industry, with a global framework of maritime safety regulations (primarily through the IMO) and additional maritime regulations originating from EU and UK legislation. This has been taken into account when compiling the mitigation measures that are embedded as part of the Marine Scheme.

Table 13-16: Shipping and Navigation Embedded Mitigation

Impact	Embedded Mitigation
Pre-installation	
Micro-routeing	Detailed route development and micro-routeing to be undertaken within the marine installation corridor to avoid or minimise localised engineering and environmental constraints. Route selection undertaken to date, as outlined in Chapter 5 (avoids so far as is practicable, main navigational features and interaction with a range of receptors,

Impact	Embedded Mitigation
	including marine recreational activities and third-party infrastructure development and operators).
Legislative requirements and mitigation: - vessel-to-vessel collision - deviation from established and identified vessel routes and areas - interaction with vessel anchors and anchoring activity - interaction with fishing gear - reduction in under keel clearance - interference with marine navigational equipment	• All vessels will follow the International Regulations for Preventing Collisions at Sea 1972 (COLREGS) and International Convention for the Safety of Life at Sea 1974 (SOLAS); • All vessel wastes will be managed in accordance with the requirements set out within the International Convention for the Prevention of Pollution from Ships (MARPOL) (the discharging of contaminants is not permitted within 12 nm from the coast to preserve bathing waters); • Vessel contingency plans for marine oil pollution in the form of Shipboard Oil Pollution Emergency Plan (SOPEP) and chemical handling procedures will be in place; • All vessels will display appropriate lights and shapes; • All vessels will broadcast their status on AIS at all times; • All non-local vessels will operate to IMO regulations for ballast water management to manage INNS risks; • Guard vessels will use radio detection and ranging (RADAR) with Automatic RADAR Plotting Aid (ARPA) to monitor vessel activity and predict possible interactions, will be employed to work alongside the installation vessel(s) during installation and maintenance work (which will also minimize anchor disturbance on the seabed); • An advisory 500 m safety zone will be established around all vessels associated with the installation works; • The discharging of contaminants is not permitted within 12 nautical miles (NM) from the coast to preserve bathing waters; • Route selection will avoid so far as is practicable main navigational features; • Promulgation of information to local clubs, marinas and harbours in the vicinity of the landfalls; • Piloting of large vessels; • Limits to wave height / wind speed conditions for operations / activities will be followed by all vessels; • All vessels will follow Port bylaws and General Directions; • Very High Frequency (VHF) Broadcast Safety Navigational Warnings; • Industry guidance on the avoidance of fishing in the vicinity of subsea cables will be followed; • As-built locations of cable and external protection will be supplied to UKHO (Admiralty) and Kingfisher (KIS-ORCA); • Cable burial and protection measures are designed to minimise risk of snagging; • Routine inspection and maintenance throughout the lifecycle of the asset to identify and remediate cable exposures or other potential snagging risks; • Reduction in charted water depth to LAT limited to less than 5% where possible; and • Route Selection (specific planning for location of cable routing in shallow areas).

13.6.3 Installation Phase

13.6.3.1 Vessel-to-vessel collision

The risk of vessel-to-vessel collision applies to the installation and decommissioning phases of the Marine Scheme. These phases will require large slow-moving vessels with restricted manoeuvrability. Their presence across the location of the marine installation corridor will present an obstacle to all passing traffic which has limited capability to avoid this traffic.

Throughout the year a range of vessel types cross the marine installation corridor in multiple locations. Some Eight Ports and Harbours in the immediate vicinity of the marine installation corridor, and in particular the Port of Tyne contribute to the vessel activity, However Ports and Harbour associated with the Firth of Forth and other heavily trafficked coastal areas are also expected to contribute significantly

to the vessel activity. Fishing vessels comprise the majority of this traffic with 'Cargo/Tanker' and 'Other' vessel categories also contributing significantly. Passenger vessels and offshore industry vessels, which are likely to be aware and prepared to navigate the installation vessels, comprise only a small proportion of the total vessel count. It is also noted that unmanned survey craft are increasingly in use, supporting offshore developments such as Dogger bank offshore wind farm and others in the area. However, due to embedded mitigations such as Notice to Mariners and pre-operational consultations the awareness of the operation among vessels using the area will be raised. Port Pilotage also provides further collision risk mitigation where applicable. However, it cannot be presumed that all vessels approaching and exiting the area, or vessels otherwise using the area, will necessarily be aware of the presence of the installation vessels. In addition, the surface collision risk is likely to be greater in higher density sections of the installation path and therefore in particular from KP 10 – KP 90 and KP 130 – KP 170 as shown in Figure 13-9.

The severity of a collision with any vessel may result in a 'High' Severity/Magnitude consequence outcome (loss of crew member) among other consequences. However, the frequency is considered to be 'Remote' (Never occurred during Company's activities but has been known to occur in the wider industry) at any point along the marine installation corridor. Appropriate promulgation of operational information, presence of guard vessels, use of appropriate navigational lights and day light shape signals, defined limits to wave height / wind speed conditions within which it is safe for installation vessels to operate, utilisation of a Recommended Clearance Zone (RCZ) and Port Pilotage all act as mitigation. These assessments combine to provide a '**Tolerable**' risk ranking within the study area as summarised in Table 13-17.

It is therefore necessary to identify potential risk reduction measures in addition to those assumed to be in place, so as to reduce the risk to ALARP. It is therefore recommended that additional or increased collision avoidance measures and or procedures are employed specifically for phases of the operation which are located at the busiest or most densely trafficked sections of the cable route (KP 10 – KP 90 and KP 130 – KP 170). It is recommended that the cable laying operation procedures include provisions which recognize and address the increase in collision risk at these areas. Provisions should include:

- Operation procedures explicitly identifying the increased collision risk at KP 10 – KP 90 and KP 130 – KP 170 established prior to commencement of works;
- Guard Vessel procedures explicitly identifying the increased collision risk at KP 10 – KP 90 and KP 130 – KP 170 established prior to commencement of works;
- Prior reconfirmation with crew, that the installation vessels are entering the two areas of higher density traffic.

Table 13-17: Increased Risk of Vessel-to-Vessel Collision

Impact	Consequence	Frequency	Risk	Additional RRMs	Residual Risk
Increased risk of vessel-to-vessel collision	High	Remote	Tolerable	High traffic density specific procedures established	ALARP

13.6.3.2 Deviation from established vessel routes and areas

Some disruption to routine vessel routeing and any otherwise scheduled activity may be expected during the installation phase. The installation phase will require large slow-moving vessels with restricted manoeuvrability, their presence within the marine installation corridor will present an obstacle which is unable to deviate and is therefore considerably constrained by its operations. This will likely necessitate deviations for some vessel operators routinely using the area.

Throughout the year a range of vessel types cross the marine installation corridor in multiple locations. Fishing and Cargo/Tanker vessels, which comprise the majority of this traffic, are unlikely to experience significant disruption in the case where they are required to navigate the Marine Scheme; this being an essentially routine activity for commercial vessels. Passenger vessels and offshore industry vessels,

which comprise only a small proportion of the total vessel count, are likely to be aware and prepared to navigate clear of the installation vessels due to the embedded mitigations promulgating awareness of the operation (e.g. through consultation, Notice to Mariners) and practising good passage planning techniques and procedures. Similarly, local boat clubs will also be notified of the installation operations in advance to permit rescheduling or relocating of any organised events. Nonetheless, some temporary disruption and subsequently required deviation from established routes can be expected.

In some circumstances, such route deviations can lead to "navigational squeeze", particularly around pinch points, and in some circumstances can force vessels towards more navigationally challenging routes. This is extremely unlikely to present an issue along the marine installation corridor, where there is ample sea room along almost the entirety of its length. One potential pinch point lies between KP 60 and KP 90, where the marine installation corridor passes the Farne Isles. However, even at its closest point, the marine installation corridor is approximately 7.5 km offshore of the Farnes, meaning a large area of navigable of sea room will be accessible whilst the installation vessel is present.

Throughout the majority of the corridor, vessels making minor route deviations to avoid the 500 m RCZ will not suffer any significant operational impact and the consequence severity is considered to be broadly 'negligible', as deviations are expected to be temporary and localised. The likelihood of some deviation is however assessed to be 'likely' which results in a risk outcome of '**Broadly Acceptable'**

Table 13-18: Impact Risk Summary: Deviation from established vessel routes and areas

Impact	Consequence	Frequency	Risk	Additional RRMs	Residual Risk
Deviation from Established vessel routes and areas	Negligible	Likely	Broadly Acceptable	NA	ALARP

13.6.3.3 Interaction with vessel anchors and anchoring activity (Anchor Snagging)

During the installation phase, there is a risk that a third-party vessel will drop anchor or lose its holding ground in adverse weather and subsequently drag its anchor, over a section of exposed cable (above seabed level) prior to cable burial or protection being installed.

Vessel anchoring patterns in the area of the marine installation corridor are captured in Figure 13-20. The figure shows that the marine installation corridor does not encroaches on designated anchorage areas along the vast majority of the marine installation corridor. However, the proximity of anchorage areas associated with Thorntonloch, north of Eyemouth, Sunderland and Seaham (south of the English landfall location) present potential for incidents of interaction with anchors. Vessels are recorded at anchor at a number of locations in the vicinity of the marine installation corridor and in particular at these inshore locations. However, anchoring is also seen generally between KP 20 and KP 110, in the winter period, and in the immediate vicinity of the marine installation corridor between KP 40 and KP 50.

In the case of a snagging incident, it is possible that smaller vessels suffer a risk of foundering should they not be able to free themselves. A severity of consequence of 'High' is therefore selected. The frequency of anchor snagging is assessed as 'Unlikely' recognising that vessels will largely be aware of the operation and cable location. This is due to embedded mitigations covering promulgation of information to sea users about both the location and installation of the cable, as well as through guard vessel activity patrolling sections of unburied cable during the installation phase.

Frequency and severity outcomes combine give a '**Tolerable**' risk ranking which requires the identification of further potential risk reduction measures, in addition to those assumed to be in place. It is therefore necessary to identify potential risk reduction measures in addition to those assumed to be in place, so as to reduce the risk to ALARP. It is recommended to identify sections of unburied or unprotected cable to sea users, where they are not patrolled by guard vessel, through the use of temporary marker buoys and to reduce the duration between cable laying and associated burial and

protection works is minimised insofar as is practicable, in order to minimise the period when exposed cables are present on the seabed.

Table 13-19: Impact Risk Summary: Interaction with vessel anchors and anchoring activity (Anchor Snagging)

Impact	Consequence	Frequency	Risk	Additional RRMs	Residual Risk
Interaction with vessel anchors and anchoring activity	High	Unlikely	Tolerable	Use of temporary marker buoys to identify unburied cable prior to installation Duration of exposed / unprotected cable minimized	ALARP

13.6.3.4 Interaction with fishing gear

Fishing vessels' gear could become snagged on the cable where sections may be exposed prior to burial or protection. Vessels may sustain damage, considered to be 'medium' according to the commercial fisheries appraisal (Chapter 14: Commercial Fisheries, section 14.6.2.4). However, they may also suffer foundering as a worst case outcome during this phase of the Marine Scheme. A large number and variety of fishing vessels are seen in the survey, which is expected to include demersal and dredger types, among others. Significant levels are seen along much of the marine installation corridor (See Figure 13-22).

The appointment of a Fisheries Liaison Officer (FLO) for the duration of the cable installation, combined with Kingfisher notifications and notices to mariners, and other marine warnings as appropriate represents suitable and effective embedded mitigation by ensuring that fishermen using the area are aware of the potential seabed hazard prior to installation. Guard vessels will be used to monitor the area around sections of exposed cable between lay, burial, protection works etc which provides further risk reduction. Nonetheless, interaction with fishing gear is more likely where fishing activity is most dense; North of the marine installation corridor around Dunbar, KP 0 to KP 25 and between KP 110 to KP 170 where trawler activity is prevalent.

Given the prior promulgation of information on the Marine Scheme to fishermen via the FLO and other notices to mariners, as well as the use of guard vessels between cable laying and protection works, the probability of interactions with fishing gear is already considered to be reduced. The likelihood of gear snagging is therefore assessed as 'Unlikely', assuming that sections of the cable may be left unburied for a period of time, due to ground conditions or existing infrastructure, before cable protection is installed. The consequences of such an outcome can be severe and are assessed as 'High' – potential loss of crew member or vessel. This results in an overall **'Tolerable'** risk, which warrants further risk reduction.

It is therefore necessary to identify potential risk reduction measures in addition to those assumed to be in place, so as to reduce the risk to ALARP. To achieve the required risk reduction the duration between cable laying and associated burial and protection works will be reduced as far as is practicable, in order to minimise the period when exposed cables are present on the seabed.

Table 13-20: Impact Risk Summary: Fishing gear snagging or dragging cable (leads to foundering)

Impact	Consequence	Frequency	Risk	Additional RRMs	Residual Risk
Foundering due to fishing gear snagging or dragging cable	High	Unlikely	Tolerable	Use of temporary marker buoys to identify unburied cable prior to installation Duration of exposed / unprotected cable minimised	ALARP

13.6.4 Operation Phase

13.6.4.1 Vessel-to-vessel collision due to maintenance activities

There is a risk of vessel-to-vessel collision during the operation phase of the Marine Scheme during maintenance and repair works. Vessels will be required to conduct periodic surveys to monitor the cable and perform any preventative maintenance. This may require large slow-moving vessels with restricted manoeuvrability. Their occasional presence across the marine installation corridor will present an obstacle to all passing traffic. The risks are analogous to those identified and assessed for installation, but with a significantly reduced likelihood.

Throughout the year, a range of vessel types cross the marine installation corridor in multiple locations. Cargo/Tanker vessels comprise the majority of this traffic with Fishing and Offshore Industry vessel categories also contributing significantly. Passenger vessels, which are likely to be aware and prepared to navigate the maintenance vessels, and recreational vessels comprise only a small proportion of the total vessel count. Nonetheless, the surface collision risk is likely to be greater in higher density sections of the marine installation corridor and therefore in particular between KP 10 – KP 90 and KP 130 – KP 170 as shown in Figure 13-9.

Due to embedded mitigation such as Notice to Mariners, as well as pre-operational consultations, awareness of any maintenance activities by vessels using the area will be raised. However, it cannot be presumed that all vessels using, approaching and exiting locations area, or vessels otherwise using the area, will necessarily be aware of the presence of maintenance activities.

A collision with any vessel could result in a 'High' Severity consequence outcome (loss of crew member) among other consequences such as personal injuries and vessel damage as with vessel collision in the installation phase. However, it is noted that no maintenance works are foreseen/scheduled throughout the life of the cable with only regular surveys and preventative maintenance considered. The likelihood is considered to be 'Remote' along the full length of the marine installation corridor. These assessments combine to provide a '**Tolerable**' risk ranking.

It is necessary to identify potential risk reduction measures in addition to those assumed to be in place, so as to reduce the risk, to ALARP. Additional or increased collision avoidance measures and or procedures will be employed specifically for the operation phase which are located at the busiest or most densely trafficked sections of the marine installation corridor (KP 10 – KP 90 and KP 130 – KP 170). It is recommended that the maintenance procedures include provisions which recognize and address the increase in collision risk at these areas. Provisions should include:

- Operation procedures explicitly identifying the increased collision risk at KP 10 – KP 90 and KP 130 – KP 170 established prior to commencement of works;
- Guard Vessel procedures explicitly identifying the increased collision risk at KP 10 – KP 90 and KP 130 – KP 170 established prior to commencement of works;

- Prior reconfirmation with crew, that the installation vessels are entering the two areas of higher density traffic.

Table 13-21: Impact Risk Summary: Increased Risk of Vessel-to-Vessel Collision

Impact	Consequence	Frequency	Risk	Additional RRMs	Residual Risk
Increased risk of vessel-to-Vessel collision	High	Remote	Tolerable	High traffic density specific procedures established	ALARP

13.6.4.2 Deviation from established vessel routes and areas due to presence of maintenance vessels

Maintenance vessels conducting regular surveys to monitor the cable and perform any preventative maintenance may cause some disruption to routine vessel routeing, and any otherwise scheduled activity. Maintenance activities may require large slow-moving vessels with restricted manoeuvrability, and their presence across the location of the marine installation corridor will present an obstacle which is unable to deviate and is therefore considerably constrained by its operations. This will likely necessitate deviations for some vessel operators routinely using the area. Throughout the year a range of vessel types cross the marine installation corridor in multiple locations. Fishing and Cargo/Tanker vessels, which comprise the majority of this traffic, are unlikely to experience significant disruption in the case where they are required to navigate the Marine Scheme; this being an essentially routine activity for commercial vessels. Passenger vessels and offshore industry vessels, which comprise only a small proportion of the total vessel count, are likely to be aware and prepared to navigate clear of the installation vessels due to the embedded mitigations promulgating awareness of the operation (consultation, Notice to Mariners etc) and practicing good passage planning techniques and procedures. Nonetheless, some temporary disruption and subsequently required deviation from established routes can be expected.

Due to the impermanence of the maintenance vessels, the severity of consequence is considered to be 'Low' as deviations are expected to be temporary and indeed short lived. The likely frequency of deviation is however assessed to be 'Likely' which results in risk outcome of '**Broadly Acceptable**'.

Table 13-22: Impact Risk Summary: Deviation from established vessel routes and areas

Impact	Consequence	Frequency	Risk	Additional RRMs	Residual Risk
Deviation from Established vessel routes and areas	Low	Unlikely	Tolerable	NA	ALARP

13.6.4.3 Interaction with vessel anchors and anchoring activity

During the operational phase there is a risk that an anchored vessel will lose its holding ground and subsequently drag anchor over a section of exposed cable (above the seabed level).

Vessel anchoring patterns in the area of the marine installation corridor are captured in Figure 13-20. The figure shows that the marine installation corridor encroaches on no designated anchorage areas. However, vessels are recorded at anchor at a number of locations along the marine installation corridor and in particular at landfall north of Eyemouth and Seaham south of Landfall. Additionally, vessels are also at anchor particularly in the winter period between KP 20 and KP 110 and in particular between KP 40 and KP 50 in the winter season.

In the case of a snagging incident, it is possible that smaller vessels could risk foundering should they not be able to free themselves. For larger vessels if the cable is recovered to surface it poses an

electrocution risk. A severity of outcome of **'**High**'** is therefore selected. The likelihood of anchor snagging is assessed as **'**Remote**'** recognising that the cable is buried to a minimum target depth of lowering of 0.6 m, with greater depths prescribed where necessary to account for risk of interactions with anchors. Where this isn't practical exposed sections are protected and this protection is designed to minimise the risk of snagging in so far as practicable. Vessels will largely be aware of the cable location due to embedded mitigations covering industry guidance on safe anchoring practices and promulgation of information to sea users, about both the maintenance operations and the cable location itself. These combine to give a **'Tolerable'** risk ranking and the need to consider further risk reduction.

However, the embedded mitigation; industry guidance on safe anchor and fishing practises, cable burial where possible, with protection measures where this is impractical, and provision of as-built locations of the cable and external protection to UKHO (Admiralty) and Kingfisher (KIS-ORCA) essentially represents all reasonably practicable measures to reduce snagging risks. No further design measures are therefore considered justifiable. The measures are considered to cover all practicable means and to reduce the risks to ALARP.

Table 13-23: Impact Risk Summary: Interaction with vessel anchors and anchoring activity (Anchor Snagging)

Impact	Consequence	Frequency	Risk	Additional RRMs	Residual Risk
Interaction with vessel anchors and anchoring activity	High	Unlikely	Tolerable	None Identified (embedded measures considered sufficient)	ALARP

13.6.4.4 Interaction with fishing gear

Fishing vessels whose gear becomes snagged on the cable may sustain damage or suffer foundering during the operation phase of the project. Pre-lay ploughing may result in the creation of berms and rock displacement which presents additional seabed hazards to fishing gear. A large number and variety of fishing vessels are seen in the survey, which includes Potter/Whelker and demersal and dredger types, among others. Significant levels are seen along much of the marine installation corridor (See Figure 13-22).

As the cable is expected to be buried to between 1.5 m and 0.8 m where practicable, and otherwise protected using rock berms or other external protection measures as detailed in Chapter 2: Project Description. All external protection measures shall be designed to minimise the risk of snagging insofar as possible. However, industry guidance recommends avoidance of demersal fishing over cables and other safe practises relating to seabed hazards. This embedded mitigation, combined with the provision of As-built locations of cable and external protection to UKHO and Kingfisher (KIS-ORCA) represents substantial risk reduction. As such, the risk of snagging is considered to be suitably reduced, as with the risk of anchor snagging addressed in the previous section. In addition, the appointment of a FLO during the installation phase of the project provides substantial assurance that fishermen will be aware of the cable location following the installation.

The consequences of such an outcome can be severe and are assessed as 'High' – potential loss of crew member or vessel. However, given the cable burial and protection measures, prior promulgation of information on the installation to fishermen via the FLO and via UKHO and KIS-ORCA, as well as notices to mariners, and the relevant industry guidance on fishing near cables and seabed hazards, the probability of snagging incidents is already considered to be minimized. The likelihood of gear snagging is therefore assessed as 'Remote'. This results in an overall '**Tolerable**' risk, which therefore warrants further risk reduction.

It is necessary to identify potential risk reduction measures in addition to those assumed to be in place, to reduce the risk to ALARP. However, industry guidance on safe fishing practises, combined with cable burial where possible and protection measures where this is impractical, already represent an extensive and comprehensive range of reasonably practicable snagging risk reduction measures. It is therefore

recommended that post lay survey reports are disseminated to relevant fisheries organisations and other stakeholders to further increase awareness.

Table 13-24: Impact Risk Summary: Fishing gear snagging or dragging cable leads to foundering)

Impact	Consequence	Frequency	Risk	Additional RRMs	Residual Risk
Foundering due to fishing gear snagging or dragging cable	High	Remote	Tolerable	Dissemination of post- lay survey to relevant organizations and stakeholders for information	ALARP

13.6.4.5 Reduction in under keel clearance

The marine installation corridor is generally in waters at LAT of greater than 50 m. Therefore, the slight reduction in effective depth between the keel of a vessel and the seabed topography (under keel clearance) presents no concern for the majority of the length of the marine installation corridor. However, water depths of 10 m at LAT extend some 1.5 km – 2 km from landfall at Thorntonloch Beach, along the marine installation corridor and a similar profile is seen at landfall north of Seaham.

A small number of vessels tracks with draughts up to 7.5 m are seen in the shallower depths close to the marine installation corridor landfalls, particularly at Seaham, however it is noted these are not recorded at the immediate location of the marine installation corridor (See Figure 13-9).

In line with MCA guidance, it is not planned to reduce the existing water depth by more than 5% along any section of the cabling. it is therefore expected that under keel clearance is only reduced at a small number of locations. Additionally, the use of HDD to bring the cable to land from under the seabed limits the potential for reductions in under keel clearance to the exit pit locations, which may require mattress and rock protection. These are to be located within an area of minimum depth range of 4 m to 10 m at LAT.

Reductions in under keel clearance increase the risk of grounding with a rock berm or other protection feature which may result in injury and or vessel damage, with consequences assessed as being ‘Medium’. Vessels with deep draughts (relative to the depth of water that they are navigating in) are expected to exercise particular diligence and care through the adoption of good passage planning techniques and procedures. This, combined with consultations and communications identifying and raising awareness of the cable location, presents a frequency of likelihood of impact to be assessed as ‘Remote’. These combine to produce an overall assessment of ‘**Broadly Acceptable**’ risk ranking and no further risk reduction measures are therefore considered necessary.

Table 13-25: Impact Risk Summary: Reduction in Under keel Clearance

Impact	Consequence	Frequency	Risk	Additional RRMs	Residual Risk
Reduction in under keel clearance	Medium	Remote	Broadly Acceptable	NA	ALARP

13.6.4.6 Interference with marine navigational equipment

Given the transmission characteristics of the HVDC cables, it is feasible that a significant zone of potential magnetic compass deviation from EMF emissions could persist along the marine installation corridor. A worst case of more than 5 degrees compass deviation for a large portion of the route is foreseeable (National Grid, 2021) . This may present disruption to navigation in the operation phase of the Marine Scheme.

Most commercial vessels use a range of instruments for navigation, particularly gyrocompasses which are not affected by EMFs. However, some vessels may rely solely on magnetic compass navigation and may experience misrouting where traveling in the direction of the cable and where the interference is most pronounced i.e., in shallow water / inshore. Vessels relying solely on a magnetic compass for navigation are also likely to navigate by visual landmarks in shallow water and inshore areas. However, poor visibility and challenging sea states may nonetheless result in misrouting towards otherwise obscured hazards or objects.

Embedded mitigation includes optimisation of cable configuration and separation distances to minimise compass deviation, as far as practicable. This will reduce the likelihood and severity of vessel misrouting. Additionally, magnetic compass deviation effects are limited to the immediate vicinity of the of the installation corridor, so effects on the limited number of vessels expected to rely solely on magnetic equipment will be short lived, and only likely to result in minor course deviations. The consequence severity is nonetheless assessed as 'High' due to the increased hazard prevalence at inshore locations along the installation corridor, where more pronounced and persistent deviation could occur. However, complete reliance on magnetic compass navigation is considered very unlikely for any vessel in a given situation and location. Additionally, as the majority of the cable will be laid in water deep enough to eliminate the electromagnetic field effects (50 m), the probability of disruption is assessed as 'Remote'. These combine to produce a **'Tolerable'** risk rating and the need to consider further risk reduction measures.

It is therefore necessary to identify potential risk reduction measures in addition to those assumed to be in place, to reduce the risk to ALARP. Therefore, all reasonably practicable measures should be taken to minimise magnetic compass deviations through optimization of cable configurations to within acceptable limits. Where this may not be practicable further consultation with MCA should be undertaken to identify additional mitigation such as magnetic compass deviation survey and reporting to UKHO for inclusion in admiralty charts.

Table 13-26: Impact Risk Summary: EMF with marine navigational equipment

Impact	Consequence	Frequency	Risk	Additional RRMs	Residual Risk
EMF with marine navigational equipment	High	Remote	Tolerable	Consultation with MCA to identify acceptable mitigation where ideal cable configurations are impracticable	ALARP

13.6.5 Decommissioning Phase

All impacts relating to the installation phase are considered to apply to the decommissioning phase. The potential risk reduction measures identified for the construction phase, in addition to those assumed to be in place, so as to reduce the risk to ALARP, will be applied during the decommissioning phase.

As such all residual risk is considered to be ALARP for all decommissioning impacts.

13.7 Mitigation and Monitoring

Project specific mitigation have been prescribed from the shipping and navigation appraisal and will be implemented to ensure that impacts to shipping and navigation from the Marine Scheme are reduced ALARP. The project specific mitigation is presented in Table 13-27.

Table 13-27: Project Specific Mitigation

Project Stage	Project Specific Mitigation Measure / commitment topic	Description of mitigation, commitment and/or monitoring measure
Pre-Installation	Further consultation with MCA	Where ideal cable configurations are impracticable further consultation with MCA shall be undertaken to identify project specific mitigation measures such as magnetic compass deviation survey and reporting to UKHO for inclusion in admiralty charts.
	Consultation with Blyth Demonstration Site	Consultation with the relevant Blyth Demonstration Site project operators shall be undertaken to confirm operation dates (including windfarms construction, cable installation and survey vessel activity) and otherwise rationalise activity schedules to minimise clashes and potential interactions.
Installation	Vessel-to-vessel collision risk	Cable laying operation procedures should include provisions which recognize and address the increase in collision risk at the most densely trafficked areas of the installation corridor. Provisions should include: • operation procedures explicitly identifying the increased collision risk at KP 10 – KP 90 and KP 130 – KP 170 established prior to commencement of works; • Guard Vessel procedures explicitly identifying the increased collision risk at KP 10 – KP 90 and KP 130 – KP 170 established prior to commencement of works; and • prior reconfirmation with crew, that the installation vessels are entering the two areas of higher density traffic.
	Duration of time between cable laying and burial and protection work	The duration between cable laying and associated burial and protection works will be minimised insofar as is practicable, in order to minimise the period when exposed cables are present on the seabed.
	Identify sections of unburied or unprotected cable to sea users	Sections of unburied or unprotected cable will be identified to sea users, where they are not patrolled by guard vessel, through the use of temporary marker buoys.
Post-installation	Post lay survey reports are disseminated to relevant fisheries	Post lay survey reports will be disseminated to relevant fisheries organisations and other stakeholders to further increase awareness.

13.8 Residual Impacts

Across all phases of the Marine Scheme, all impacts were assessed to be '**Tolerable**' or '**Broadly Acceptable'**. Following the implementation of the Project Specific mitigation measures, identified and justified in Section 13.7 , the residual impacts, from all phases of the Marine Scheme, can be considered ALARP (See Table 13-18 to Table 13-26).

13.9 Cumulative and In-Combination Effects

The full cumulative and in-combination effects appraisal is presented in Chapter 16: Cumulative and In-Combination Effects.

The potential for cumulative shipping and navigational effects between the Marine Scheme and the English Onshore and Scottish Onshore Schemes was considered, however as there is no potential for vessels associated with Marine Scheme to be working concurrently with the HDD, these projects were excluded from further appraisal. No pathways were identified between these projects and the Marine

Scheme for impacts with fishing gear, reduction in under keel clearance or EMF resulting in magnetic compass deviation.

In-combination effects are where receptors could be affected by more than one environmental impact. Where a receptor has been identified as only experiencing one effect or where only one topic has identified effects on that receptor, there is no potential for in-combination effects. The receptor groups within this chapter do not interact between chapters, therefore receptors have been wholly appraised within this respective topic chapter.

13.10 Summary of Appraisal

A summary of the findings of the appraisal is provided in Table 13-28 below.

Table 13-28: Summary of shipping and navigation appraisal

Project Phase	Potential Hazard / Impact	Receptor	Severity / Magnitude	Likelihood / Frequency criteria	Risk	Project Specific Mitigation	Residual Risk
Installation	Vessel to vessel collision	Shipping and Navigation	High	Remote	**Tolerable**	High traffic density specific procedures established	**ALARP**
	Deviation from established vessel routes and areas		Negligible	Likely	**Broadly Acceptable**	N/A	**ALARP**
	Interaction with vessel anchors and anchoring activity		High	Unlikely	**Tolerable**	Use of temporary marker buoys to identify unburied cable prior to installation Duration of exposed / unprotected cable minimized	**ALARP**
	Interaction with fishing gear		High	Unlikely	**Tolerable**	Use of temporary marker buoys to identify unburied cable prior to installation Duration of exposed / unprotected cable minimized	**ALARP**
Operation (including maintenance and repair)	Vessel to vessel collision		High	Remote	**Tolerable**	High traffic density specific procedures established	**ALARP**
	Deviation from established vessel routes and areas		Low	Unlikely	**Tolerable**	N/A	**ALARP**

Project Phase	Potential Hazard / Impact	Receptor	Severity / Magnitude	Likelihood / Frequency criteria	Risk	Project Specific Mitigation	Residual Risk
	Interaction with vessel anchors and anchoring activity		High	Unlikely	**Tolerable**	Non identified (embedded measures considered sufficient)	**ALARP**
	Interaction with fishing gear		High	Remote	**Tolerable**	Dissemination of post- lay survey to relevant organizations and stakeholders for information	**ALARP**
	Reduction in under keel clearance		Medium	Remote	**Broadly acceptable**	N/A	**ALARP**
Decommissioning	All impacts relating to the installation phase are considered to apply to the decommissioning phase.						

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