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Seagreen 1A Export Cable Corridor Screening Report

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Document Change Summary

Rev	Date	Detail of Change	Changed by

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AIS	Automatic Identification System
B	Magnetic Components
BGS	British Geological Survey
CaP	Cable Plan
CBRA	Cable Burial Risk Assessment
CDM	Construction Design and Management
CEH	Centre for Ecology & Hydrology
CEMP	Construction Environmental Management Plan
CITES	Convention on International Trade in Endangered Species
CMS	Convention of Migratory Species
COSHH	Control of Substances Hazardous to Health Regulation
cSAC	Candidate Special Area of Conservation
DP2	Dynamic Positioning
E	Electric
ECR	Offshore Export Cable Corridor
EIA	Environmental Impact Assessment
ELC	East Lothian Council
EMF	Electromagnetic Fields
EMP	Environmental Management Plan
EPS	European Protected Species
EU	European Union
FLO	Fisheries Liaison Officer
FMMS	Fisheries Management and Mitigation Strategy
GT	Gross Tonnage
HDD	Horizontal Directional Drilling
HES	Historic Environment Scotland
HRA	Habitat Regulations Appraisal
HSE	Health, Safety and Environment

iE	Induced Electric
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
m	Meters
MBES	Multibeam Echosounders
MCA	Marine Coastguard Agency
MLWS	Mean Low Water Springs
MNNS	Marine Non-Native Species
MoD	Ministry of Defence
MPCP	Marine Pollution Contingency Plan
µT	Micro Tesla
NCA	Nature Conservation Appraisal
NCMPA	Nature Conservation Marine Protected Area
nm	Nautical Miles
NMPi	National Marine Interactive Plan
NRA	Navigational Risk Assessment
O&M	Operation and Maintenance
OFTO	Offshore Transmission Owner
OTA	Offshore Transmission Asset
OWF	Offshore Wind Farm
PAC	Pre-Application Consultation
PAH	Poly-Aromatic Hydrocarbons
PCB	Poly-Chlorinated Biphenyls
PMF	Priority Marine Features
pNCMPA	Possible Nature Conservation Marine Protected Area
pSPA	Proposed Special Protection Area
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SBP	Sub-Bottom Profilers

SCANS	Small Cetaceans in the European Atlantic and North Sea
SEL	Sound Exposure Levels
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen's Federation
SG1A	Seagreen 1A Project
SOLAS	Safety of Life at Sea
SPA	Special Protection Area
SPM	Suspended Particulate Matter
SMU	Seal Management Units
SSC	Suspended Sediment Concentration
SSS	Side Scan Sonar
SWEL	Seagreen Wind Energy Limited
SG1A Ltd	Seagreen 1A Limited
TEC	Transmission Entry Capacity
UKHO	United Kingdom Hydrographic Office
UNCLOS	United Nations Convention on the Law of the Sea
USBL	Ultra-Short Baseline
UXO	Unexploded Ordinances
V m-1	Volts Per Metre
VMP	Vessel Management Plan
VTS	Vessel Traffic Service
WTG	Wind Turbine Generators

1. Introduction

Seagreen Wind Energy Ltd (SWEL, hereafter referred to as Seagreen) is a joint venture between SSE Renewables and Total. In 2014 Seagreen was awarded Section 36 Consents (S36 Consents) under the Electricity Act 1989 by Scottish Ministers for Seagreen Alpha and Seagreen Bravo Offshore Wind Farms (OWFs). Marine Licences for Seagreen Alpha and Bravo OWFs and the Offshore Transmission Asset (OTA) (together the 'Marine Licences') were also awarded by Scottish Ministers in October 2014, under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009. Together the wind farms Seagreen Alpha and Seagreen Bravo and the OTA collectively comprise 'the Seagreen Project'.

To maximise energy generation and facilitate full export capacity for the Seagreen Project, Seagreen 1A Limited, hereafter referred to as Seagreen 1A) is proposing to consent an additional export cable corridor (approximately 108km) from the consented Seagreen Project Area to an identified landfall location at Cockenzie. This single offshore export cable infrastructure comprises the Seagreen 1A project, hereafter referred to as the SG1A Project.

In accordance with Part 4 of the Marine (Scotland) Act 2010, Seagreen 1A proposes to submit an application for a Marine Licence to Marine Scotland's Licensing and Operations Team (MS-LOT) for the installation of the SG1A Project. The proposed 108 km offshore export cable corridor (ECR) is shown in Figure 1.1.

This report presents details of the characteristics and location of the proposed works along with the characteristics of any potential impacts to support a screening decision. This report will also outline any potential impacts that will be considered further in an Environmental Appraisal (EA) that will be produced to support the application for the Marine Licence. Based on the characteristics of the SG1A Project and with consideration of potential impacts that may arise from the project, it is Seagreen 1A's position that an Environmental Impact Assessment (EIA) under Marine Works (Environmental Assessment) (Scotland) Regulations 2017 (the 2017 EIA Regulations) is not required to support the Marine Licence application.

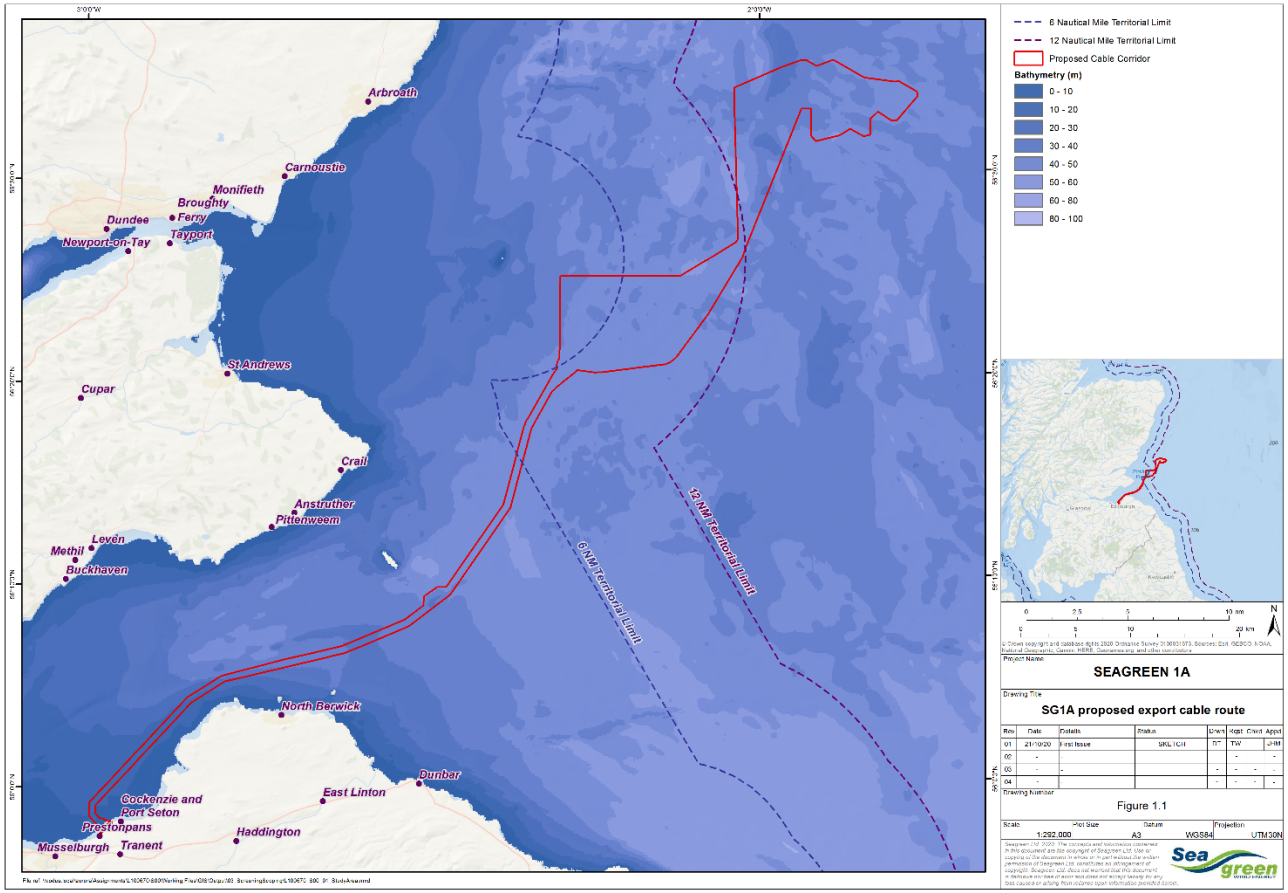

Figure 1.1 – Seagreen 1A preferred subsea cable route corridor

1.1 Background

Seagreen is a joint venture between SSE Renewables (49%) and Total (51%). Seagreen was awarded exclusive development rights in the Firth of Forth Round 3 Offshore Wind Zone (the "Firth of Forth Zone") by The Crown Estate in 2010. The Firth of Forth Zone lies beyond the 12 nautical mile (NM) Scottish territorial waters limit.

The Seagreen Project is located in the North Sea, in the outer Firth of Forth and Firth of Tay region and comprises the OWFs (the Wind Turbine Generators (WTGs), their foundations and associated array cabling), together with associated infrastructure of the OTA (Offshore Substation Platform (OSP), their foundations and the offshore export cable which will make landfall at Carnoustie and connect to the Tealing substation (Seagreen, 2018).

The SG1A Project, comprises one high voltage export cable to mean high water springs (MHWS), cable landfall and connection to the onshore infrastructure. Scour protection and cable protection may also be required.

In February 2020, Seagreen received a grid offer from National Grid for the Cockenzie substation in East Lothian with Transmission Entry Capacity (TEC) of 360MW. This was accepted by Seagreen in June 2020, with a connection date of October 2023. The proposed export cable infrastructure will transmit electricity from up to 36 WTGs in the consented Seagreen Project Area, via an OSP also consented under the Seagreen Project, to the new landfall location at Cockenzie.

The onshore cable infrastructure for SG1A will be consented under the Town and Country Planning Act (Scotland) 1997 and is not considered further within this report.

2. Consent Requirements

2.1 Consideration of the need for EIA

When considering the SG1A Project in isolation, the installation of a single offshore export cable does not fall under either Schedule 1 or Schedule 2 of the 2017 EIA Regulations. However, it is considered that the proposed works may represent a change or an extension to an authorised project and therefore may fall under the description of projects provided at Paragraph 13 of Schedule 2 of the 2017 EIA Regulations (i.e. a change to an installation for the harnessing of wind power for energy production (wind farms) where those works are already authorised). In this context an EIA is only required where the change may have significant adverse effects on the environment.

The 2017 EIA Regulations specify that in making a determination as to whether or not a Schedule 2 project is an EIA project, the relevant criteria set out in Schedule 3 must be considered together with the results of any relevant assessment. These criteria cover the characteristics of the works, the location of the works and the characteristics of the potential impacts. This Screening Report provides the required information to satisfy the Schedule 3 selection criteria as outlined below in Table 2.1.

It is noted that the SG1A Project overlaps considerably with the already assessed and consented Inch Cape OWF export cable corridor (further detail on the SG1A ECR layout is provided in section 3.2). This overlap has been designed to minimise any disturbance across the Forth and Tay area. An Environmental Impact Assessment was undertaken to support the successful consent application of Inch Cape OWF (Inch Cape, 2011; 2018). Given the overlap between the SG1A Project and the Inch Cape export cable corridor, information and assessment conclusions presented in the Inch Cape documents (Inch Cape, 2011; 2018) are used within this Screening Report, to support the characterisation of potential impacts of the SG1A Project (Section 6).

Taking into consideration the conclusions of the Inch Cape assessments, along with the assessments undertaken and presented within this Screening Report, and the scale of works for the SG1A Project (one single offshore export cable compared with up to six Inch Cape offshore export cables), this Screening Report has determined that the SG1A Project will not have any significant environmental impacts.

On the basis of the information presented in this report, Seagreen 1A is requesting that Scottish Ministers make a determination that an EIA under the 2017 EIA Regulation is not required to support the SG1A Project Marine Licence application.

Table 2.1 - Summary of the Schedule 3 Criteria and the relevant locations where each is addressed within this Screening Report

Schedule 3 Criteria	Subsections	Location in document
Characteristics of works 1. The characteristics of works must be considered having regard, in particular, to—	(a) the size and design of the works;	Section 3.3.2.2
	(b) cumulation with other existing works and/or approved works;	See cumulative impact sections within the key environmental consideration Sections 6.2.5.7, 6.3.5.5, 6.4.5.6, 6.5.5.4, 6.6.5.6, 6.7.5.7, 6.8.5.11, 6.9.5.4.
	(c) the use of natural resources, in particular land, soil, water and biodiversity;	Section 4.8
	(d) the production of waste;	Section 4.8
	(e) pollution and nuisances;	Section 4.8
	(f) the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge;	Section 4.8
	(g) the risks to human health (for example due to water contamination or air pollution).	Section 4.8

Location of works 2. The environmental sensitivity of geographical areas likely to be affected by works must be considered having regard, in particular, to—	(a) the existing and approved land use;	Section 4.4
	(b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground;	Section 4.8
	(c) the absorption capacity of the natural environment, paying particular attention to the following areas— (i) wetlands, riparian areas, river mouths; (ii) coastal zones and the marine environment; (iii) mountain and forest areas; (iv) nature reserves and parks; (v) European sites and other areas classified or protected under national legislation; (vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure; (vii) densely populated areas; (viii) landscapes and sites of historical, cultural or archaeological significance.	Section 6
Characteristics of the potential impact 3. The likely significant effects of the works on the environment must be considered in relation to criteria set out in paragraphs 1 and 2 above, with regard to the impact of the works on the factors specified in regulation 5(3), taking into account—	(a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);	Section 6 and Section 8
	(b) the nature of the impact;	Section 6 and Section 8
	(c) the transboundary nature of the impact;	Section 6 and Section 8
	(d) the intensity and complexity of the impact;	Section 6 and Section 8
	(e) the probability of the impact;	Section 6 and Section 8
	(f) the expected onset, duration, frequency and reversibility of the impact;	Section 6 and Section 8
	(g) the cumulation of the impact with the impact of other existing and/or approved works;	Section 6 and Section 8
	(h) the possibility of effectively reducing the impact.	Section 6 and Section 8

2.2 Marine Licence Requirement

In accordance with Part 4 of the Marine (Scotland) Act 2010, a Marine Licence is required for the installation and operation of submarine cables in Scottish waters.

Seagreen 1A does not consider a formal EIA to be required for the SG1A Project, however, it is noted that in its Guidance for Marine Licence Applicants (Marine Scotland, 2015a) Marine Scotland advises "applicants for marine licences for submarine cables should consider the scale and nature of their projects and give consideration to the need for a proportionate environmental assessment".

For larger projects, where there is potential for the subsea cable to impact key environmental receptors, it is recommended by Marine Scotland (Marine Scotland, 2015a) that an assessment of potential impacts on these receptors is carried out. Results from this assessment in addition to other relevant information about the Project should then be provided to support the Marine Licence application.

In line with Marine Scotland Guidance, this Screening Report sets out any potential impacts that will be considered further in an Environmental Appraisal that will be produced to support the SG1A Project application for a Marine Licence.

2.3 Consultation

Table 2.2 below highlights consultation undertaken to date in relation to the SG1A Project. Seagreen 1A intends to continue active consultation for the duration of planning, and all subsequent phases of the SG1A Project, particularly with the fisheries community. In light of the COVID-19 pandemic, it is expected all consultation will continue to be carried out virtually via video calls, email and telephone.

Table 2.2 - Consultation with stakeholders to date

Consultee	Description	Date
Marine Scotland	Call with key contacts to introduce the concept of the SG1A Project - first communication	27 May 2020
NatureScot	Call with key contacts to introduce the concept of the SG1A Project - first communication	3 June 2020
NatureScot, East Lothian Council (ELC)	Call to discuss SG1A Ornithology survey strategy and confirm survey and data requirements	10 September 2020
Marine Scotland	Call to discuss SG1A Ornithology survey strategy and confirm survey and data requirements	15 September 2020

Marine Scotland	SG1A Project update meeting. Confirmation of export cable corridor, discussion on consenting approach, project programme, key topics and next steps to screening	10 November 2020
Marine Scotland, NatureScot, Marine Scotland Science	SG1A Project update meeting and benthic survey scope. Update NatureScot on export cable corridor, discussion on consenting approach and programme and benthic survey scope and approach proposed	18 November 2020
Commercial Fisheries Stakeholders, including the Forth and Tay Commercial Fisheries Working Group members, Scottish Fishermen's Federation, Scottish White Fish Producer's Organisation, Regional Inshore Fisheries Groups and fishing vessel operators	SG1A Project Introduction email distributed including a map, and a summary of the background to the project plus expected upcoming activities and consultation information	20 November 2020
NatureScot	Email – agreement on benthic survey scope	26 November 2020
Marine Scotland Science	Letter – 'Seagreen 1A Consultation on Benthic Survey Scope of Works'	2 December 2020

2.3.1 Consideration of the need for Pre-Application Consultation (PAC)

Applicants for Marine Licences for certain prescribed classes of activities are required to carry out pre-application consultation (PAC) under The Marine Licensing (PAC) (Scotland) Regulations 2013 (the "PAC Regulations"). One of the prescribed classes of activities is the deposit of a submarine cable in the sea, or on or under the seabed from a vehicle, vessel, aircraft, marine structure or floating container, but only where that cable:

1. exceeds 1,853 metres in length; and
2. crosses the intertidal boundary.

Both criteria are met in relation to the SG1A Project and therefore PAC will be required. A virtual offshore PAC event for SG1A Project is planned to take place in January 2021, with the official public notification being issued in early December 2020, allowing a surplus of the statutory minimum period of time of 6 weeks of notice before the PAC event and 12 weeks prior to submission of the Marine Licence application. A PAC report will be developed and issued by Seagreen 1A alongside the Marine Licence application.

2.4 Scottish National Marine Plan

The Scottish Government adopted the National Marine Plan (NMP) in early 2015 (Marine Scotland, 2015b) to provide an overarching framework for marine activity in Scottish waters, with the aim to enable sustainable development and the use of the marine area in a way that protects and enhances the marine environment whilst promoting both existing and emerging industries. This is underpinned by a core set of general policies which apply across existing and future development and use of the marine environment. The relevant core policies and principles of the NMP have been considered in the context of the SG1A Project and development of this Screening Report.

2.5 Other legislative requirements

Where there is potential for a project to have an adverse effect on a Natura site (Special Area of Conservation (SAC) or Special Protection Area (SPA)), including proposed or candidate sites e.g. pSPAs or cSACs, an appropriate assessment is required in accordance with the Habitats Directive to ascertain whether a project will adversely affect the integrity of a site in view of the conservation objectives of the site.

The requirements of the Habitats Directive are transcribed in Scotland by the Conservation (Natural Habitats, &c.) Regulations 1994, as amended, and the Conservation of Offshore Marine Habitats and Species Regulations 2017. In accordance with these regulations, and as part of the Habitats Regulation Appraisal (HRA) process, where it is identified that there is potential for a Likely Significant Effect (LSE) on a Natura site, the applicant is required to provide information on the effects of the project on the integrity of a European site to the competent authority, to enable them to undertake an appropriate assessment of the project.

In addition to requirements for an HRA (see Section 7.1.2), where a project has the potential to impact either a designated or possible Nature Conservation Marine Protected Area (NCMPA or possible NCMPA (pNCMPA)) designated under the Marine (Scotland) Act 2010, applicants are also required to provide specific information on the potential impacts of the proposed project on the conservation objectives of these sites.

The potential for the SG1A Project to interact with features of these designated sites are considered in the relevant topic in Section 6. In support of the Marine Licence Application, a Nature Conservation Appraisal (NCA) will also be produced and submitted as an appendix to the Environmental Appraisal to satisfy the legislative requirements. Further details are provided in Section 7.1.2.

3. Location of Works: Route Selection

The proposed location for the SG1A Project is in the Firth of Forth and Firth of Tay between the consented Seagreen Project and the anticipated landfall location at Cockenzie as outlined in Figure 1.1. The SG1A project overlaps considerably with the consented Inch Cape export cable corridor, with the SG1A ECR

running south and east of the Inch Cape OWF, north of the consented Neart Na Gaoithe OWF and northwest of Berwick Bank and Marr Bank proposed OWFs (Figure 3.1).

The options considered for the SG1A Project have been informed by work undertaken as part of a number of previous studies to establish a technically and environmentally feasible subsea cable route corridor which can be presented in the Marine Licence application.

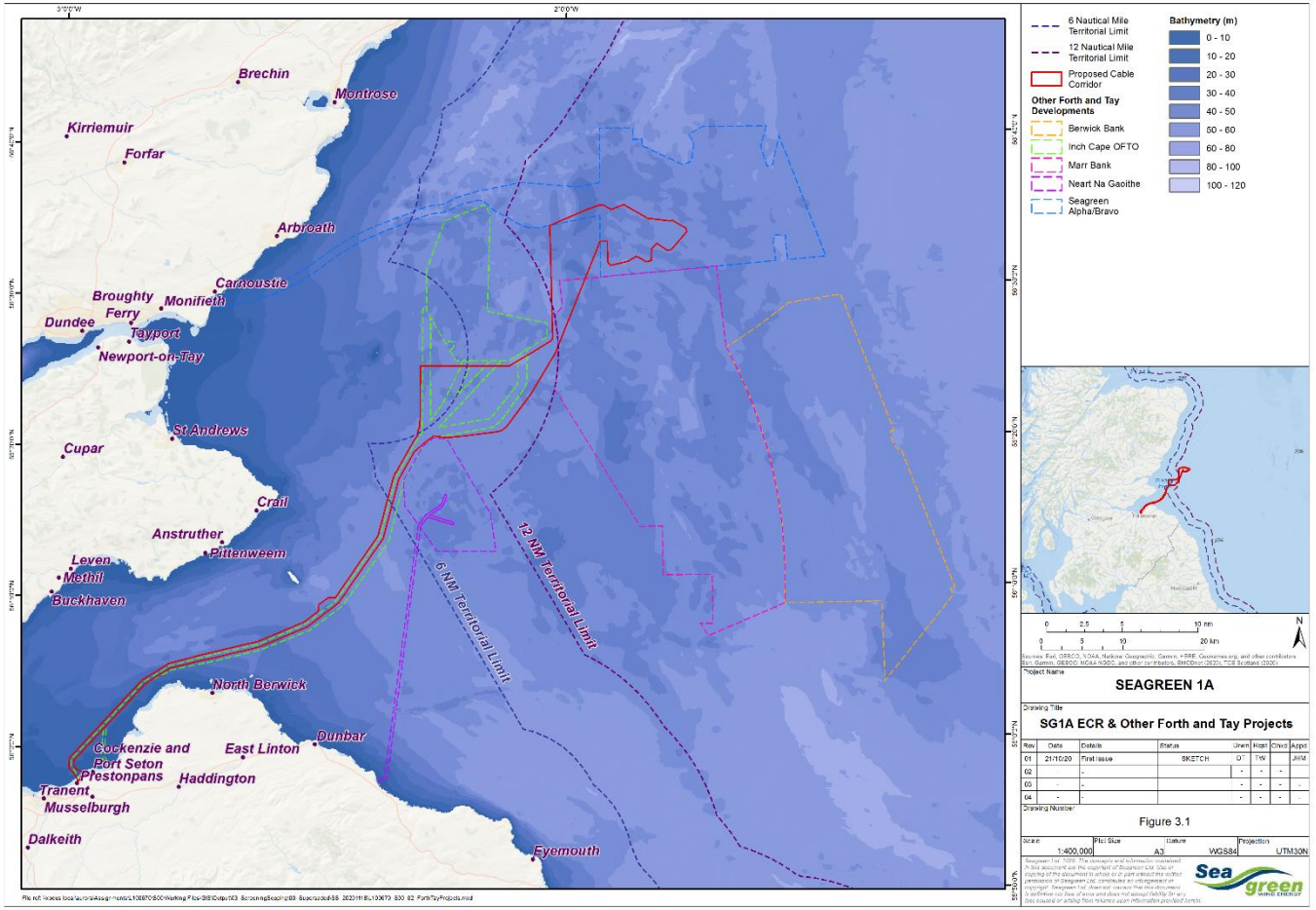

Figure 3.1 SG1A Project, the nearby Offshore Wind Farm developments and partially overlapping Inch Cape export cable route

3.1 Landfall Locations

The final landfall location and ECR for the Seagreen 1A Project are yet to be determined; however, two potential landfall locations have been identified and are currently under consideration at Cockenzie and Seton Sands. The chosen landfall location and onshore transmission infrastructure will be the subject of a separate onshore planning application under the Town and Country Planning Act (Scotland) 1997.

3.2 Subsea Cable Indicative Layout

The SG1A ECR follows a similar alignment to the consented Inch Cape OWF cable corridor to minimise disturbance across the Forth and Tay area.

The proposed SG1A ECR has been selected following a robust cable route selection process which considered environmental constraints, engineering feasibility and other marine users in the region, particularly fishing activities. Known environmental sensitivities including protected sites and their key features, important seabed habitats and wreck features are avoided where possible. Known areas of hard seabed substrate are also avoided and the cable route has been selected to reduce the overall cable lengths to maintain project feasibility. The route selected also seeks to avoid other offshore wind developments in the region, maintaining separation distance from both the Inch Cape and Neart na Gaoithe wind farm project boundaries. However, across much of its offshore route, the SG1A ECR overlaps across approximately 400m-500m of the consented Inch Cape ECR and extends approximately 200m-300m beyond this. This route was selected to minimise disturbance and reduce environmental impacts by closely following the trajectory of a consented cable corridor.

From early discussions with Inch Cape, Seagreen 1A understand that the Inch Cape project is unlikely to require and install the full six export cables consented in 2014. Discussions are ongoing with Inch Cape to understand export cable number and requirements, cable installation processes, any proximity issues and the potential for any cable crossings.

3.3 Marine Surveys

3.3.1 Regional existing benthic surveys

The SG1A Project area is well studied with considerable existing data available for the Forth and Tay region, including:

- Benthic surveys:
  - EUSeaMap;
  - The Seagreen Project (characterisation and pre-construction);
  - Inch Cape and Neart na Gaoithe survey data and EIA; and
  - Cooper and Barry (2017). A big data approach to macrofaunal baseline assessment, monitoring and sustainable exploitation of the seabed.
- Marine Ornithology surveys (see Section 6.5.1 for further details):

- Seagreen, Inch Cape and Neart na Gaoithe OWF monthly boat-based surveys;
- Seagreen, Inch Cape and Neart na Gaoithe OWF monthly aerial surveys;
- Seagreen 1A Project (offshore cable): intertidal and nearshore bird surveys up to 1.5 km from shore (MHWS), July 2020 to present; and
- Inch Cape offshore cable: intertidal and nearshore bird surveys up to 1.5 km from shore (MHWS), January 2012 to January 2013.

3.3.2 Additional surveys

Additional surveys are proposed by Seagreen 1A, to validate existing survey data (Section 3.3.1) and to provide up-to-date data to inform detailed design and installation methods. Further planned surveys also include a static fishing gear observation survey (November 2020), offshore ornithology surveys (ongoing), benthic and geophysical surveys (December 2020).

3.3.2.1 Benthic surveys

A benthic subtidal ecology baseline validation survey is proposed to validate the existing benthic ecology baseline characterisation by confirming habitats and biotopes along the export cable route. The benthic survey scope of works was presented to MS-LOT, Marine Scotland Science and NatureScot on 18 November 2020 (see Section 2.3).

The validation surveys will include:

- Repeat sampling of representative habitats/biotypes, with a division of the SG1A Project into three areas according to the existing understanding of the sediment characteristics, as follows:
  - Offshore course sediments;
  - Sand and muddy sediments; and
  - Inshore coarse sediments.
- Proposed sample methodology:
  - 20-30 combined grab and seabed imagery sampling locations;
  - Grab samples: PSA, benthic infauna (ID, abundance and biomass); and
  - Seabed imagery: Stills and video. Analysed for habitats of conservation importance (e.g. reefs; sea pens and burrowing megafauna).

The survey is proposed to be deployed in early December.

3.3.2.2 Ornithology Surveys

Nearshore and intertidal surveys in relation to the SG1A Project have been commissioned by Seagreen 1A and have been ongoing since July 2020 and are due to continue over the 2020/21 winter period.

The 'Seagreen 1A Transmission Cable: Onshore and offshore ornithology survey strategy' (Seagreen 1A, 2020) includes the following approaches for data collection:

- Continue the current digital aerial survey campaign commenced in 2019 on behalf of the Forth and Tay developers: Seagreen, Inch Cape and Neart na Gaoithe. Data will provide information on breeding, passage and wintering seabirds for approximately 47 km along the SG1A ECR at its seaward end, depending on its final location. Data will be compared to boat-based data collected between 2009 and 2013 for a comparable area;
- Monthly nearshore and inter-tidal bird surveys at set standardised locations, with an estimated minimum coverage of out to 1.5 km offshore from Mean High Water Springs, onshore; and
- For the remaining portion of the SG1A ECR information will be derived from the existing literature. This is in line with the strategy deployed by Inch Cape and agreed with NatureScot based on the low level of impacts predicted for the central region of the SG1A ECR.

This Screening Report, and the Marine Licence application for the SG1A Project, considers the marine bird species relevant to the offshore and inshore waters only (greater than 1 km from the coast). The ornithology interests for the intertidal, nearshore (up to 1 km from the coast) and onshore habitat zones will be considered in the SG1A Project's onshore consent application.

4. Characteristics of Works: Project Description

4.1 Project Specifications

Electricity generated by the Seagreen 1A Project will be transmitted using an HVAC cable (rated at up to 220 kV or 275 kV) submarine technology. The circuit will comprise of a 3-core aluminium or copper cored cable with steel and plastic armour wires (hybrid design) and a polypropylene outer layer. Key Parameters of the SG1A export cable are outlined in Table 4.1 below.

Table 4.1 – Key Project Parameters

Export Cable Parameters	Value
Max number of export cables	1
Max number of export cable trenches	1
Anticipated cable corridor width max (km)	1
Anticipated working width max (m)	100
Anticipated buried export cable length*	Approximately 80%
Maximum rock or mattress protected length*	Approximately 20%
If trenched, estimated width per trench (max) (m)	3 m
If trenched, cable burial depth (min – max) (m)	1-3 m

Export Cable Parameters	Value
If rock or mattress protected, maximum height (m)	1 m
If rock or mattress protected, maximum width (m)	6 m
Number of construction vessels for export cable installation	2

*The project will aim to maximise achievable protection by burial, but allowance is made for cable protection where burial is not possible

4.2 Installation

In order to protect cable infrastructure and minimise disruption to other marine users, Seagreen 1A intends to maximise achievable protection by burial along the majority of the SG1A ECR. Where this is not possible, for example at crossings with existing cables, or where the seabed characteristics are inappropriate for burial, additional cable protection measures will be applied.

The exact details of the cable installation technique to be employed will be confirmed when the contract for installation is awarded. It is however envisaged that a variety of installation and burial techniques will be required due to the variable nature of the seabed along the proposed cable corridor. Further information on proposed cable burial methods are provided in Section 4.2.3.

4.2.1 Seabed Preparations

Prior to offshore cable installation, linear seabed debris will be removed by grapnel tow (PLGR). Areas of boulders and confirmed Unexploded Ordinances (UXO) may also require clearance if not avoidable by a minor cable route deviation. Pre-sweeping may be required in order for the burial techniques to be employed effectively.

4.2.2 Cable Burial

Cable burial depth will be determined by a detailed hazard identification survey, which will assess the different locations and the various shipping and dredging activities. It is possible that the hazard identification survey will confirm areas where the cable burial depth may need to be varied due to local features, such as:

- sand waves;
- erosion of the seabed;
- shipping traffic anchor risk;
- intense dredge or trawl fishing activities; and
- existing infrastructure or observed seabed obstacles.

The anticipated export cable burial depth will be between 1 m and 3 m depending on ground conditions and the outcome of further cable burial risk assessments (CBRA). As previously stated, based on current understanding of ground conditions it is anticipated that up to 80% of the SG1A export cable will be buried.

If buried, the estimated maximum trench width will be 3 m and the maximum width of the temporary zone of influence, due to plough or Remotely Operated Vehicle (ROV) tracks, will be approximately 10m.

4.2.2.1 Cable Burial Risk Assessment

Following initial re-routing, based on results and data from the marine surveys, a CBRA will be carried out for the refined subsea cable route. The main objective of the CBRA will be to ensure that, based on the available survey data, cable burial can be achieved, using a variety of installation tools, along as much as possible of the preferred cable route.

The CBRA will consider a variety of tooling, i.e. pre- and post-lay plough, jetting, fluidisation and mechanical cutting (see Section 4.2.3), all of which will be considered as options for the cable installation contractor to utilise as required.

The CBRA will produce an indicative depth of burial listing for the cable route, which will afford suitable protection to the cable, based on external factors. The burial depth of the cable is anticipated to be between a minimum of 1 m and a maximum of 3 m. Where the CBRA identifies that due to seabed conditions, cable burial is not possible, alternative options for protecting the cable will be considered. The selection of any mechanical protection methods will be made to maximise the effectiveness of burial, and with careful consideration of other sea users, particularly commercial fisheries stakeholders. These additional protection measures may include, for example, rock placement and concrete mattressing (see Section 4.3). The CBRA will also provide indicative rock volumes and locations for any boulders and rocky seabed which exist in the SG1A ECR.

4.2.3 Cable Burial Tools

Different approaches and techniques are available for offshore cable installation. These are:

- cable lay with post lay burial using a jetting ROV, or a mechanical trencher; and
- simultaneous cable lay and burial, using a cable plough or a mechanical trencher

A combination of methods may be used for cable installations, depending on ground conditions. The preferred approach will be confirmed on completion of the pre-construction geotechnical site investigation surveys. Further detail regarding these options are provided below.

4.2.3.1 Cable Burial by Ploughing

Cable burial ploughs cut through the seabed, lifting the soil from a trench into which the cable is laid (Figure 4.1). The plough is designed to cut a narrow trench, with a slot of material temporarily supported which then falls back over the cable. The advantage of this method is that burial can be achieved as the cable is laid, thus minimising risk to the cable. However, the number of vessels which can carry out this method and that have the required cable carrying capacity for heavy power cable is limited.

The performance of a plough and the depth of burial which can be achieved are a function of plough geometry and seabed conditions, with dense or stiff soils providing the greatest challenge. One disadvantage of ploughing is the slow speed and very high tow forces required.

Figure 4.1- Cable Plough

4.2.3.2 Cable Burial by Jetting

Where the seabed predominantly comprises soft sediments the export cable may be buried using a post-lay jetting technique, generally controlled from a Dynamic Positioning (DP) vessel. The cable is laid on the seabed and a ROV fitted with high-pressure water jets is subsequently positioned above the cable (Figure 4.2). The jets fluidise a narrow trench into which the cable sinks under its own weight. The jetted sediments settle back into the trench and with typical tidal conditions the trench coverage is reinstated over several tidal cycles.

The advantage of this method is that the cable can be laid in a relatively rapid operation during suitable weather conditions. Cable burial can then be achieved separately with less concern over weather constraints disrupting operations. However, the performance of a jetting ROV is limited where sediments are more compacted.

Figure 4.2 - Jetting ROV

4.3 Cable Protection Methods

The SG1A project will seek to bury the export cable wherever possible, however, achieving satisfactory export cable burial depths may not be possible in some areas, due to for example hard substrate. A set target Depth of Lowering and Depth of Cover will be confirmed by the SG1A cable installation contractor, and set out within the Construction Environmental Management Plan (CEMP). Where burial is not achievable, mechanical protection will be installed to achieve the target Depth of Cover. The preferred method of protection, in consideration of industry-standards and design recommendations from fisheries stakeholders is rock placement. Other measures which may be utilised for the cable protection where burial is not achieved include:

- placement of concrete mattresses over the cable; or
- placement of grout bags over the cables.

4.3.1 Rock Placement

Rock placement has long been established as a method for protecting cables and is the preferable protection method of the three contingency options provided in this report. Placement of rock is a relatively quick operation and is possible to complete in more adverse weather than other forms of protection such as mattress installation. The graded rock used is normally imported from land quarries, although sea aggregates can also be used, with grain sizes being tailored to achieve the necessary protection. Where water depth is not a limiting factor, rock is usually deposited by a fall pipe vessel as this is the most efficient method of getting the material onto the seabed. In shallower waters (<10 m) a specialist vessel fitted out with basic equipment for depositing? the aggregate over the side may be used.

The maximum height of any rock placement export cable protection is expected to be 1 m above the seabed, with a maximum width of up to 6 m.

4.3.2 Concrete Mattresses

Mattresses are generally made of concrete elements formed on a mesh of polypropylene rope, which will conform to changes in seabed morphology (Figure 4.3). Bevelled elements are used on the edges to create a sloped profile against the seabed. Where appropriate, mattresses fitted with polypropylene 'fronds' can be used to enhance the protection provided. The fronds encourage sediment deposition, in the best case creating a protective sand bank over the mattress. Mattresses require placement either by divers or a ROV to ensure that they are positioned correctly, consequently this takes longer than other methods.

The maximum height of any mattressed export cable protection is expected to be 1m above the seabed, with a maximum width of 3-6 m.

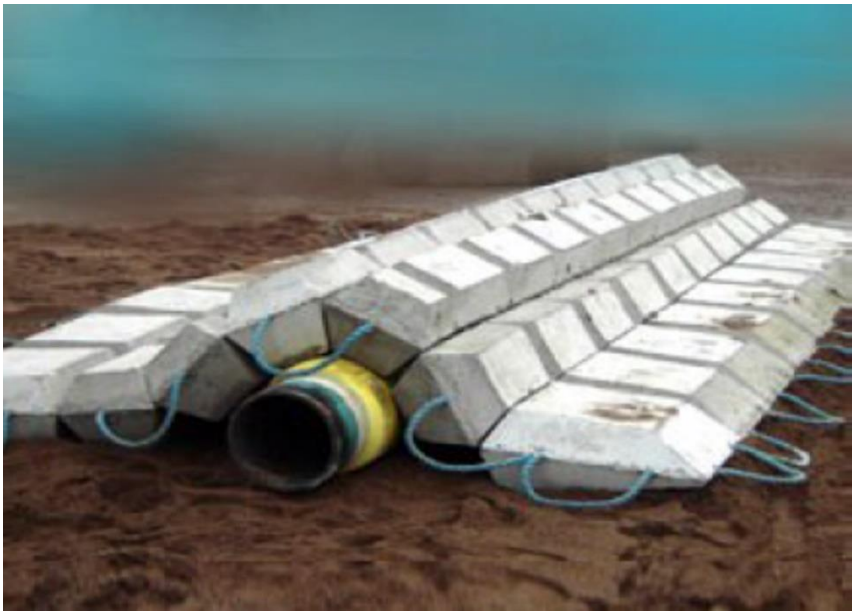

Figure 4.3 - Cable Protection using concrete mattresses

4.3.2.1 Grout bags

The placement of grout bags over the cables which are then inflated with structural grout. The grout cures to provide an effective over cover protection system for the cables.

4.4 Landfall

At the Cockenzie landfall location, a trenchless installation technique (Horizontal Directional Drilling (HDD) or Direct Pipe) will be used to install a cable duct from the transition pit location (located onshore above MHWS and subject to a separate planning application) and out to approximately Mean Low Water Springs (MLWS). The cable will be pulled to shore from an offshore vessel suspended by floats. The cable will be drawn through the ducts to the transition pit by a winch. Cables seaward of the pipe ends will be protected by jetting or trench excavation.

In the intertidal area and/or the shallow subtidal water, a backhoe excavator may be used to dig the trench at the duct entrance. Beach access may be required, particularly for trench excavation. This may be achieved via temporary local access at the landfall location, or by use of an existing point of access nearby.

For any trenchless installation operations, the maximum drill rig area is expected to be of the order of 50 m by 50 m. The equipment to be used includes the drilling rig and drill spoil processing equipment. For the cable pull in, a temporary winch will be required to draw the cable.

4.5 Operations, Maintenance and Repair

Operation and Maintenance (O&M) of the export cable after commissioning will comprise of both scheduled and unscheduled events. Scheduled works on the offshore electrical infrastructure will include regular monitoring or survey, statutory inspection and routine inspection visits. When necessary, retrofitting and upgrading works may also take place. The offshore survey works will normally be timetabled for the summer months, given the typically more settled weather and longer day light hours. Twenty-four hour working will also be evaluated, as this type of solution could be delivered from a mothership stationed offshore.

The project will have an O&M team in place for the day to day management and control of the project infrastructure. This is expected to be based in purpose built onshore O&M Control Centre facilities, ideally situated on the quayside at the chosen operations port location. If there is no local airport or heli-port available, this facility could also accommodate the helicopter hangar and heli-pad if required.

In order to manage the post consent and ongoing site monitoring requirements it is likely that a combination of dive support vessels and ROVs will be used to undertake inspection of cables, scour protection and rock protection.

4.6 Decommissioning

The requirement to decommission is a condition of The Crown Estate lease and is also incorporated in the statutory consenting process through the provisions of the Energy Act 2004. Under the statutory and licensing processes, the appointed Offshore Transmission Owner (OFTO) will be required to prepare a detailed decommissioning programme and set aside funds for the purposes of decommissioning.

The decommissioning programme will consider the latest technological developments, legislation and environmental requirements at the time that the work is due to be carried out. For the purpose of the characteristics of impacts which have been detailed for each relevant environmental receptor (Section 6), it is assumed that decommissioning worst case scenario parameters will be no more than those for the construction phase alone.

4.7 SG1A Project Mitigation and Management Measures

An overview of the SG1A Project mitigation measures that will be applied are summarised in Table 4.2. Any additional environmental topic specific mitigation is presented throughout Section 6.

Table 4.2 - Summary of SG1A Project mitigation and management measures

Measure	Details
General	
Pre-construction surveys will be conducted to inform detailed route engineering.	Appropriate pre-construction validation surveys including geophysical, geotechnical, terrestrial and benthic scopes will be conducted to confirm the locations of potentially sensitive features. Detailed route design will be informed by the survey results, and sensitive features avoided where possible.
Environmental planning.	Development and implementation of a Marine Pollution Contingency Plan (MPCP) Development and implementation of a CEMP. The CEMP will set out those responsible for overseeing work and the implementation of mitigation and good practice working methods during construction to minimise environmental effects.
Offshore	
Marine megafauna mitigation.	○ All vessels will be compliant with the Scottish Marine Wildlife Watching Code (NatureScot, 2017) ○ All vessels will comply with the Basking Shark Code of Conduct (Marine Conservation Society, undated)
Control measures and shipboard oil pollution emergency plans (SOPEP) will be in place and adhered to under MARPOL Annex I requirements for all vessels. In the event of an accidental fuel release occurring appropriate standard practice management procedures will be implemented accordingly.	As per the MARPOL 73/78 requirement under Annex I, all ships with 400 GT and above must carry an oil prevention plan as per the norms and guidelines laid down by International Maritime Organization under MEPC (Marine Environmental Protection Committee) act. Production of this plan will help to ensure that the potential for release of pollutants from construction, operation and decommissioning is minimised.
Vessels will be equipped with waste disposal facilities (sewage treatment or waste storage) to IMO MARPOL Annex IV Prevention of Pollution from Ships standards.	Measures will be adopted to ensure that the potential for release of pollutants from construction, operation and decommissioning is minimised.

Measure	Details
Ballast water discharges from vessels will be managed under International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (BWM Convention).	The BWM Convention, adopted in 2004, aims to prevent the spread of harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. Measures will be adopted to ensure that the risk of Marine Non-Native Species (MNNS) introduction during construction, operation and decommissioning is minimised.
Vessels will adhere to the IMO guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species (Biofouling Guidelines) (resolution MEPC.207(62).	The Biofouling Guidelines provide a consistent approach to minimising the risk of MNNS introduction via biofouling on ship's hulls.
The use of external cable protection including rock berms and/or mattresses will be minimised, and only be deployed where adequate protection of the cables cannot be achieved through burial.	Cable burial is the first choice for protection, as this minimises impacts on the environment and other sea users. However, when this is not possible due to existing subsea assets, or seabed conditions, other cable protection measures may be utilised to ensure the cable is adequately protected. The preferred option for this will be rock placement.
All rock berms and external cable protection will be designed with slopes less than 1:2.5, and of suitable construction to minimise snagging risk.	Minimising disruption to commercial fisheries resulting from the installation and operation of the cables.
A Fisheries Liaison Officer (FLO) will be employed to manage interactions between cable installation vessels, personnel, equipment and fishing activity. This will be managed through a Fisheries Management and Mitigation Strategy (FMMS).	Employment of a FLO will ensure all commercial fisheries operators in the vicinity of the Project will be proactively and appropriately communicated with in terms of proposed Project operations including exclusions, dates and durations.
Notice to Mariners (including local), Kingfisher bulletins, Radio Navigational Warnings, NAVTEX, and/or broadcast warnings will be promulgated in advance of any proposed works. The notices will include the time and location of any work being carried out, and emergency event procedures.	Ensure navigational safety and minimise the risk and equipment snagging.

Measure	Details
Compliance with International Regulations for the Prevention of Collision at Sea (IMO, 1972) and the International Regulations for the Safety of Life at Sea (SOLAS).	SOLAS is an international maritime treaty which sets minimum safety standards in the construction, equipment and operation of merchant ships. The convention requires signatory flag states to ensure that ships flagged by them comply with at least these standards. In relation to the Project, compliance will ensure navigational safety and minimise the risk of equipment snagging.
As built survey data will be provided to the UKHO and Kingfisher for inclusion on Admiralty Charts and KIS-ORCA Awareness Charts.	Ensure navigational safety and minimise the risk of equipment snagging.
Crossing and Proximity agreements will be established with relevant cable and pipeline owners or operators of other assets.	These agreements will include the ability of a cable or pipeline operator to access their asset during construction if required. If such works are required to occur simultaneously, consultation with the cable or pipeline operator will be undertaken.
Protocol for Accidental Discoveries of Marine Historical Assets.	The Protocol will define procedures to be taken in the event of a discovery in order to avoid impact to any marine historic assets. Marine archaeology exclusion zones will be established where relevant, where access will be restricted.
Protocol for Dropped Objects at Sea	Seagreen 1A will implement prevention, notification and recovery processes for Dropped Objects
Navigational safety	Appropriate lighting and marking of vessels will be implemented to minimise risk to other marine users.

4.8 Other Schedule 3 Criteria

In addition to the characteristic of works detail provided in Section 4, the following section outlines how the SG1A Project has regard to:

- Use of natural resources (Schedule 3 1(c));
- Production of waste;
- Pollution and nuisances;
- Risk of major accidents and/or disasters;
- Risks to human health;
- Existing and approved land use;
- Relative abundance, availability, quality and regenerative capacity of natural resources; and
- Absorption capacity of the natural environment.

In terms of the **use of natural resources**, installation of the cable using trenching methods across the intertidal and subtidal areas offshore would necessitate the removal of material during excavation of the cable trench, however this would be temporary during the construction phase and the material would either be reinstated (intertidal) or allowed to backfill naturally (subtidal) and surveyed to ensure

reinstatement to a similar profile. The installation methodology would not result in the long-term exploitation of significant volumes of natural resources. Therefore, no significant adverse effects on the environment through the use of natural resources are anticipated.

Regarding **production of waste and pollution and nuisances**, all wastes will be managed in line with an Environmental Management Plan (EMP) which will be prepared for the works. The EMP will include waste management measures to minimise, reuse, recycle and dispose of waste streams in compliance with relevant waste legislation. Marine pollution prevention and contingency planning measures will also be set out in a MPCP which will be prepared for the works. The EMP and MPCP will likely form a consent requirement of any awarded Marine Licence. Nuisance will be controlled by planning conditions through the submission and approval of an EMP which will contain proposed measures for the mitigation of construction noise and vibration. Due to the measures in place to control and/or manage waste, pollution and nuisance, which are expected to be secured by consent conditions, significant adverse effects on the environment are not predicted.

Regarding **risk of major accidents and/or disasters, including those caused by climate change**, Seagreen 1A will require all contractors and subcontractors to complete adequate risk assessments for all aspects of the installation activities and these requirements will be captured within a Construction Method Statement which will be prepared for the works. The project will be a notifiable project for the purposes of the Construction (Design and Management) Regulations 2015 (CDM Regulations), and Seagreen 1A will require compliance with the CDM Regulations in the design of the project and through the completion of the installation process through conditions of contract. Management standards in line with ISO 9001, 14001 and OHSAS 18001 will be applied for the overall Seagreen 1A project management system, and the management systems of all contractors will be required to concur with the same principles.

In relation to **risks to human health**, Seagreen 1A will require compliance with the Control of Substances Hazardous to Health Regulations 2002 (COSHH Regulations) through conditions of contract in ensuring that the risk to health from workplace exposure to hazardous substances is appropriately assessed and that exposure is prevented or, where this is not reasonably practicable, adequate controls are implemented and exposure monitored and managed to within acceptable levels, in line with relevant regulations. Health and Safety regulations will be adhered to at all times and relevant Health, Safety and Environment (HSE) Management tools implemented, to ensure the safety of the workforce and the general public.

Having regard to the **existing and approved use**, the **relative abundance, availability, quality and regenerative capacity of natural resources in the area**, and the **absorption capacity of the natural environment (with reference to coastal zones and European and nationally designated sites)**, due to the relatively small area of disturbance in comparison to the wider Cockenzie area, the localised nature of the effects arising from the works, and the short-term and temporary (all areas restored to their natural profile) nature of potential effects, there will be no significant adverse effects on the environment. This conclusion is further supported by the information provided in Section 6 (Characteristics of Impact – Key Environmental Considerations).

5. Indicative Project Programme

The key programme dates for construction of the SG1A Project are summarised in Table 5.1 below. The indicative programme is based on submitting a Marine Licence application in February 2021 and achieving consent for the project in June 2021.

The assessment allows for construction activities to take place 24/7 and at any time of the year, as vessel utilisation is important in maintaining schedule and reducing cost. The indicative construction programme for the SG1A Project commences in Q2 2023 and completes in Q2 2024. It is in Seagreen 1A's interest to plan and implement an efficient and effective construction programme. Construction activities will take place within the periods below, but are not expected to take the full duration shown against each activity.

Seagreen 1A will endeavour to minimise impact or disruption to other users of the sea in planning the construction activities in more detail. For example, the export cable will be buried or protected as soon as is practicable after being laid on the seabed.

It is proposed to maintain ongoing dialogue with the commercial fishing sector from project inception, throughout development and into construction through the designated communication channels, including the FLO when contracted. Further information on commercial fisheries and specifically on mitigation, including via notices and engagement are provided in Section 6.7.4.

Table 5.1 - Indicative Construction Programme

Programme Stage	Start	Completion
Installation of export cable	Q2 2023	Q3 2023
Commissioning of export cable and handover to operator(s)	Q3 2023	Q4 2023
Project completion	-	Q2 2024

Table 5.2 - Construction Activity Summary

Construction Aspect	Likely vessel requirements
Pre-construction geophysical survey	Dedicated geophysical survey vessel of ECR corridor using side scan sonar, multibeam echosounder and magnetometer.
Pre-construction geotechnical survey	Dedicated geotechnical survey vessel will take a number of boreholes, core penetration tests (CPTs) and vibrocores within ECR corridor.
Cable Pre-Lay Grapnel Run (PLGR)	Dedicated vessel with PLGR device and Remotely Operated Vehicle (ROV)
Cable lay and burial	Cable lay vessel
Cable Mattress / Rock Placement	Construction vessel or dedicated rock placement vessel
Scour protection	Construction vessel or dedicated rock placement vessel

The availability of construction vessels of the capacity required for the installation of the ECR is also a key consideration.

For the purpose of this assessment, it has been assumed that there will be up to two primary construction vessels (one cable lay vessel, approximately 150 m and one cable protection vessel approximately 100 m), servicing the construction stage at any given time. Smaller support vessels may be required for landfall works.

The objectives in developing the construction methods will be to:

- minimise construction related health and safety risks to personnel;
- minimise construction related environmental risks;
- minimise cost risk;
- minimise schedule risk; and
- maximise production.

6. Characteristic of Impacts: Key Environmental Considerations

6.1 Overview of Proposed SG1A Project

This section presents the key environmental topics with potential for interaction with the SG1A Project. For each topic, consideration is given to the existing baseline, study area, mitigation measures and the characteristics of potential impacts. Each topic will outline any potential impacts that may require further consideration in an Environmental Appraisal that will be produced to support the application for the SG1A Project Marine Licence.

In consideration of the characteristics, location and duration of works associated with the SG1A Project, the following offshore environmental topics have not been included in this Screening Report. They have not been considered further as no pathway for any potential impact has been identified between the receptor and the proposed works associated with the SG1A Project Further information is provided in Table 6.1.

Table 6.1 Offshore Environmental Topics not considered further within this report or the Environmental Appraisal

Environmental Topic	Justification for not including in Environmental Appraisal
Seascape, Landscape and Visual Amenity (SLV)	During operation, the SG1A Project will be an underwater cable therefore there is no pathway for impact. During construction and decommissioning the presence of 2 construction vessels in an active shipping area will not result in any impacts on SLV. Visual disturbance from landfall works will be included within the onshore Planning Application and supporting environmental information.

Military and Civil Aviation	During operation, the SG1A Project will be an underwater cable therefore there is no pathway for impact. During construction and decommissioning the presence of 2 construction vessels in an active shipping area will not result in any impacts on aviation. Potential impacts on military vessel operations is considered within the Shipping and Navigation assessment in this report (Section 6.8).
Socio-economics, Tourism and Recreation	No potential impact pathways are identified for the SG1A Project and these receptor groups in light of the nature, duration, extent and location of the works.
Population and Human Health	
Air quality and Climate Change	
Offshore Airborne Noise	
Other Human Activities	

The key project parameters that are being considered when characterising the potential impacts of the SG1A project are listed in Table 4.1 (Section 4).

The SG1A Project overlaps considerably with the already assessed and consented Inch Cape OWF export cable corridor (further detail on the SG1A ECR layout is provided in section 3.2). Given the overlap between the SG1A Project and the Inch Cape export cable corridor, information and assessment results presented in the Inch Cape EIA documents (Inch Cape, 2011; 2018) are referred to throughout Section 6 of this Screening Report to support the characterisation of potential impacts of the SG1A Project. However, it is highlighted that the Inch Cape project is consented for six offshore export cables, whereas the SG1A Project is for one single offshore export cable, which is a notable differential considered in the following sections when characterising potential impacts of the SG1A Project.

6.1.1 Approach to Cumulative Assessment

The relative position of the SG1A Project may give rise to the potential for cumulative interactions with other nearby offshore wind farm developments, including their export cables which will be assessed for relevant environmental receptors in the Cumulative Assessment within the Environmental Appraisal. Only those developments which do not form part of the existing environment (i.e. are not operational/installed) will be considered. The developments which are considered relevant to the cumulative assessment include:

- The Seagreen Project (consented, pre-construction);
- Berwick Bank OWF (scoping);
- Marr Bank OWF (concept/early planning);
- Inch Cape OWF (consented); and
- Neart Na Gaoithe OWF (under construction);

Each topic in Section 6 provides consideration of the potential for cumulative interactions of the SG1A Project with other nearby developments and whether they will be considered further in the Environmental Appraisal. Depending on the geographical extent of the study area to be considered for each receptor within the Environmental Appraisal, the exact list of developments may include additional projects to those listed above.

6.2 Physical Environment and Water and Sediment Quality

This section provides a description of the physical environment baseline and characterises any potential impacts which may affect physical environment receptors during construction, operation and maintenance and decommissioning phases of the SG1A Project.

6.2.1 Key Data Sources

The key data sources used to inform the physical environment and water and sediment quality section include:

- Marine Scotland National Marine Interactive Plan (NMPi);
- Joint Nature Conservation Committee (JNCC) MPA Mapper;
- Scottish Environment Protection Agency (SEPA) River Basin Management Plan, water environment hub data viewer;
- Inch Cape Offshore Wind Farm Environmental Statement:
  - Chapter 10 Metocean and Coastal Processes;
  - Appendix 10A – 10F;
  - Appendix 10A.1 – 10A.7
  - Appendix 12B Contaminated Sediments Baseline Development Area
- Barne, *et al.,* (1997). Coasts and seas of the United Kingdom, Region 4, South-east Scotland: Montrose to Eyemouth;
- Firth of Forth Banks Complex site summary and data confidence assessments;
- Firth of Forth SSSI site management statement;
- Cefas Suspended Sediment Climatologies around the UK (Cefas, 2016);
- British Geological Survey (BGS) Offshore GeoIndex Map (BGS, 2020a);

6.2.2 Study Area

The study area applied to this topic covers the proposed extent of the updated SG1A Project and a wider region covering the outer area of the Firth of Forth, approximately between Arbroath in the north and Dunbar in the south. For this topic, the Firth of Forth entrance is taken to be the estuary mouth between Wormiston in the north to North Berwick in the south (Figure 1.1).

6.2.3 Baseline Description

6.2.3.1 Metocean Conditions

The mean spring tidal range across the Firth of Forth is in the order of 4m, increasing from outer areas towards the inner firth and Estuary, due to the funnelling effect of the coastline (Inch Cape, 2011; 2018). Information from the studies completed for the Inch Cape export cable corridor illustrates that along the proposed SG1A ECR the mean spring range increases from about 4.4 m in the vicinity of the Seagreen Project through to about 5.2 in proximity to the landfall (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013a; b; c; e; f; g). In terms of the period of flows, the duration of the flood is longer, corresponding to faster flow speeds on the ebb. The flow directions are mostly parallel to the coastline, resulting in variations in the flow direction along the SG1A Project. The mean spring current speeds along the SG1A Project range between 0.25 - 1.0 m/s, increasing across the entrance of the Firth of Forth, between Wormiston and Auldhame (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013a; b; c; e; f; h). Mean neap current speeds are slower at speeds of between 0 – 0.5 m/s along the SG1A Project (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013a; b; c; e; f).

Waves across the SG1A Project have an approach from the east to northeast associated with long-period swell waves and from the southwest associated with fetch limited locally generated wind waves. Modelling completed for the Inch Cape ECR indicated the dominant direction along much of the SG1A Project is from the northeast. The characteristic wave properties along the SG1A Project generally reduces towards the coast, due to depth limited influence of the seabed and the sheltering afforded by the coastline. Therefore, the most common significant wave heights associated with winter conditions can vary between less than 0.75 m on approach to the landfall to up to 2 m, in proximity to the Seagreen Project, with isolated events of up to 5 m (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013a; b; c; e). Significant wave heights associated with summer conditions are considerably lower, with maximum heights of 1 m at the offshore extent.

6.2.3.2 Geology and Bathymetry

There are several bedrock lithologies along the SG1A Project. The Firth of Forth is underlain by Carboniferous rocks which characterise the bedrock geology (Barne, *et al.*, 1997). The Carboniferous geology includes a zone of Coal Measures, which extends across the firth at Edinburgh. Elsewhere, the pre-Coal Measures (Namurian) sandstones and mudstones are largely of deltaic and fluvial origin, including oil-shales and thin limestones. Notably, some of these geological features are unconformably exposed at the coast, resulting in the designations associated with the Firth of Forth Site of Special Scientific Interest (SSSI) discussed further in Section 6.2.3.4 below.

In terms of bathymetry, the seabed slopes relatively smoothly from the coast to around 50 m on the Wee Bankie. Across the outer firth and towards the Inch Cape, Seagreen, Neart na Gaoithe and Berwick Bank offshore wind developments, there are a number of bedforms and deeps ranging in depth between 40 m and 80 m. Tidally dominated seabed bedforms from mega-ripples to sandbanks are present along the SG1A

Project, with evidence of movement associated with these features (Repsol Nuevas Energias UK Limited and EDP Renewables , 2013a; b; e).

6.2.3.3 Seabed Sediment and Transport Regime

The seabed sediment across much of the Firth of Forth predominantly comprises Holocene deposits of unconsolidated sand and gravel, particularly in the outer firth, with increasing silt and mud content towards the inner firth (BGS, 2020). In the outer firth, fine sediment supplied to the estuary by rivers is deposited by strong tidal currents. These currents also scour some parts of the estuary floor, particularly close to the coastline, resulting in large areas of exposed rock on the seabed along the margins of the outer firth. Along the SG1A Project, the seabed sediment follows the general pattern described for the Firth of Forth, with coarser sands and gravels at the offshore extent, transforming to mud-rich sands and mud/silt towards the landfall (BGS, 2020).

Average suspended particulate matter (SPM) across the Firth of Forthis relatively low compared with elsewhere in Scotland and the UK (Cefas 2016). Average measurements of 1 – 2 mg/l were assessed for the period between 1998 and 2015, increasing to about 3 – 5 mg/l closer to the coast. Sediment concentrations along the SG1A Project over the winter months are around 2 – 3 mg/l increasing to 5 mg/l at the coast, while during the summer months, the SPM are generally around 0 – 1 mg/l everywhere (Cefas, 2016). Site observations at Neart na Gaoithe, in proximity to the SG1A Project in the summer of 2010, identified concentrations ranging between 3 – 8 mg/l (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013a; b; e; f; I; j; k). These lower concentrations were estimated to be associated with calm weather conditions at an offshore location, whereas concentration of around 20 mg/l were more characteristic of the outer firth area, increasing to much higher concentrations at the coast. In terms of the sediment transport regime, there is net drift direction towards and into the Firth of Forth at the entrance into the Firth. Further offshore in proximity to the Seagreen Project, the dominant transport direction is to the north (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013a; b; f; g).

6.2.3.4 Conservation Sites with Geodiversity Features

The SG1A Project intersects two conservation sites which are designated for geodiversity features, the sites as well as the qualifying interest features are summarised in Table 6.2-.

Table 6.2- Geodiversity conservation sites in the vicinity of the SG1A Project

Designation	Site name	Geodiversity qualifying interest features and summary
NCMPA	Firth of Forth Banks Complex NCMPA	The NCMPA is separated out into three distinct regions, where the SG1A Project overlaps the Scalp Banks and Wee Bankie region. The relevant geodiversity interest features within the site include: • Offshore subtidal sand and gravels; • Quaternary of Scotland; • Moraines (geodiversity feature); and • Shelf banks and mounds.
SSSI	Firth of Forth SSSI	The geodiversity interest features include: • Coastal geomorphology of Scotland; • Carboniferous – Permian Igneous; • Maritime cliff; • Mineralogy of Scotland; • Mudflats; • Lower Carboniferous (Dinantian - Namurian (part)) • Quaternary of Scotland; • Saltmarsh; • Sand dunes; and • Upper Carboniferous (Namurian (part) – Westphalian)

Based on the mapped location of the qualifying interest features within the Scalp Bank and Wee Bankie region of the Firth of Forth Banks Complex NCMPA (Figure 6.1, JNCC, 2020a), the SG1A Project will most likely interact with one or more qualifying interest features in the site.

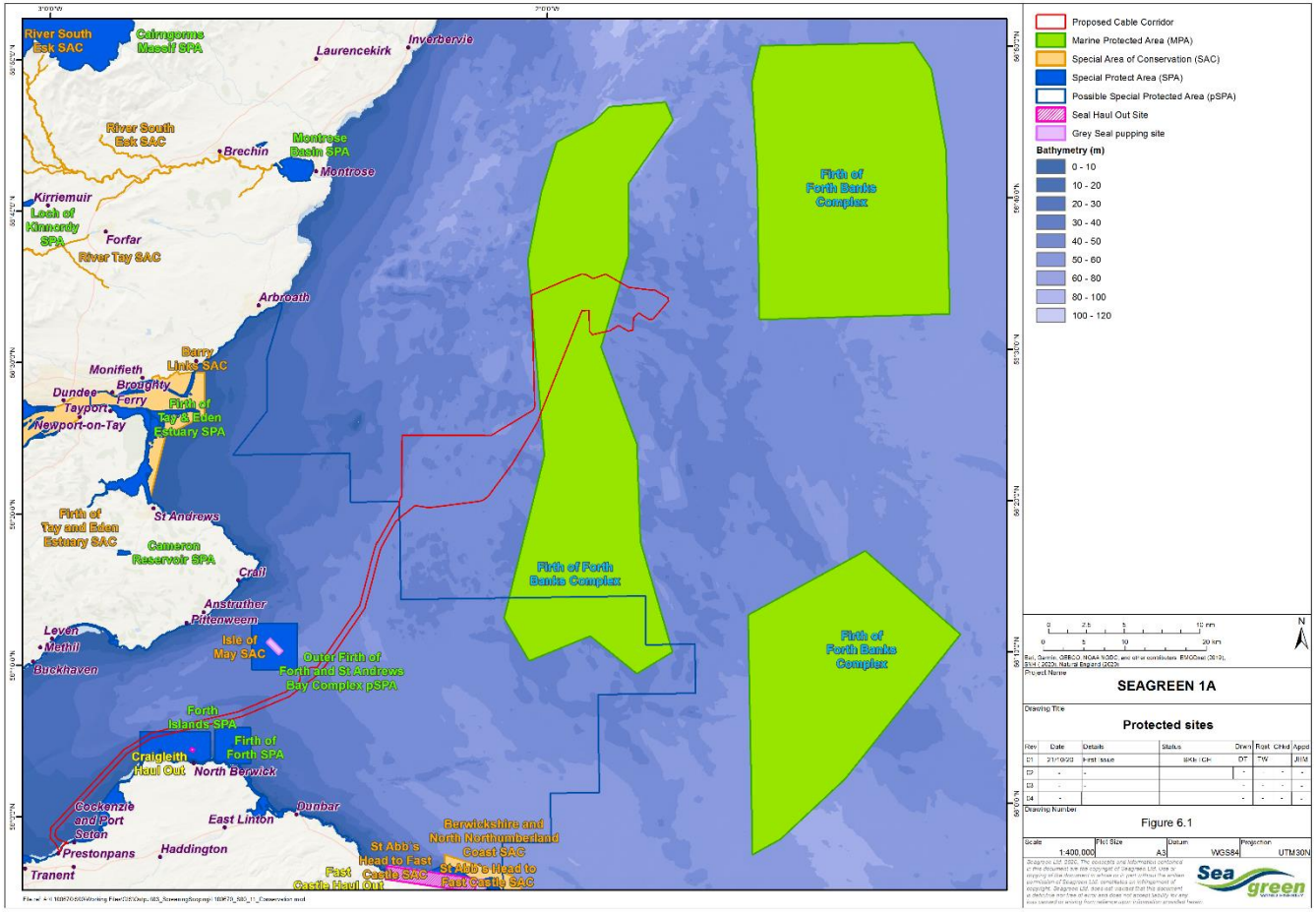

Figure 6.1 – Protected sites in the vicinity of the SG1A Project

6.2.3.5 Water Quality

The temperature of surface waters in the outer Firth of Forth is relatively uniform, averaging 5.5-6.0°C in winter and 13°C in summer, suggesting efficient mixing of fluvial outputs into the marine environment. The salinity of the sea water in the region is generally only very slightly below that of oceanic water (35 g/kg) and is fairly homogenous across the Firth of Forth (Dyke, 1987).

The SG1A Project crosses a number of designated coastal water bodies within Scotland river basin district (Figure 6.2), which are:

- Firth of Forth Outer – Offshore;
- Eyebroughty to North Berwick;
- Port Seton to Eyebroughty; and
- Leith Docks to Port Seton.

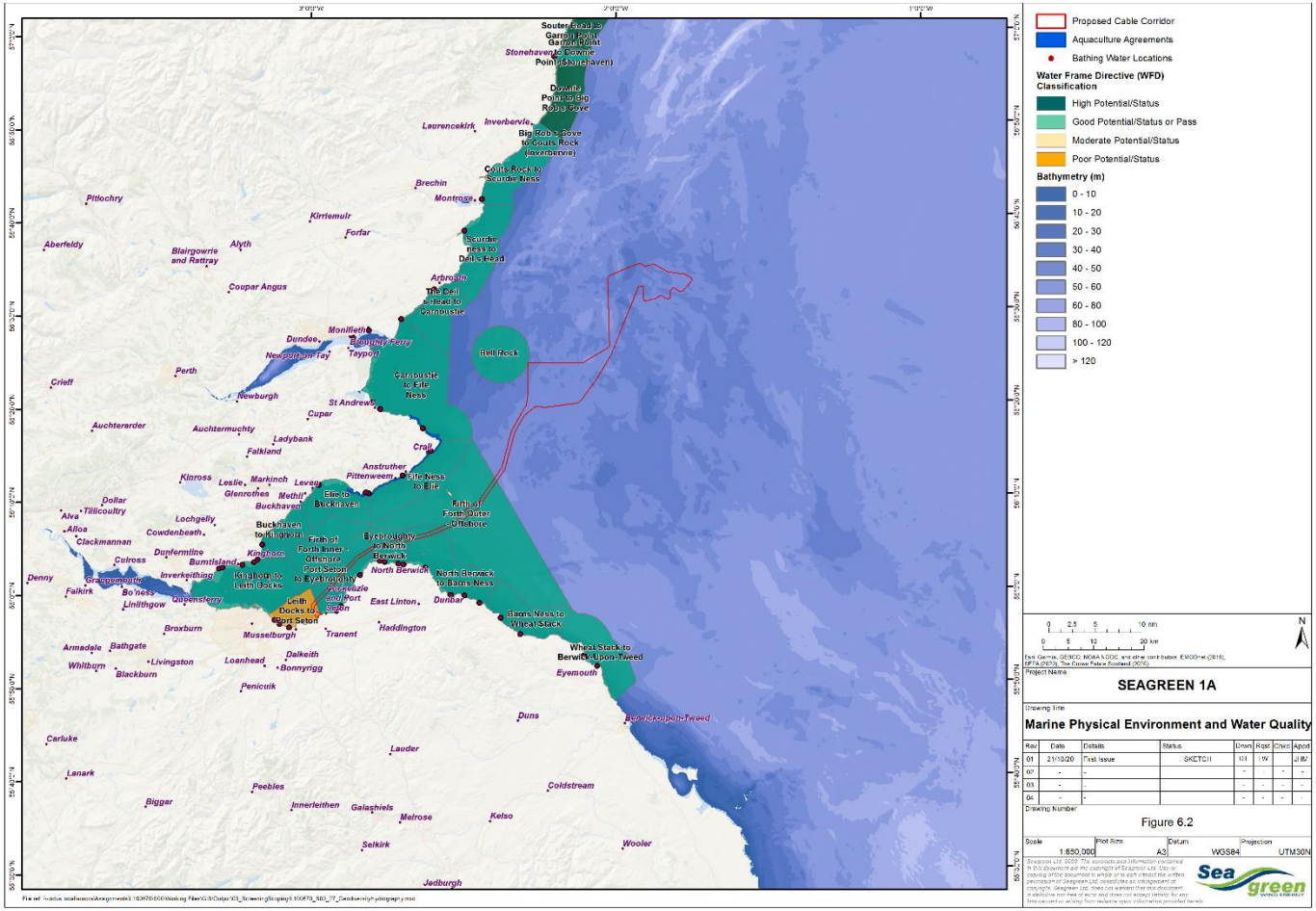

Figure 6.2 - Designated coastal water bodies within Scotland river basin district

Each of the coastal water bodies are assessed as having a Good water quality status, based on recent available information obtained from the SEPA water environment hub. However, the overall condition is Good for all the water bodies except Leith Docks to Port Seton, which is Poor, primarily due to the physical condition in relation to modification to the seabed, banks and shores (SEPA, 2020).

The designated bathing water in proximity to the cable landfall location is Seton Sands at approximately 1 km from the landfall and is at a Good status (SEPA, 2020). The other bathing water approximately 2 km from the SG1A Project is Gullane, with an Excellent status. All other bathing waters are over 2 km from the cable corridor or landfall location and are therefore not applicable to the SG1A Project (Figure 6.3).

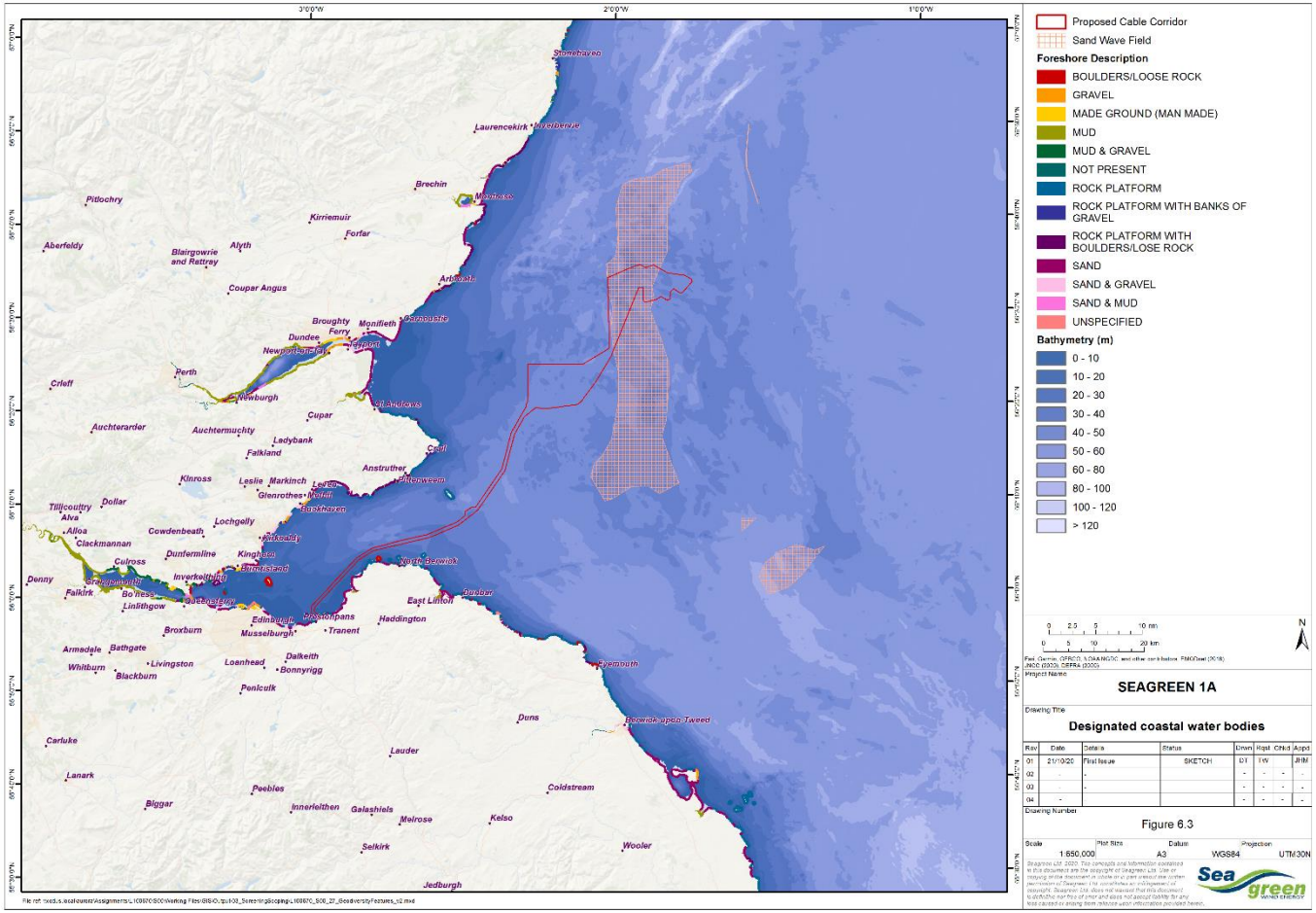

Figure 6.3 Designated Coastal Water Bodies

There are no designated shellfish waters within the Firth of Forth or in proximity to the SG1A Project.

6.2.3.6 Sediment Quality

Sediment contaminant samples were collected and analysed from locations within the Inch Cape development area, with two samples within the Inch Cape export cable corridor (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013l). For the samples located within the Inch Cape export cable corridor contaminant levels were below CEFAS Action Level 1 (AL1) for the majority of contaminants (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013l). However, occurrences of Chromium, Copper and Nickel, did have contamination above AL1, but the levels were only just over the threshold and were not necessarily repeated in both samples taken at each location, indicating the contamination is most likely localised. There were no occurrences of contaminants above Cefas AL1 associated with Poly-Aromatic Hydrocarbons (PAH), Poly-Chlorinated Biphenyls (PCB) and Organotins or any occurrences of contaminants above Cefas AL2 (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013l).

6.2.4 Mitigation and Management Measures

The SG1A Project mitigation and management measures are presented in Section 4.7 and have been included when characterising the potential impacts to physical environment features and water and sediment quality. There are no additional mitigations required specific to Physical Environment and Water and Sediment Quality.

6.2.5 Characteristics of Potential Impacts

This section characterises the potential impacts which have been identified for physical environment receptors and provides recommendations on whether further consideration is required in the Environmental Appraisal to be submitted with the SG1A Project application for Marine Licence.

In most cases, the physical environment features are not themselves receptors but are instead pathways with the potential to indirectly impact other environmental receptors. The potential changes to the physical environment features and their associated pathways will be used to inform other environmental, biological and human environment receptor topic assessments, including:

- Benthic Ecology;
- Natural Fish and Shellfish Resource;
- Marine Mammals and other Megafauna;
- Marine Ornithology; and
- Marine Archaeology.

Despite the potential for physical environment features to predominantly be considered as pathways, the receptors relevant to this characterisation of potential impacts includes the following:

- Geodiversity features within the intersected Conservation sites;
- The coast; and

- Designated waterbodies and bathing waters.

The following sections consider the potential impacts to the identified receptors as well as the relevant impact pathways to other environmental receptors, while a summary of the potential impacts and conclusions are included in Table 6.3.

6.2.5.1 Changes to the Metocean and Sediment Transport Regimes

The metocean climate are regional processes with localised variations due to the seabed and any morphological features. The SG1A Project involves the installation of a single offshore export cable, which will be localised in extent and short-term in duration. The proposed project design is to bury the cable wherever possible, with a minimum expected burial rate of 80% of the route, achieving suitable depth of cover to reduce any future exposure risk. In locations where cable protection may be required (estimated to be up to 20% of the route), the applied rock protection would be used to achieve an adequate depth of cover for cable protection. Even with the profile above the seabed, the presence of the buried cable or required protection measures would not be enough to disrupt or alter the regional wave and tidal processes or the associated sediment transport in this area of the Firth of Forth.

For this reason, any potential impact associated with changes to the metocean and sediment transport regimes **will not be included** within the Environmental Appraisal.

6.2.5.2 Introduction of Scour Associated with Cable Protection Measures

The use of scour protection measures would be in locations where target depth cannot be achieved, most likely associated with the occurrence of bedrock or solid geology along the SG1A Project. The nature of the solid geology is that it is resistant to erosion, while cable protection measures are designed to limit the development of scour. Therefore, the potential for scour occurring associated with protection measures is considered to be very low and this potential impact **will not be included** within the Environmental Appraisal.

6.2.5.3 Changes to Landfall Morphology

The proposed cable installation at the landfall, is by a trenchless technique, such as HDD or Direct Pipe, from an onshore location out to approximately MLWS. Beyond the duct entrance, trenching methods, including jetting, ploughing or mechanical trenching, may be applied. Following the use of installation equipment in the landfall area, the seabed would be reinstated to its original profile, following best practice for works in the coastal environment. The use of trenchless methods at landfall and the reinstatement of the local profile (either in the intertidal or shallow subtidal) negates any change to the coastal morphology. Therefore, any potential impact on changes to landfall morphology **will not be included** within the Environmental Appraisal.

6.2.5.4 Changes to Sediment Concentration and Bed Level

The assessment completed for the Inch Cape export cable corridor which covered the landfall area and installation of multiple offshore export cables, neither the Firth of Forth SSSI at the coast or offshore

NCMPA were predicted to experience any change to the metocean or sedimentary environment due to cable installation. In consideration of the SG1A Project comprising of a single export cable, and the works being short-term and temporary in nature, any impacts to the SSSI or offshore NCMPA are expected to be less than those defined for Inch Cape (Inch Cape, 2011; 2018). Any increases in SSC in relation to the SG1A Project will also be highly localised and temporary. Therefore, it is considered that there will be no impact on interest features associated with the installation of the single offshore export cable of the SG1A Project and any impact on geodiversity interest features within conservation sites **will not be included** within the Environmental Appraisal.

The potential changes to SSC associated with the Inch Cape export cable corridor were investigated through numerical modelling associated with the installation of several offshore export cables (Inch Cape, 2011; 2018). The Inch Cape study identified the highest SSC to occur in relation to subtidal environments, however these effects were highly localised to the export cable corridor, to within a distance of about 200 m (Repsol Nuevas Energias UK Limited and EDP Renewables , 2013a; b; e; f; I; j; k). Typical SSC of 3-10 mg/l above background levels were modelled, with short duration peaks of up to 300 mg/l. It was estimated that higher concentration of thousands of mg/l could occur, but these would be limited to a few tens of metres from the cable installation activity location. Following the initial seabed disturbance, sediment would quickly settle out within tens to a few hundreds of metres and over a period of seconds to minutes (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013a; b; e; f). For the finest sediment, although these may persist in the water column for longer, these would also settle out within hours of disturbance at a maximum dispersion distance of less than 3 km (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013a; b; e; f). The resulting sediment deposition thickness over the sediment plume footprints, would be indiscernible at the greatest distance to only a few centimetres beyond the export cable corridor (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013a; b; e; f). Overall, the impact assessment associated with the installation of the Inch Cape export cables concluded that modifications to the seabed were minor in the immediate vicinity of the cable installation activity and negligible (minor) over the wider area (Repsol Nuevas Energias UK Limited and EDP Renewables, 2013a). Any impacts associated with SSC for the SG1A Project would be less than those assessed for Inch Cape, as the SG1A project comprises the installation of a single offshore export cable. Therefore, impacts to sediment concentration and bed level **will not be included** in the Environmental Appraisal.

It is considered that information described above and as modelled for the Inch Cape export cable is sufficient to adequately inform the SSC pathways for other sensitive receptors and this is referred to in the following sections.

6.2.5.5 Changes to Water Quality of Designated Waterbodies and Bathing Waters (including accidental spill)

During the cable installation activities, there is the potential for accidental hydrocarbon spills, however, the cable installation vessels will comply with the international requirements of the MARPOL convention, as well as best practice for works in the marine environment. As such, the potential risk of any such accidental spill is reduced. Leaching of materials from the cable is also considered to be highly unlikely given the use of

modern cable armour and protection. Increases in SSC associated with cable installation for the Inch Cape export cables were modelled to be typically 3-10 mg/l above background levels, with short duration peaks being localised to the vicinity of the installation activity. Any increases in water quality in relation to the SG1A Project will therefore be highly localised and temporary, quickly reducing to within the range of natural variability of water quality status in the coastal waterbodies and bathing waters. Therefore, the potential impact associated with changes to water quality **will not be included** within the Environmental Appraisal.

6.2.5.6 Disturbance of Contaminated Sediments

The sediment sampling and analyses completed for the Inch Cape export cable corridor identified that contaminant levels were below Cefas AL1 for the majority of metals and all PAH, PCB and organotins. However, for the metal contaminants that were over, these were only just above the threshold levels and were not necessarily repeated across both samples taken, thereby indicating only localised effects. Any disturbances of contaminated sediments in relation to the SG1A Project will therefore be highly localised and temporary, and the levels of contaminants within the sediments of the SG1A Project are very low. Therefore, the potential impact associated with the disturbance of contaminated sediments **will not be included** within the Environmental Appraisal.

Table 6.3-Summary of the characteristics of potential impacts to physical environment and water and sediment quality receptors associated with the SG1A Project

Potential impact	Relevant phase of SG1A Project installation			To Include in Environmental Appraisal
	Cable installation	Cable operation (Maintenance and Repair)	Decommissioning	
Changes to metocean and sediment transport regimes	✓	✓	✓	No
Changes to sediment concentration and bed level	✓	✓	✓	No
Changes to landfall morphology	✓	X	✓	No
Introduction of scour associated with cable protection measures	X	✓	X	No
Disturbance or damage to the geodiversity interest features within conservation site	✓	X	✓	No
Changes to water quality status of designated waterbodies and bathing waters (including accidental spill)	✓	✓	✓	No
Disturbance of contaminated sediments	✓	✓	✓	No

6.2.5.7 Cumulative Impacts

Impacts on physical environment and water and sediment quality receptors are deemed to be minimal in absolute terms, as described above. This is also the case, when considering the potential cumulative

impacts relative to nearby offshore wind farm developments. Results of previous assessment work to support the consent of multiple offshore export cables for Inch Cape, identified that any works completed as part of cable installation and associated with cumulative activities in the surrounding developments would lead to effects which are spatially localised and short-lived. The cumulative impact assessment associated with the installation activity for the Inch Cape export cables, determined impacts to range between negligible and minor for the varying impacts associated with the works for the assessed offshore windfarm projects. Given the significant overlap and proximity of the SG1A Project with the Inch Cape cable corridor, it is considered that the installation of one additional offshore export cable, for the SG1A Project, will not give rise to any potential cumulative impacts greater than that already assessed for Inch Cape and concluded to be not significant. For this reason, the potential for cumulative impacts on the physical environment and water and sediment quality from the SG1A Project **will not be included** within the Environmental Appraisal.

6.2.6 Conclusions and Proposed Methodology for the Environmental Appraisal

With consideration of the selection criteria in Schedule 3 of the 2017 EIA Regulations, the characterisation of potential impacts with respect to the physical environment and water and sediment quality is such that the proposed SG1A Project would not result in any significant adverse impacts to the environment. This finding supports a screening decision that the SG1A Project does not require an Environmental Impact Assessment.

No impacts on the physical environment and water and sediment quality from the SG1A Project have been identified as requiring further consideration within the Environmental Appraisal. Any potential changes and impacts would be less than or within the bounds of the determined effects associated with the consented Inch Cape export cable corridor. Furthermore, mitigation that would be employed during cable installation activities (see Section 4.7) would further reduce the potential or scale of any impacts.

6.3 Benthic Ecology

This section provides a description of the benthic ecology baseline and characterises any potential impacts which may affect benthic ecology receptors during construction, operation and maintenance and decommissioning phases of the SG1A Project.

6.3.1 Key Data Sources

Data sources for benthic ecology characterisation across the SG1A Project comprise a mixture of online resources, providing broad-scale benthic habitat mapping, regional and site-specific survey data and published information specific to protected sites. Key data sources used include:

- EMODnet Broad-scale seabed habitat map for Europe (EUSeaMap);
- JNCC MPA Mapper;
- JNCC evidence base for the Firth of Forth Banks Complex MPA, including Pearce *et al* (2012);
- Inch Cape Offshore Wind Farm Environmental Statement:

- Seagreen Project EIA Report (Seagreen, 2012; 2018);
- Firth of Forth Banks Complex MPA site summary and data confidence assessments;
- Firth of Forth SSSI site management statement; and
- Firth of Forth SSSI Citation.

6.3.2 Study Area

The study area applied to this topic covers the proposed extent of the SG1A Project with a 10 km buffer as shown in Figure 1.1. Seabed habitats in nearby offshore development sites including the Seagreen Project, Inch Cape and Neart na Gaoithe are considered where relevant to inform the baseline. This section considers the benthic habitats, communities and species in the subtidal and intertidal parts of the study area.

6.3.3 Baseline Description

6.3.3.1 Overview of bathymetry, seabed habitats and sediments

Benthic communities comprise the fauna and flora that live on or in the seabed. Their composition and distribution is highly dependent on the type of seabed (e.g. presence of hard or soft substrata, sediment characteristics) and water depth.

An overview of the bathymetry, seabed habitats and sediments in the study area is provided in Section 6.2.3. Section 6.2.3 also provides an overview of the seabed sediments, sediment quality and their distribution in study area and wider in the Firth of Forth.

Predictive mapping highlights the variety of benthic habitats within the study area. Under the EUNIS seabed habitat classification system, the seabed in the furthest offshore parts of the study area, including the SG1A ECR to the west and southwest where it widens and overlaps with Inch Cape Development Area (Figure 6.4), consists of 'Deep circalittoral sand' and 'Deep circalittoral coarse sediment'. Sediments along the cable corridor become increasingly muddy as it passes southeast of the Isle of May and into the Firth of Forth and are classified as 'Deep circalittoral mud' and 'Circalittoral sandy mud', although patches of exposed rock and biogenic reef are present. Sediments are more mixed closer to the East Lothian coastline and include circalittoral and infralittoral mixed and coarse sediments (Figure 6.4).

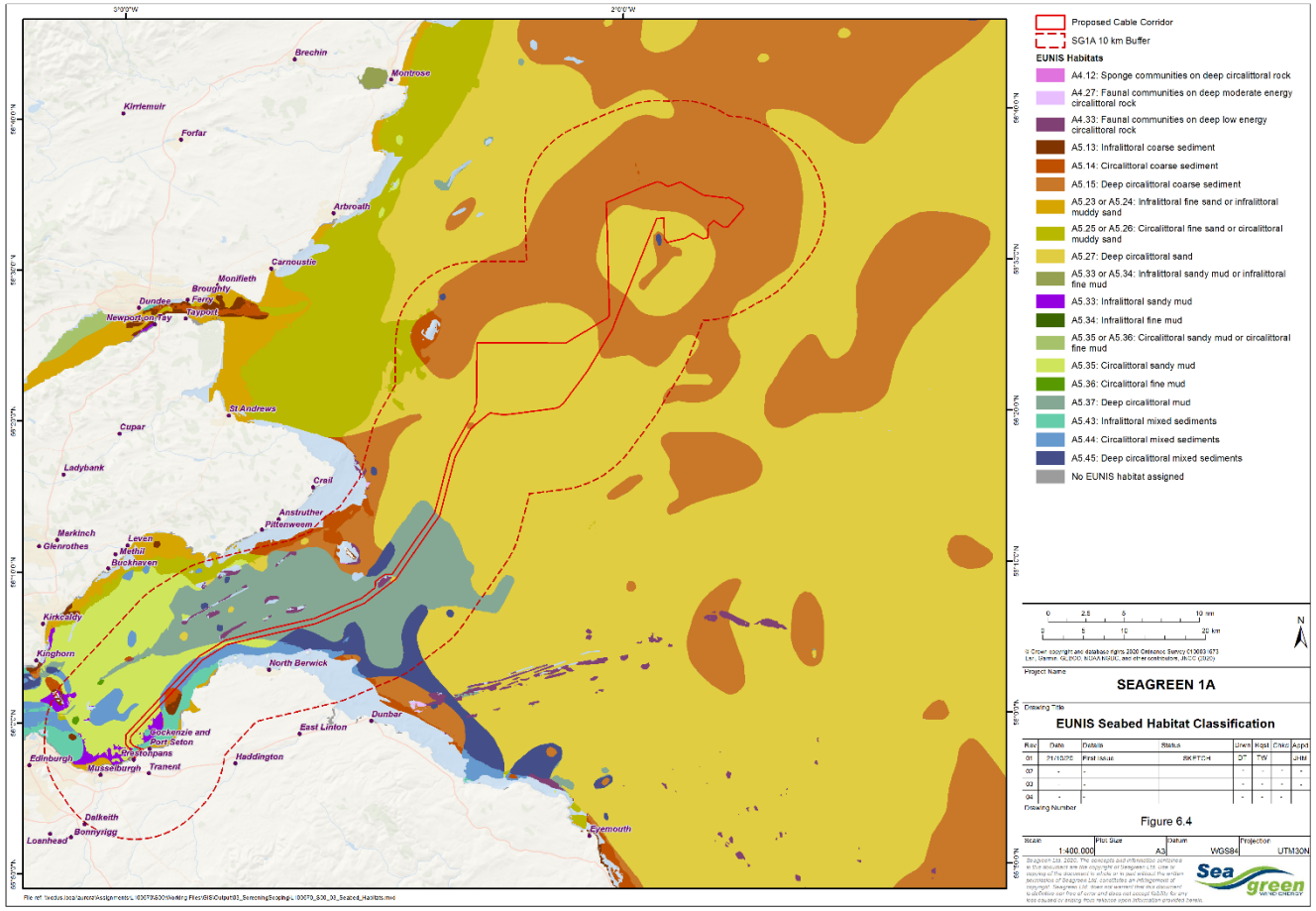

Figure 6.4 - EUNIS Seabed Habitat Classification in the Study Area (EMODnet, 2020)

6.3.3.2 Relevant site-specific survey information

The broadscale habitat mapping described above is supported by a significant amount of survey data collected for the Seagreen Project (Seagreen, 2018), the Inch Cape Development Area and the Inch Cape Offshore Export Cable Corridor (Inch Cape, 2011; 2018), as well as earlier survey data obtained in 2009 for the Neart na Gaoithe development (Cooper and Barry, 2017).

Figure 6.5 shows the locations of site-specific surveys conducted to date within the survey area. Given the significant overlap and proximity of the SG1A Project, the outputs of the Inch Cape surveys, as presented below, are considered relevant to characterising the baseline environment of the SG1A Project and benthic ecology study area.

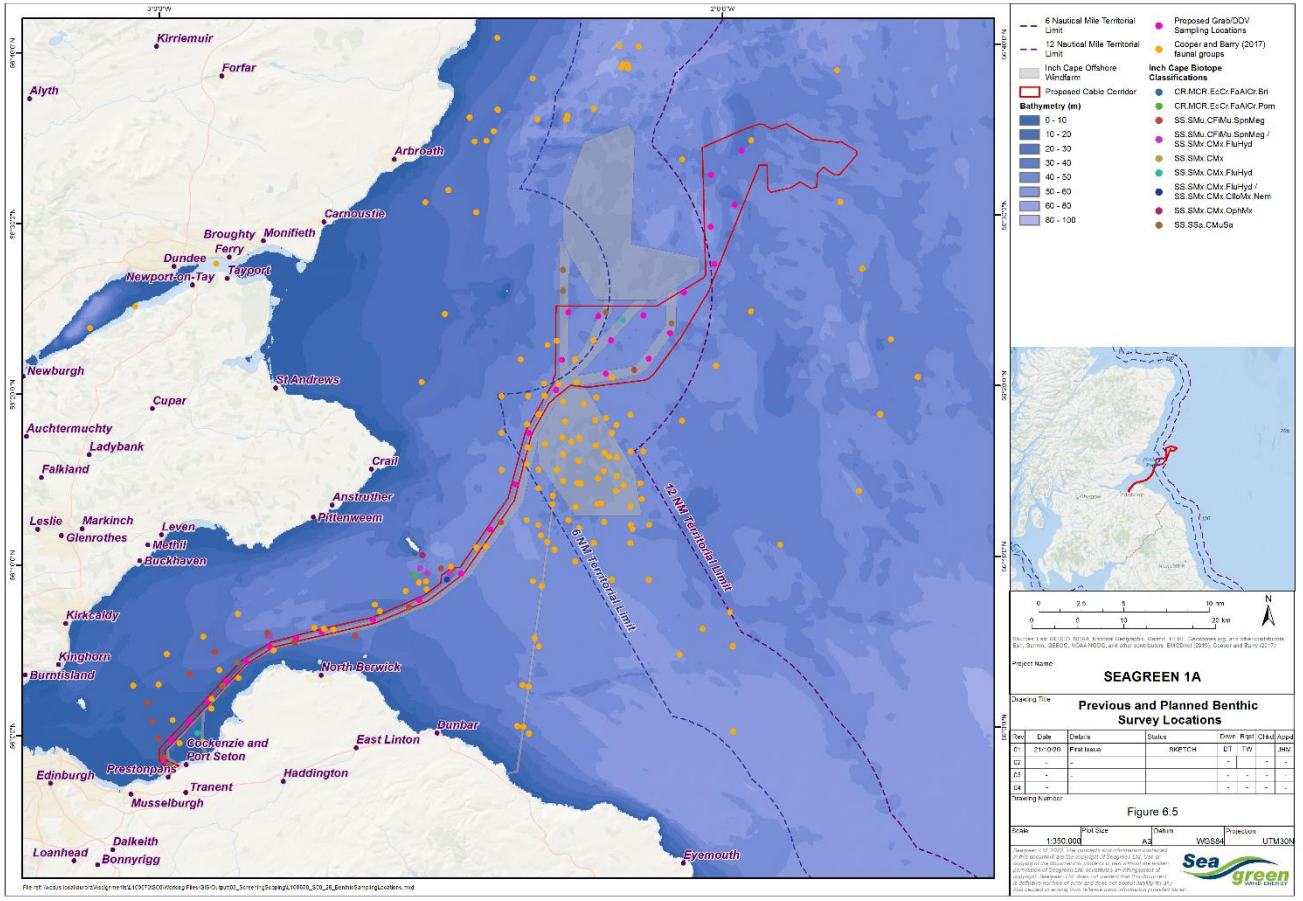

Figure 6.5 - Existing Seabed Survey Data

The results summarised in Table 6.4 and Table 6.5 have been used to characterise the baseline benthic environment in the SG1A study area.

Table 6.4 - Summary of findings from 2012 benthic survey at Inch Cape Development site

Survey Topic	Description
Physical environment	Circalittoral sands and gravelly sands with areas of muddy mixed sediment.
Epibenthic communities	Coarse and mixed sediment communities dominated by species typical of these habitats, i.e. dead man's fingers (*Alcyonium digitatum)*, horned wrack (*Flustra folicacea*), brittlestars (*Ophiothrix fragilis*), hydroids (e.g. *Hydrallmania falcata*) and a number of small fish and mobile benthic invertebrates.
Biotope classification	Predominantly the circalittoral mixed sediment biotope '*Mysella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment' (SS.SMx.CMx.MysThyMx), with significant areas of '*Glycera lapidum, Thyasira* spp. and *Amythasides macroglossus* in offshore gravelly sand' (SS.SCS.OCS). Some occurrence of '*Mediomastus fragilis, Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel' (SS.SCS.CCS.MedLumVen).
Sediments chemistry and contaminants	Levels of total organic carbon (TOC) and sulphide were low at all stations. PAHs, PCBs and organotins were also low, with concentrations below Cefas Action Levels (AL), Canadian Sediment Quality Guidelines and Dutch Standards. Arsenic, cadmium, chromium, copper, and nickel concentrations exceeded Cefas AL 1. Levels of all contaminants varied across the survey area, but no areas of enhanced contamination were identified, despite the presence of the historical disposal ground at Bell Rock (located partially within the survey area).

Table 6.5 - Summary of findings from subtidal and intertidal benthic surveys along the Inch Cape Offshore Export Cable Corridor

Survey Topic	Summary Description
Subtidal surveys	• Predominant sediment type slightly gravelly muddy sand • Slightly gravelly sand and slightly gravelly sandy mud making up the remaining classes • Dominant mud/sand biotope was 'Seapens and burrowing megafauna in circalittoral fine mud' (SS.SMu.CFiMu.SpnMeg). Towards the intertidal, sediments classified as more heterogeneous infralittoral mixed (IMx) and circalittoral mixed (CMx) derived biotopes.
Intertidal surveys – A) Cockenzie	Cockenzie was divided into two main areas, hard substratum and mixed substrata. In south of survey area, substrate ranged from sandy gravel on the upper to mid shore, to sandy gravel and cobbles on the mid to lower shore • Small boulders present on the extreme low shore and sub-tidal area. • Algal growth onmid to lower shore with biotope 'Barnacles and *Littorina* spp. on unstable eulittoral mixed substrata' (LR.FLR.Eph.BLitX), • Down the shore, *Fucus spiralis* on full salinity upper eulittoral mixed substrata' (LR.LLR.F.Fspi.X) weremore prevalent. The hard substrata in the northern half showed • '*Pelvetia canaliculata* and barnacles on moderately exposed littoral fringe rock' (LR.MLR.BF.PelB) on the upper shore; • *'Chthamalus* spp. on exposed upper eulittoral rock' (LR.HLR.MusB.Cht.Cht) on the mid shore • 'Fucus spiralis on exposed to moderately exposed upper eulittoral rock' (LR.MLR.BF.FspiB) on the mid to lower shore

	• kelp biotope of '*Laminaria digitata* on moderately exposed sublittoral fringe bedrock' (IR.MIR.KR.Ldig.Ldig) and 'Lanice conchilega in littoral sand' (LS.LSa.MuSa.Lan). on the extreme low shore Previous sampling (EMU, 2010), identified a thin band of a mussel bed (LS.LBR.LMus.Myt.Mx) on mid shore mixed cobble and gravel substrates. During the EMU (2012) survey this habitat was not present, suggesting that this is likely to have been a naturally ephemeral feature.
Intertidal surveys – B) Seton Sands	• Seton Sands consisted predominantly of fine sand habitats, though a small area of hard substrata'*Fucus spiralis* on full salinity sheltered upper eulittoral rock' (LR.LLR.F.FSpi.FS) occurred within a fine sand biotope on the upper shore. • Upper to mid shore mobile sand banks (LS.LSa.MoSa.AmSco.Sco) led to a large mid to low shore polychaete dominated biotope (LS.LSa.FiSa.Po) • Polychaete worms were present in large numbers to the low shore but the bivalve mollusc, • *Angulus tenuis*, was present on the extreme low shore, • '*Nephtys cirrosa*-dominated littoral fine sand' (LS.LSa.FiSa.Po) biotope further classified to 'Polychaetes and *Angulus tenuis* in littoral fine sand' (LS.LSa.FiSa.Po.Aten).
Sediments chemistry and contaminants	Please see Section 6.2.3.6

6.3.3.3 Protected sites and species

There are no SACs designated for benthic habitats or species within the SG1A Project or benthic study area.

The northeastern part of the SG1A Project lies within the Firth of Forth Banks Complex Nature Conservation MPA (Figure 6.1) which is designated for the following biodiversity features (JNCC, 2020a):

- Offshore subtidal sands and gravels;
- Ocean quahog (*Arctica islandica*) aggregations; and
- Shelf banks and mounds.

As part of the evidence base for the Firth of Forth Banks Complex MPA, JNCC commissioned an analysis of benthic grab data collected at the site location in 2011 (Pearce *et al*, 2012).

The report provides information on sediment physical characteristics, faunal assemblages, and the assignment of a biotope to each of the faunal samples, including the proposal of new biotopes based on the information gathered during the survey. The study also identified the occurrence within the survey area of features of conservation interest including Annex I habitats, MPA search features and rare or alien species. The data gathered and analysed provides important information that has been used to inform the baseline for impact assessments in this area.

The SG1A Project landfall location at Cockenzie passes through the Firth of Forth SSSI, which covers long sections of the Firth of Forth coastline, including the intertidal zone. Notified features of SSSIs do not extend below the low water mark. The only biological features of the site within the intertidal zone are mudflats, which provide feeding grounds for birds. The most important mudflats are found in the estuary part of the Firth of Forth, outside of the SGIA Project area (NatureScot, 2020a).

6.3.4 Mitigation and Management Measures

The SG1A Project mitigation and management measures are presented in Section 4.7 and have been included when characterising the potential impacts to benthic ecology (including the installation methods and measures which will be set out in the CEMP, SOPEP and MCMP). No additional mitigation specific to benthic ecology will be implemented. The SG1A Project is undertaking a benthic survey to validate existing available baseline data and inform detailed design and the results of this survey will be provided to MS-LOT once available. No further mitigation measures will be implemented specifically for benthic ecology.

6.3.5 Characteristics of Potential Impacts

This section characterises the potential impacts which have been identified for benthic ecology receptors and provides recommendations on whether further consideration is required in the Environmental Appraisal to be submitted with the SG1A Project application for Marine Licence. A summary of the potential impacts and conclusions are included in Table 6.6.

6.3.5.1 Temporary direct disturbance of benthic habitats and species

Direct disturbance to benthic habitats and species has the potential to occur during the installation of the single export cable which is expected to take place between Q2 and Q3 2023.

The proposed use of a trenchless technique (HDD or Direct Pipe) for installing the cable from the onshore landfall to the lower intertidal area will avoid significant impacts within the intertidal zone. The offshore (subtidal) parts of the cable will be installed using jetting, ploughing or mechanical trenching techniques. The maximum width of the trench is estimated to be 3 m, with a cable burial depth of up to 3 m. Depending on the installation methods used, temporary direct impacts may occur within an anticipated maximum working width of 100m for the length of the ECR. Further direct impacts may occur during the placement of rock or mattress protection, or the installation of grout bags (estimated to be required for up to 20% of the cable length) over a maximum width of 6 m, and by the use of anchors by the cable installation vessels.

During the operational phase, the only potential source of direct disturbance is likely to be during maintenance activities, which would be temporary and highly localised.

As stated in Section 4.6, a detailed decommissioning programme will be prepared at the appropriate time. The programme will be developed based on technological, legislative and environmental requirements at the time. The impacts during decommissioning are expected to be similar, and less significant, than those predicted during installation.

As described above in Section 6.3.3, the benthos of the SG1A Project area is well understood from comprehensive surveys conducted and nearby areas of similar water depth and seabed type. Seagreen 1A will conduct a validation survey, to provide further assurance of the understanding gained from previous surveys in the area. The proposed survey will also confirm habitats and biotopes along the ECR and provide up-to-date data.

Potential impacts from cable laying within a significant proportion of the SG1A ECR, including the two landfall options, has previously been assessed as not significant in the ES for the consented Inch Cape Export Cable (Inch Cape, 2011; 2018). As detailed in the key project parameters (Table 4.1), the SG1A Project has a small construction working corridor (100 m) and works will be short term only (Q2/Q3 2023) with direct disturbance being highly localised and temporary. Therefore, it is unlikely the SG1A project will have any potential significant direct impacts on benthic ecology. With consideration of the above, the potential impacts to benthic habitat from direct disturbance from the SG1A Project **will not be included** within the Environmental Appraisal.

6.3.5.2 Indirect impacts from temporary resuspension and resettlement of sediments

Trenching activities and the placement of cable protection materials on the seabed may result in resuspension of sediments, which will settle to the seabed over a wider area and have the potential to impact benthic communities by smothering and temporary increases in suspended sediment concentrations.

Indirect impacts from cable installation have been assessed for much of the SG1A ECR in the ES for the consented Inch Cape Export Cable and were assessed as not significant (Inch Cape, 2011; 2018). Given the small scale of works for SG1A (only one export cable), any potential impacts which are associated with the SG1A export cable, will be less than those identified for Inch Cape. As detailed in the key project parameters (Table 4.1), the SG1A Project has a small construction working corridor (100 m) and works will be short term only (Q2/Q3 2023) with any changes in suspended sediment concentrations being highly localised and temporary. Therefore, it is unlikely the SG1A project will have any potential significant indirect impacts on benthic ecology. With consideration of the above, the potential indirect impacts from temporary resuspension and resettlement of sediments **will not be included** within the Environmental Appraisal.

6.3.5.3 Release of contaminants bound in sediments

The information presented in Section 6.2.3 demonstrates the absence of significant contamination of surface sediments within the SG1A ECR. The impact assessments conducted for the consented Inch Cape and Seagreen Project predict that there will be no significant impacts from the release of sediment contaminants during the installation, maintenance or decommissioning of the export cables (Inch Cape, 2011; Inch Cape, 2018; Seagreen, 2018). In consideration of the SG1A Project key project parameters (Table 4.1) and known contaminants (Section 6.2.5.4), any disturbance of sediment will be temporary in duration and highly localised. Therefore, the potential impact associated with the disturbance of contaminated sediments **will not be included** within the Environmental Appraisal.

6.3.5.4 Long-term loss of original habitat and introduction of hard substrate

The SG1A export cable will be trenched and buried wherever possible along its entire length and therefore the seabed is expected to return to its original condition, with recovery and re-colonisation commencing

immediately following cable installation. It is possible that there will be requirement for cable protection, using rock or concrete mattresses or grout bags, but this is only anticipated along up to 20% of the route. The deposited protection materials will be different from the natural seabed, however, the affected areas will only be along up to 20% of the ECR and with a width of up to 6 m in these locations. This highly localised and small footprint, in the context of natural habitats in the wider region, is not considered likely to give potential significant impacts. In addition, no significant impacts were determined from the placement of protection in the ES for the consented Inch Cape export cable (Inch Cape 2011; 2018). Therefore, potential impacts to benthic habitat from long term loss of habitat **will not be included** in the Environmental Appraisal.

Table 6.6 - Summary of the characteristics of potential impacts to benthic ecology receptors associated with SG1A

Potential impact	Relevant phase of Project			To include in Environmental Appraisal
	Cable installation	Cable operation (maintenance and repair)	Decommissioning	
Temporary direct disturbance of benthic habitats and species	✓	✓	✓	No
Indirect impacts from temporary resuspension and resettlement of sediments	✓	✓	✓	No
Release of contaminants bound in sediments	✓	X	✓	No
Long-term loss of original habitat and introduction of hard substrate	✓	X	X	No

6.3.5.5 Cumulative Impacts

Given the highly localised and temporary nature any disturbance, resuspension or release of contaminants from the SG1A Project, no significant cumulative impacts are anticipated, even when considered cumulatively with other planned offshore wind farm installation activities.

In relation to long term loss of habitat, the areas of seabed likely to be affected by the SG1A project are extremely small in relation to overall areas of similar seabed habitat.

Given the very wide distribution of the sedimentary habitats in the wider region, together with the presence of natural hard substrata in the SG1A study area, there are unlikely to be significant cumulative impacts in relation to long term loss of habitat.

Therefore, cumulative impacts on benthic ecology **will not be included** in the Environmental Appraisal.

6.3.6 Conclusions and Proposed Methodology for the Environmental Appraisal

Taking account of selection criteria in Schedule 3 of the 2017 EIA Regulations, the characterisation of potential impacts with respect to the benthic ecology is such that the proposed SG1A Project would not result in any significant adverse impacts to the environment. This finding supports a screening decision that the SG1A Project does not require an Environmental Impact Assessment.

No impacts on benthic ecology from the SG1A Project have been identified as requiring further consideration within the Environmental Appraisal.

6.4 Natural Fish and Shellfish Resource

This section provides a description of the Natural Fish and Shellfish Resource baseline and characterises the potential impacts which may affect natural fish and shellfish receptors during the Construction, Operation and Maintenance and Decommissioning phases of the SG1A Project.

6.4.1 Key Data Sources

The following key data sources have been used to inform the natural fish and shellfish resources baseline:

- Inch Cape Offshore Environmental Statement (Inch Cape, 2011; 2018)
- Neart Na Gaoithe OWF ES (Neart Na Gaoithe, 2012)
- The Seagreen Project EIA Report (Seagreen, 2012; 2018)
- Fisheries statistics per ICES Rectangle (MMO, 2020)
- Marine Scotland NMPi (NMPi, Marine Scotland, 2020);
- Scottish Biodiversity List (NatureScot, 2020b)
- International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2020)
- Coull *et al*. (1998) Fisheries sensitivity maps in British waters. Available online at https://www.cefas.co.uk/media/o0fgfobd/sensi_maps.pdf
- Ellis *et al*. (2012) Spawning and nursery grounds of selected fish species in UK waters. Available online at https://www.cefas.co.uk/publications/techrep/TechRep147.pdf.
- MarLIN (2020). The Marine Life Information Network. Available online at https://www.marlin.ac.uk/; and
- National Biodiversity Network (NBN) (2015). NBN Atlas. Available online at https://nbn.org.uk/content-block/nbn-gateway/;

Citations for other sources have been included throughout the baseline, which are referenced in Section 0.

The SG1A Project overlaps considerably with the consented Inch Cape export cable corridor, and also is in proximity to other consented projects Neart na Goaithe and the Seagreen Project. These projects provide a large amount of data which has been used to inform this assessment. It is also highlighted, that the Inch Cape cable corridor is consented for up to six offshore export cables (and is likely to install less), whereas the SG1A Project is for a single offshore export cable, which is a notable differential considered in the following natural fish and shellfish section.

6.4.2 Study Area

The SG1A Project is located in ICES Division IVb (Central North Sea) (see Section 6.7, Figure 6.10), within the ICES Ecoregion of the Greater North Sea. Natural fish and shellfish stocks are monitored, and advice is provided at a scale of ICES Ecoregion and Division level. For the purpose of this report, the natural fish and shellfish resource study area is provided on two scales:

1. SG1A study area which is the exact footprint of the SG1A Project on the seabed; and
2. ICES Division study area which is the Central North Sea (IVb).

6.4.3 Baseline Description

This section characterises the natural fish and shellfish resource in areas relevant to the SG1A Project. Many fish species are highly mobile. They can move easily to avoid a temporary change in their environment and are therefore not vulnerable to disturbance. However, species which are seabed-dependent for some or all of their life-cycle, or are not highly mobile, are typically more vulnerable to the potential direct impacts associated with disturbance. Seabed dependent species have therefore been considered in detail in the following baseline, with other fish and shellfish species also documented.

6.4.3.1 Designated Sites

There are no protected sites which are designated due to presence of qualifying natural fish or shellfish species which overlap with the SG1A Project. However, the River Teith SAC is a protected site within the Ecoregion study area, located ~55km west of the landfall of the SG1A Project, which is designated for migratory fish species which may use waters relevant to the SG1A Project as migratory pathways. These species include Atlantic salmon *Salmon salar* and Sea Lamprey *Petromyzon marinus*. This SAC will be considered as part of the HRA screening process which will accompany the Marine Licence application.

6.4.3.2 Fish and Shellfish Assemblage

This section should be read in conjunction with Section 6.8.4, which details the commercially exploited species that are recorded in areas relevant to the SG1A Project. According to landings per ICES rectangle (MMO, 2020), the SG1A Project supports a number of commercially exploited fish and shellfish species, with Nephrops, lobster and crab comprising the majority of the landed weights from the ICES rectangles in which SG1A Project is located. The average landings weights (2014-2018) of the top 20 commercially exploited species from the ICES rectangles with which the SG1A Project overlaps is provided in Table 6.7

Table 6.7 Average landings weights (tonnes, 2014-2018) of commercially exploited fish and shellfish from the ICES rectangles in which the SG1A Project is located (MMO, 2020)

	ICES rectangle				
Species	**40E7**	**41E7**	**41E8**	**42E7**	**42E8**
Nephrops (Norway Lobster) *Nephrops norvegicus*	290.4	1171.4	7.2	56.2	2.3
European lobster *Homarus Gammarus*	22.7	142.3	180.9	252.9	763.6
Brown crab *Cancer pagurus*	135.3	161.7	77.1	326.8	4.1
Scallop *Pectinus maximus*	84.6	197.7	16.8	167.5	2.4

Whelk *Buccinum undatum*	23.2	47.6	2.0	76.9	0.6
Velvet crab *Necora puber*	55.5	31.8	1.8	25.6	8.7
Razor clam *Ensis spp*	4.4	70.5	0.0	6.3	0.0
Mackerel *Scomber scombrus*	4.3	8.6	3.1	24.9	12.6
Mixed Squid *Loligo spp* and Octopi	1.0	45.1	0.0	1.6	0.0
Clams *Mya arenaria*	12.7	16.2	0.0	7.5	0.9
Surf Clams *Mactridae*	0.0	0.1	0.2	3.4	12.1
Squid *Loligo spp*	0.0	9.8	0.0	3.5	0.0
Monks/anglerfish *Lophius sp*	0.0	13.1	0.0	0.1	0.0
Haddock *Melanogrammus aeglefinus*	0.7	1.1	0.0	1.7	5.0
Dab *Pleuronectidae sp*	0.7	1.0	0.5	0.1	0.9
Atlantic cod *Gadus morhua*	0.6	1.8	0.1	0.1	1.0
Whiting *Merlangius merlangus*	0.3	1.7	0.2	0.2	1.7
Plaice *Pleuronectes platessa*	0.7	1.7	0.0	0.1	0.0
Green Crab *Carcinus maenas*	0.2	1.0	0.1	0.1	0.1

The SG1A Project overlaps with areas of surveys carried out to inform the baselines for Inch Cape, the Seagreen Project and is in proximity to Neart na Gaoithe and Berwick Bank (EMU, 2010 AMEC, 2013; IECS, 2012; Berwick Bank, 2020). In particular, the SG1A Project overlaps considerably with the consented Inch Cape export cable corridor. It is considered that information which was collected and presented in relation to the Inch Cape export cable, the Seagreen Project, and Neart Na Gaoithe is sufficient to adequately inform the natural fish and shellfish resource baseline for the SG1A Project and has therefore been used to corroborate and further elaborate on the landings data described above, in relation to natural fish and shellfish resources. The full lists of species which were recorded during these surveys can be found within the relevant appendices (EMU, 2020; AMEC, 2011; IECS, 2012). For the purpose of this Screening Report, focus has been given to seabed-dependent species which may be more vulnerable to disturbance of habitat. The following natural fish and shellfish species have been described below:

- Sandeel: seabed dependent, Priority Marine Feature (PMF) and Scottish Biodiversity List species, notable prey species;
- *Nephrops*: seabed dependent and commercially exploited;
- Scallops: seabed dependent, sedentary (king scallop) and commercially exploited; and
- Herring: seabed dependent for spawning and egg maturation, commercially exploited, Scottish Biodiversity List species and PMF

Sandeel, are a bony fish, and are commercially targeted in the North Sea. Sandeel trawling in some grounds relevant to the SG1A Project including Wee Bankie and Marr Bank have been closed to commercial fishing since 2000 (Article 29a from Council Regulation No 850/88)). Sandeel are seabed-dependent for almost their entire life-cycle (except feeding and spawning), inhabiting medium to coarse grained sandy substrates of sandbanks (Holland *et al*, 2005). Sandeels form an important role in the North Sea foodweb, comprising a food source for marine birds, mammals (Frederiksen *et al*, 2006). As evidenced by existing survey data

collected on behalf of Neart Na Gaoithe, the SG1A Project which is located within the 12nm territorial limit is unlikely to support sandeel populations (Neart Na Gaoithe, 2014) due to the muddy substrate composition in this area (Section 6.3; EMODnet, 2020) which is not suitable habitat for sandeel (Greenstreet *et al*., 2010). Further offshore, where the SG1A Project extends beyond 12nm, the seabed is understood to be composed of sand and coarse substrate (EMODnet, 2020) which may be more favourable sandeel habitat and is in proximity to locations where sandeel was recorded during Seagreen benthic surveys. According to the Scoping Report for the Seagreen optimised project (2017) parts of the western area of the Seagreen OWF, where the SG1A Project eastern end is located, are likely to be unsuitable for sandeel. It should be noted that Sandeel, and particularly Raitt's sandeel (*A. marinus*) which were found in most abundance in benthic surveys of the Seagreen study area (IECS 2012) are understood to have slow growth and recovery rates.

Nephrops is commercially exploited throughout Scottish waters and are known to be present in abundances in areas relevant to the SG1A Project, especially within the 12nm territorial limit nearshore of the Marr Bank sandbanks, as confirmed by existing benthic surveys in the region (EMU, 2020; AMEC, 2011; IECS, 2012). *Nephrops* inhabit muddy sediments and spend almost all their life cycles in epibenthic burrows, except for feeding and mating. *Nephrops* are understood to be relatively resilient to the effects of smothering and disturbance due to their inherent ability to burrow into substrates, and fast growth/reproductive rates (Inch Cape, 2011; 2018).

King Scallop and Queen Scallop (*Aequipecten opercularis*) are present in the offshore area the SG1A Project according to survey data and landings, with King Scallop particularly commercially exploited due to being less mobile than Queen Scallop. Scallops are bivalve, sedentary, filter-feeders which settle on clean firm sand and sandy gravel (Seagreen, 2018). It is understood that scallop are not typically present in the SG1A Project located in ICES 41E7 but are present in ICES 43E7 and 42E8. Scallop are potentially vulnerable during the larval phase to increased SSC or disturbance, however, in areas of commercial fishing activity the levels of seabed disturbance from dredging and trawling is expected to exceed the temporary disturbance which may result from installation of the SG1A cable (Seagreen, 2018; Black and Perry, 1999).

Herring is a Scottish Biodiversity List species and PMF and is commercially exploited throughout the UK. It should be noted that the North Sea herring stock crashed due to over-fishing in the 1890s, resulting in the current monitoring and regulation applicable to the fishery (ICES, 2020). Herring stocks are categorised regionally and have varying spawning/nursery periods at different locations. The Buchan stock is understood to be of relevance to the SG1A Project. Herring are pelagic but are seabed-dependent (with relatively diverse seabed type affiliation) for spawning, with eggs remaining on the seabed until larvae hatch (approximately 3 weeks in August and September for the Buchan Herring stock). Data from the Working Group of International Pelagic Surveys (WGIPS, 2020) indicates that the Buchan spawning activity is primarily located to the north of the SG1A Project. The Seagreen Optimised Project EIA (2018) found that disturbance was not expected to exceed the baseline levels of disturbance from existing activities.

6.4.3.3 Spawning and Nursery Grounds

As noted in Section 6.4.3.2, species which are seabed dependent for all or some of their life stages, such as spawning, have been carefully considered within this report. The fish and shellfish species which may use areas relevant to the SG1A Project and are known to be dependent on the seabed for spawning are sandeel, *Nephrops* and potentially herring. A full list of all fish and shellfish species which may use the SG1A Project study area for spawning or nursery habitat is provided in Appendix A.

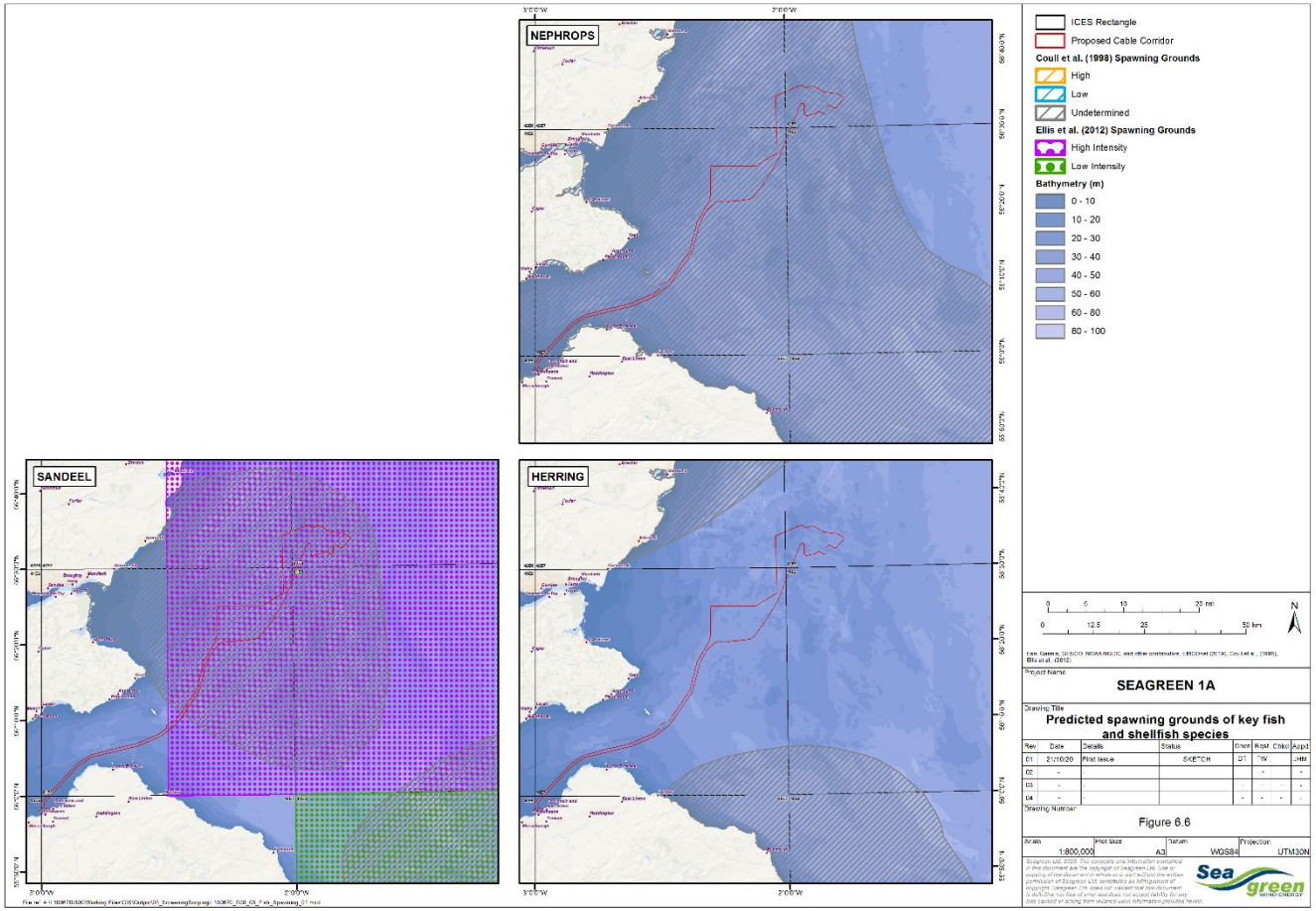

Figure 6.6 Predicted spawning grounds of key seabed-dependent fish and shellfish species in the vicinity of the SG1A Project

6.4.3.4 Noise Sensitive Species

Auditory detection in fish species remains poorly understood. Fish have diverse inner ears and accessory hearing structures. While accessory hearing structures enhance hearing, the function of the diversity of inner ears is not completely clear (Ladich and Hulz-Mirbach, 2016).

Hawkins and Popper (2014) have divided fishes into several different categories based on the structures associated with hearing. The functional groups include:

- Low sensitivity to noise - fishes without a swim bladder (these can only detect kinetic energy – e.g., sharks, common skate complex, mackerel, whiting);
- Medium sensitivity to noise - fishes with a swim bladder that is far from the ear and thus not likely to contribute to pressure reception, so the fishes are primarily kinetic detectors (e.g., salmon, sea trout) and eggs and larvae that are less mobile than adult fish and therefore not able to readily move away from the noise source; and
- High sensitivity to noise - fishes with a swim bladder or other air bubble that is close to the ear and enables sound pressure to be detected, broadening the hearing range and increasing hearing sensitivity (e.g., herring, sprat, cod).

There is potential for a number of noise sensitive species such as cod, herring, sprat, and Atlantic salmon to be present along the proposed SG1A Project.

6.4.3.5 Migratory and Electro-magnetic Field (EMF) sensitive species

There is the potential for several elasmobranch species to be present along the SG1A Project. These include Lesser spotted dogfish (*Scyliorhinus canicula*), cuckoo ray (*Raja naevus*), spurdog (*Squalus acanthias*), tope (*Galeorhinus galeus*) and common skate (*Dipturus batis* – complex). Other EMF-sensitive species present in waters relevant to the SG1A Project include cod, and lobster. Migratory species such as Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), the European eel (Anguilla anguilla), allis and twaite shad (Alosa alosa and Alosa fallax), and sparling (Osmerus eperlanus) may use waters relevant to the SG1A Proejct for migration. Particular focus has been provided here on species which have been highlighted in the EIAs of Inch Cape and Neart Na Gaoithe as being potentially sensitive to the impacts from offshore developments (Inch Cape, 2011; Inch Cape, 2018; Neart Na Goithe, 2012).

Atlantic salmon is an Annex II species and are diadromous spending most of their lives at sea, only returning to freshwater rivers to spawn, and returning to the sea in April/May as smolts (Malcolm *et al*, 2015). It is assumed from the Seagreen Project (Seagreen 2012, 2018) and existing studies in the region that Atlantic Salmon may utilise the SG1A area for migration (Seagreen, 2018; Malcolm *et al*., 2010; Beatrice Offshore Windfarm Limited (BOWL), 2017). Atlantic salmon and the associated rod, line and net fisheries were studied in detail in the EIA for the Seagreen optimised project (Seagreen, 2018), noting an overall decline in salmon catch returns since 1990s (Seagreen, 2018). European eels, are critically endangered according to IUCN (2020), a Scottish Biodiversity Species, and are also diadromous; migrating to sea to spawn with the larvae making the return journey back to freshwater. European eel are unlikely to

use the SG1A Project intensively, but may pass through the area during migration. The migration of the European eel is not fully understood, and uncertainties remain on the duration and route of migration (Malcolm *et al*., 2010 and Righton *et al*., 2016). A proportion of the total European eel population, at the adult (silver eel) migratory stage, may pass through Scottish coastal waters. Waters bordering the northern coast of mainland Scotland, Orkney, Shetland and the Outer Hebrides are most likely to contain migratory eels from northern continental Europe as well as the UK. However, a potential migration route has been identified from the North Sea along the Scandinavian coast crossing into the north Atlantic to the north of Shetland, meaning that continental European eels may by pass Scottish coastal waters or that the migration routes may not be geographically confined (Malcom *et al*., 2010).

6.4.4 Mitigation and Management Measures

The SG1A Project mitigation and management measures are presented in Section 4.7 and have been included when characterising the potential impacts to natural fish and shellfish ecology. There are no additional mitigations required specific to natural fish and shellfish ecology.

6.4.5 Characteristics of Potential Impacts

This section characterises the potential impacts which have been identified for natural fish and shellfish receptors and provides recommendations on whether further consideration is required in the Environmental Appraisal to be submitted with the SG1A Project application for Marine Licence. A summary of the potential impacts and conclusions are included in Table 6.8.

6.4.5.1 Habitat disturbance, loss or creation

It is acknowledged that certain fish and shellfish receptors may be vulnerable to disturbance due to their affiliation with certain sediment types and therefore the potential impact pathway of disturbance to the species or its habitat has been carefully considered. The Forth and Tay region supports an active commercial fishing industry including demersal trawling, dredging and creeling (Section 6.7). On the basis of the findings of the baseline, and considering the results of the Seagreen and Inch Cape EIAs (Seagreen 2012; 2018; Inch Cape, 2011; 2018) the localised nature and short duration of any direct disturbance which may be caused by the SG1A installation or decommissioning works will be less than the disturbance which is consistently recorded within the existing environment. Wherever possible, the SG1A cable will be buried with a worst case anticipated burial of 80%. If burial is not possible protection will be placed over the cable. In areas where burial is not possible, the seabed is expected to be hard or rocky, and so the placement of cable protection is not expected to change the seabed characteristics significantly for fish and shellfish which are present. For most fish and shellfish species, the sensitivity to disturbance is low according to the Inch Cape and Seagreen EIAs (Inch Cape, 2011; 2018; Seagreen 2012; 2018), except for sandeel which are not confirmed to be present throughout the SG1A Project area in high densities. In light of the temporary and highly localised nature of any disturbance, the sensitivity of the fish and shellfish species which are most abundance in the vicinity of the SG1A Project, and in consideration of the Inch Cape EIA (Inch Cape,

2011; 2018) the potential impacts of disturbance, changes or creation of habitat **will not be included** within the Environmental Appraisal.

6.4.5.2 Indirect disturbance due to sediment deposition (smothering) and temporary increases in suspended sediment concentrations

Sediment disturbance will be limited to the direct vicinity of cable trenching operations and no impacts from the low levels of sediments disturbance by trenching activity are expected, including to diadromous fish or shellfish species. Any disturbed sediment is expected to be rapidly dispersed by tidal currents (Section 6.2). with the rates of deposition or increased SSC not expected to surpass the levels which may cause negative impacts to fish and shellfish species. For the most part, species which are bottom-dwelling, are relatively resilient to SSC/sediment deposition. In light of the temporary and localised nature of any SG1A activities which may cause increases in SSC/sediment deposition, and the relatively low sensitivity of most of the key species in the SG1A Project area, this impact **will not be included** within the Environmental Appraisal.

6.4.5.3 Underwater noise

With respect to underwater noise, the limited number of vessels expected to be involved in any seabed preparation and cable installation activities and the short duration and temporary nature of cable installation activities for SG1A is unlikely to produce significant levels of underwater noise volumes or frequencies. The overall underwater noise levels from trenching, jetting or burial will be negligible when compared to the noise levels which were considered in previous EIAs in the region (Inch Cape, 2018; Seagreen, 2018). Therefore, the potential for impacts of underwater noise on fish and shellfish receptors associated with SG1A activities **will not be included** within the Environmental Appraisal.

6.4.5.4 Electromagnetic fields (EMFs)

EMF emissions are generated from the transmission of electricity through subsea cables. The cables produce electromagnetic fields which have both electric (E) measured in volts per metre (V m-1) and magnetic components (B) measured in micro tesla (µT). While the direct electric field is mostly blocked with the use of conductive sheathing, the magnetic field penetrates most materials and therefore are emitted into the marine environment with the resultant induced electric (iE) field.

It is commonly recommended that cable burial is used to increase the distance between the cable and the electro-sensitive species (Gill *et al*., 2005; 2012). However, where burial is not possible; cable protection, e.g. concrete mattresses or rock placement increases the distance between marine species sensitive to EMF and the EMF source.

As detailed in Section 4, the SG1A cable will be buried wherever possible, and is expected to be buried to a depth of between 1 m and 3 m. Where cables are buried to a depth of up to 1 m, the predicted magnetic field strength at the seabed is expected to be below the earth's magnetic field (assumed to be 50 µT) (Moray Firth Offshore Renewables Limited, 2012) and not detectable by elasmobranch or electro-sensitive species (fish and crustaceans). Considering the available information, while acknowledging the current

uncertainties and ongoing research which is being carried out on this topic, the potential for significant impacts due to EMF emissions are expected to be minimal and unlikely to occur for all species concerned and therefore this impact **will not be included** within the Environmental Appraisal.

6.4.5.5 Barrier effects to migratory species

It is understood that there is the potential for migratory fish species, such as Atlantic Salmon and European Eel to be impacted by activities during installation of the SG1A cable. The existing research on migratory species in waters relevant to SG1A indicates that usage of the area is relatively low. In addition, the overall footprint of any physical barriers (e.g. an installation vessel) or indirect barriers such as noise will be localised and the duration temporary. Indirect effects from operational EMF are expected to be negligible mitigated by effective burial and other embedded design mitigations of the cable itself. Therefore, the potential for significant impacts due to barrier effects are minimal and unlikely to occur for all species concerned and therefore this impact **will not be included** within the Environmental Appraisal.

Table 6.8 Summary of the characteristics of potential impacts to fish ecology receptors associated with SG1A

Potential impact	Relevant phase of Project			To include in Environmental Appraisal
	Cable installation	Cable operation (maintenance and repair)	Decommissioning	
Habitat disturbance, loss or creation	✓	X	✓	No
Indirect disturbance due to sediment deposition (smothering) and temporary increases in suspended sediment concentrations	✓	X	✓	No
Disturbance or injury due to underwater noise	✓	X	✓	No
Effects of EMF	X	✓	X	No
Barrier effects to migratory fish species	✓	X	✓	No

6.4.5.6 Cumulative Impacts

The potential impacts for natural fish and shellfish receptors identified for the Seagreen Project, Neart Na Gaoithe and Inch Cape OWFs have been assessed to have no significant impact both alone and cumulatively with other developments (Seagreen 2012; 2018, Inch Cape, 2011; 2018, Neart Na Gaoithe, 2012). For the SG1A Project, all potential impacts for natural fish and shellfish resources are unlikely to occur and will be temporary in duration and localised in spatial extent. Therefore, given the significant overlap and proximity of the SG1A Project with the Inch Cape cable corridor, and the northeastern overlap with the consented

Seagreen OWF site, it is considered that the installation of an additional single offshore export cable for the SG1A Project will not give rise to any potential cumulative impacts. For this reason, the potential for cumulative impacts on natural fish and shellfish resources receptors from the SG1A Project **will not be included** within the Environmental Appraisal.

6.4.6 Conclusions and Proposed Methodology for the Environmental Appraisal

Taking account of selection criteria in Schedule 3 of the 2017 EIA Regulations the characterisation of potential impacts with respect to natural fish and shellfish resources is such that the proposed SG1A Project would not result in any significant adverse impacts to the environment. This finding supports a screening decision that the SG1A Project does not require an Environmental Impact Assessment.

No significant impacts on natural fish and shellfish resources from the SG1A Project have been identified and therefore this topic will not be considered further within the Environmental Appraisal. The mitigation and management measures provided in Section 4.7 and Section 6.4.4 would reduce the potential or scale of any impacts.

6.5 Marine Ornithology

This section provides a description of the marine ornithology baseline and characterises any potential impacts which may affect marine ornithology receptors during construction, operation and maintenance and decommissioning phases of the SG1A Project.

This Screening Report, and the Marine Licence application for the SG1A Project, will only consider the marine bird species relevant to the offshore and inshore marine habitat zones. The inshore marine waters are defined as marine areas between 1 and 4 km of the coast. The ornithology interests for the intertidal, nearshore (up to 1 km from the coast) and onshore habitat zones will be considered in the SG1A Project's onshore consent application and are not considered further in this report.

6.5.1 Key Data Sources

The areas potentially affected by the SG1A Project have received considerable ornithological survey and research effort over the past two decades, and consequently there is a wealth of information to inform this report. The SG1A Project ornithology survey strategy (Seagreen 1A, 2020) provided a review of the key sources of information available which are:

- Commissioned surveys undertaken to inform wind energy developments in the Firth of Forth, including the Seagreen Project;
- Aerial surveys undertaken by JNCC;
- National and regional volunteer-based surveys (for example those coordinated by the BTO); and
- Breeding seabird research by Centre for Ecology & Hydrology (CEH) and universities on the Forth island breeding colonies).

These studies provide site-specific information on the abundance, distribution, habitat preferences, ranging behaviour and seasonality of the marine bird species that occur in the areas of interests. The key sources of site-specific survey information are listed below:

- Seagreen Alpha and Bravo OWFs: monthly boat-based surveys of Seagreen Round 3 Zone, 2009-2011.
- Seagreen Alpha and Bravo OWFs: monthly boat-based surveys of OWF sites buffered to 2 km, 2017.
- Seagreen Alpha and Bravo OWFs: monthly aerial surveys of OWF sites buffered to 12 km, March 2019 to September 2020.
- Seagreen Berwick Bank and Marr Bank OFWs: monthly aerial surveys of OWF sites buffered to 12 km, March 2019 ongoing, planned to end April 2021
- Seagreen 1A Project (offshore cable): intertidal and nearshore bird surveys up to 1.5 km from shore (MHWS), July and August 2020.
- Inch Cape OWF: monthly boat-based surveys of development site buffered to 4 km, 2010 - 2012.
- Inch Cape OWF: monthly aerial surveys of OWF sites buffered to 12 km, April 2019 to March 2020.
- Neart na Gaoithe OWF: monthly boat-based surveys of development site buffered to 8 km, 2010 - 2013.
- Neart na Gaoithe OWF: monthly aerial surveys of OWF sites buffered to 12 km, June 2018, ongoing, planned to continue until wind farm construction is completed.
- Inch Cape offshore cable: intertidal and nearshore bird surveys up to 1.5 km from shore (MHWS), January 2012 to January 2013.
- BTO Wetland Bird Surveys data: abundance and distribution of non-breeding (wintering) coastal and estuary birds, including nearshore waters. Data are available for the count sections corresponding to coast and nearshore parts of SG1A Study Area.
- JNCC Seabird Monitoring Programme: online database that is the national repository of count and productivity data for seabird breeding colonies, including all the Firth of Forth colonies.
- JNCC Surveillance surveys of wintering seaduck, divers and grebes: periodic aerial surveillance surveys of important wintering areas. Data are available Firth of Forth. (Dean *et al*., 2003 and 2004)

There is also a wealth of wider ornithological literature that provides context information required for impact assessment, for example publications that provide information on species' vulnerability to potential impacts, and receptor population size and conservation status (for example, Mitchell *et al*., 2004; Forrester and Andrews, 2007; Furness *et al*., 2013, Furness, 2014; Eaton *et al*., 2015; Lawson *et al*., 2015; JNCC 2018; Frost *et al*., 2019).

6.5.2 Study Area

The Marine Ornithology Study Area is defined as follows:

- The marine habitat within the SG1A Project area buffered to 2km

The size of the buffer is based on the maximum realistic distance to which effects on marine birds may extend from the SG1A Project activities and infrastructure.

It is also relevant to note that the highly mobile nature of birds means that there is potential for connectivity between the Study Area and protected sites designated for their bird interests. Therefore, the characterisation of potential ornithology impacts also considers the potential for the SG1A Project to interact with bird interests that primarily lie outside the Study Area.

6.5.3 Baseline Description

The description of baseline conditions divides the Marine Ornithology Study Area into two habitat zones, these reflecting the major environmental differences within the Study Area and their associated bird community. These habitat zones are:

- Offshore marine waters
- Inshore marine waters

The species known to use the Marine Ornithology Study Area are listed in Appendix B, together with summary information on their status, seasonality and other information relevant to to this screening assessment. The status of a species in each habitat zone presented in Appendix B is based on a qualitative evaluation of existing survey information and is categorised as either 'Scarce' or 'Regular'. Regular here is loosely defined as likely to be commonly present (at the appropriate season) and scarce is loosely defined as likely to be only occasionally present (at the appropriate season) and in only low numbers in the context of the numbers known to occur in the wider Firth of Forth.

6.5.3.1 Offshore marine waters

The offshore marine waters in the Study Area lie between 4 and approximately 30 km from the nearest coast and mostly have seabed depths between 30 and 60 metres. The offshore areas of the Study Area are well within the regular forging range (Woodward *et al*., 2019) of several seabird species breeding on islands in the Firth of Forth, in particular Isle of May, Bass Rock and Craigleith. All these islands are part of the Forth Islands SPA and support large numbers of breeding seabirds in particular, gannet, European shag, gull species (herring gull, lesser black-backed gull and kittiwake), tern species (Sandwich tern, common tern and Arctic tern and the very rare roseate tern) and auk species (common guillemot, razorbill and puffin) (Appendix B). A number of seabird species regularly occur as passage migrants or winter visitors, most notably little gull (a species listed on Annex 1 of EU Birds Directive), Sandwich tern, Arctic skua and little auk (Appendix B).

The ornithological importance of the offshore part of the Study Area is recognised through two nature conservation designations:

- Forth Islands SPA
- Outer Firth of Forth and St Andrews Bay pSPA

These two designations are designed to complement one another (Figure 6.7), with the Forth Islands SPA covering the islands in the Firth of Forth used by breeding seabirds, and the Outer Firth of Forth and St Andrews Bay pSPA covering a very large marine area that provides foraging habitat for the same breeding seabirds plus other non-breeding species that visit the area in the winter months and/or on passage (Appendix B). The offshore marine habitat in the Study Area lies within the Outer Firth of Forth and St Andrews Bay pSPA and thus qualifying species using the offshore parts of the Study Area will have direct connectivity with this pSPA. At its closest point, the offshore part of the SG1A Project passes approximately 4 km south of the Isle of May and thus, based on seabird foraging range metrics (Woodward *et al*., 2019), there will connectivity between the Study Area and the breeding seabird qualifying interest of the Forth Islands SPA.

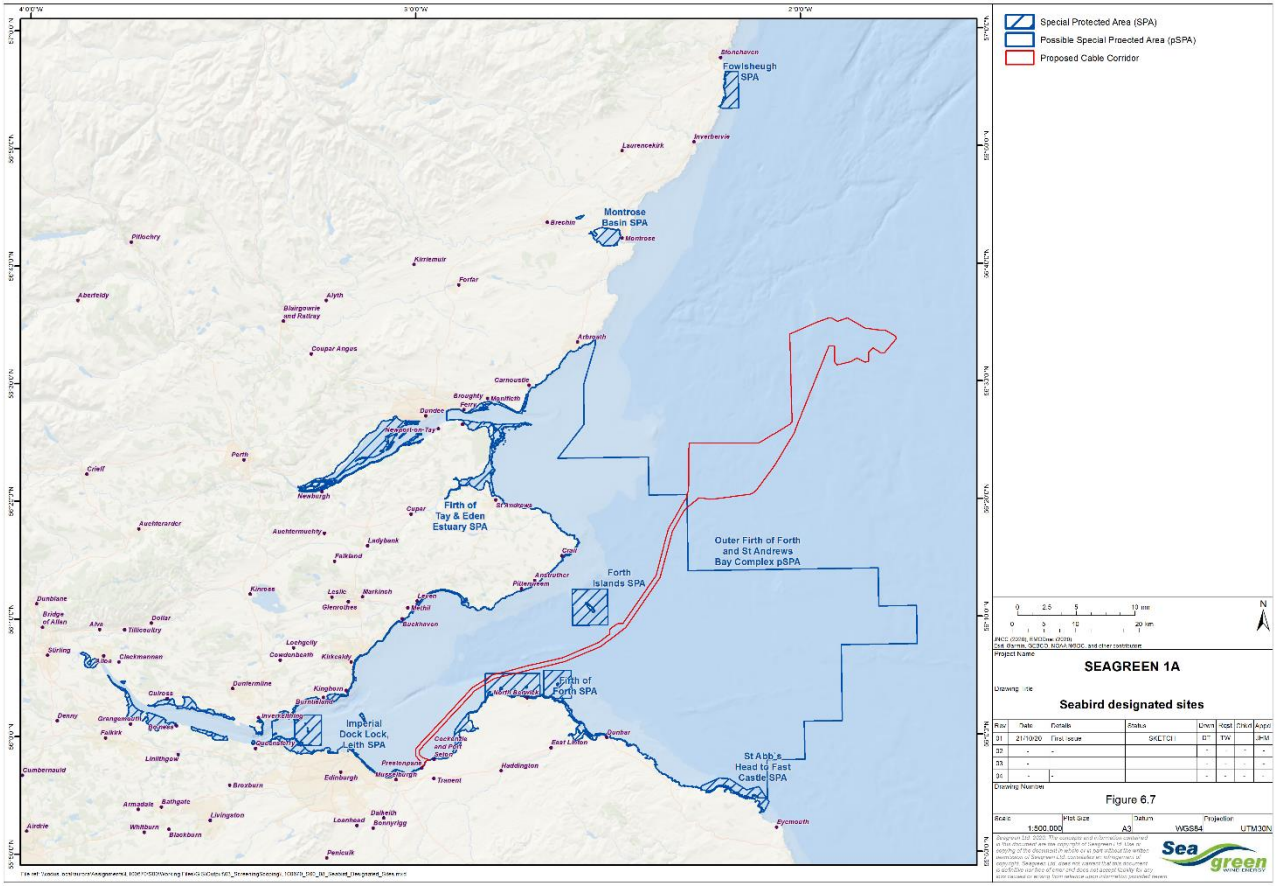

Figure 6.7 - Seabird Designated Sites

6.5.3.2 Inshore marine waters

The south-western most 16 km of the SG1A Project (i.e. the marine parts to the south west of North Berwick headland) pass thorough inshore marine waters. These differ from the offshore areas (though the change occurs gradually) in having greater shelter, shallower depths (<25m) and being closer to the coast (between 1 and 4 km). These inshore waters provide foraging for breeding seabirds in particular shag, gull and tern species (Appendix B). They also provide important foraging and resting habitat for wintering red-throated diver, grebe and seaduck species (Appendix B).

The ornithological importance of the inshore waters part of the Study Area is recognised through three nature conservation designations:

- Firth of Forth SPA
- Forth Islands SPA
- Outer Firth of Forth and St Andrews Bay pSPA

All the inshore marine habitat in the Study Area lies within the Outer Firth of Forth and St Andrews Bay pSPA and thus qualifying species using the inshore parts of the Study Area will have direct connectivity with this pSPA.

6.5.4 Mitigation and Management Measures

The SG1A Project mitigation and management measures are presented in Section 4.7 and have been included when characterising the potential impacts to offshore ornithology. Additionally, the SG1A Project's Vessel Management Plan (VMP) will provide additional mitigation measures to prevent or reduce any potential impacts to ornithology. The VMP measures will also apply to times when vessels operate outside the Study Area, for example when transiting to and from ports. The proposed VMP measures are based on the findings and recommendations of Schwemmer et al. 2010, and include the following:

- The number of vessel movements will be minimised through careful planning.
- Vessels will, where possible, use indicative routes which will aim to avoid sensitive locations when transiting between the SG1A Project and ports.
- Compliance with best practise on use of vessel work lights, for example controlling spillage of light away from the target area requiring to be lit.
- Compliance with MARPOL regulations and best-practise protocols to prevent and manage incidents of accidental release of marine contaminant.

6.5.5 Characteristics of Potential Impacts

This section characterises the potential impacts which have been identified for offshore ornithology receptors and provides recommendations on whether further consideration is required in the Environmental Appraisal to be submitted with the SG1A Project application for Marine Licence.

6.5.5.1 Disturbance/Displacement from vessel activity, Disturbance from construction noise and seabed habitat loss change effects on prey species

Vulnerability to vessel disturbance and loss of foraging habitat is examined in reviews by Garthe and Hüppop (2004) and by Furness *et al*., (2012 and 2013) and the studies by Jarret *et al*. (2018) and Goodship and Furness (2019) and are presented in Table 6.9. As there will only be two construction vessels required for the SG1A Project, there will be low vessel activity (Table 4.1) of short term duration and small extent associated for all development phases, compared with the high numbers of existing vessels which presently operate across the study area (including fishing vessels and cargo ships, Section 6.8). The installation programme currently planned for the SG1A Project will occur in Q2/Q3 of 2023, which would avoid the over-wintering season for many birds in the study area such as the red throated diver and scoter which are understood to be potentially more susceptible to disturbance than other bird species. The seabed disturbance potentially associated with the SG1A Project (and knock-on effects to prey species) are expected to be highly localised, small scale and temporary (Sections 6.3 and 6.4). In addition, any noise associated with the construction activities is expected to be localised and at low levels when compared to existing noise from existing vessel activity in the study area. Taking this into account and considering the findings of the Inch Cape and Seagreen EIAs (Inch Cape, 2011, 2018; Seagreen 2012, 2018), the potential impacts of direct disturbance, disturbance due to construction noise and seabed habitat loss effects on prey **will not be included** within the Environmental Appraisal.

6.5.5.2 Effects of lighting on nocturnal species

The vulnerability of species to the effects of bright lights is informed by the studies by Merkel (2010) and Syposz *et al*. (2015) and information on the tendency for a species to be nocturnally active (Furness *et al*., 2012), and information is provided for various species in Table 6.9. It is concluded that bird species in the study area are not typically vulnerable to vessel lighting. The exception is Manx shearwater. As there will only be two construction vessels required for the SG1A Project, there will be low levels of light produced from the SG1A Project (Table 4.1) compared with the typical levels of light emitted from vessels which are present in the study area. Taking the above into account, along with the temporary short-term nature of any night time construction works, the potential impact of effects of lighting on nocturnal species **will not be included** in the Environmental Appraisal.

6.5.5.3 Accidental release of contaminants

The likelihood of significant levels of surface pollutions being released by the SG1A Project construction activities or vessels is very low, especially in consideration of the mitigation measures relevant to control of pollutants (Section 4.7). In light of this low probability of occurrence, and with consideration of mitigation measures, the potential impact of the accidental release of contaminants to marine birds **will not be included** in the Environmental Appraisal.

Table 6.9 – Characterisations of species specific impact pathways for marine ornithology receptors

Potential impact	Duration	Extent of area affected	Receptors Species	Receptor seasonal sensitivity	Receptor spatial sensitivity	Potential consequence	Details
Construction phase							
Visual disturbance and displacement from vessel activity/presence	Short term and temporary	All of SG1A Project, localised at any one time	- divers, grebes and seaducks	Sept – March	Inshore marine waters (<25m depth)	Localised reduced foraging time and temporary displacement to alternative feeding areas	- Birds in the Study Area experience relatively high levels of baseline potential disturbance from commercial and recreational vessel activity. - All species have extensive to very extensive areas of alternative foraging habitat available locally. - Project's Vessel Management Plan includes measures to prevent or reduce disturbance to birds including avoiding sensitive areas, speed limits and using approved low sensitivity transit routes to ports. -Impacts are unlikely to be significant
			- auk species, shag	All year, esp. June – Sept	All Study Area		
			- all other species	All year	All Study Area		
Noise disturbance	Short term and temporary	All of SG1A Project, localised at any one time	- all species	All year	All Study Area	Localised reduced foraging time and temporary displacement to alternative feeding areas	- All species have low sensitivity to noise disturbance - The justification provided for visual disturbance above are applicable to noise disturbance - Impacts are unlikely to be significant

Potential impact	Duration	Extent of area affected	Receptors Species	Receptor seasonal sensitivity	Receptor spatial sensitivity	Potential consequence	Details
Effects of work-lights on nocturnal species (navigation lights excepted)	Short term and temporary	All of SG1A Project	- Manx shearwater (fledglings only)	Mid/late September only	Localised within 10 km of Isle of May	Potential disruptions of fledglings from Isle of May (if this species is breeding there) caused by bright lights	- The low levels of light introduced by a maximum of 2 installation vessels compared with the light levels from existing high numbers of night time vessel traffic. - SG1A Vessel Management Plan includes best-practise recommendations on use of bright work lights. - Impacts are unlikely to be significant
			- all other species (most species are sometimes active at night)	All year	All Study Area	Rare incidences of potentially lethal collisions with vessels in low visibility weather conditions	
Seabed habitat loss/change leading to effects on prey availability	Medium term	All of SG1A Project	- seaduck species (mainly feed on benthic molluscs and crustaceans)	Sept – March	Inshore marine waters (<25m depth)	Temporary localised effects to benthic prey, which may alter potential foraging rate. Localised area in the context of area habitat available	- Benthic feeding seaduck species may undergo short-term and highly localised reduction in foraging habitat - All species have extensive areas of alternative foraging habitat available locally and regionally. - Project mitigation measures are designed to minimise the area of seabed disturbed. - Benthic communities in disturbed areas of seabed expected to quickly recover. - Impacts are unlikely to be significant
			- all other species (mainly feed on fish prey)	All year	All Study Area		
Accidental release of contaminants	Short term and temporary	SG1A Project, localised at any one time	- divers, grebes, shag, auks and seaducks	All year	All Study Area, but especially inshore waters	Potential for temporary and localised negative effects to small numbers of individuals	- Project mitigation in the form of full compliance with MARPOL regulations and best practise mean that pollution incidents are

Potential impact	Duration	Extent of area affected	Receptors Species	Receptor seasonal sensitivity	Receptor spatial sensitivity	Potential consequence	Details
			- all other species				unlikely to occur, and if they do would be small in scale, highly localised and quickly contained and dealt with. - Impacts are unlikely to be significant
Operation phase							
Visual disturbance and displacement from vessel activity/presence	Short term and occasional (much less frequent than during construction)	All of SG1A Project, localised at any one time	- divers, grebes and seaducks	Sept – March	Inshore marine waters (<25m depth)	Localised reduced foraging time and temporary displacement to alternative feeding areas	- Vessel activity in the operational stage will be substantially less than during construction, highly localised and short-term. - Impacts are unlikely to be significant
			- auk species, shag	All year, esp. June – Sept	All Study Area		
			- all other species	All year	All Study Area		
Accidental release of contaminants	Short term and occasional	All of SG1A Project, localised at any one time	- all species	All year	All Study Area	Potential for temporary and localised negative effects to small numbers of individuals	- Same as for construction stage, see above - Impacts are unlikely to be significant
Decommissioning phase							
Visual disturbance and displacement from vessel activity/presence	Short term and occasional	All of SG1A Project, localised at any one time	- divers, grebes and seaducks	Sept – March	Inshore marine waters (<25m depth)	Localised reduced foraging time and temporary displacement to alternative feeding areas	- Same as for construction stage, see above - Impacts are unlikely to be significant
			- auk species, shag	All year, but especially June – Sept	All Study Area		

Potential impact	Duration	Extent of area affected	Receptors Species	Receptor seasonal sensitivity	Receptor spatial sensitivity	Potential consequence	Details
			- all other species	All year	All Study Area		
Effects of work-lights on nocturnal species (navigation lights excepted)	Short term and occasional	All of SG1A Project	- Manx shearwater (fledglings only)	Mid/late September only	Especially parts within 10 km of Isle of May	Potential for fatal grounding or collision of fledglings from IoM (if this species is breeding there) caused by bright lights	- Same as for construction stage, see above
			Low vulnerability - all other species (most species are sometimes active at night)	All year	All Study Area	Potential for lethal and sub-lethal harm to small numbers of individuals	- Same as for construction stage, see above

Based on the information presented in Table 6.9, a summary of the potential impacts on ornithology are presented in Table 6.10.

Table 6.10 Summary of the characteristics of potential impacts to marine ornithology receptors associated with SG1A

Potential impact	Receptor species	Relevant phase of Project			To Include in Environmental Appraisal
		Cable installation	Cable operation (maintenance and repair)	Decommissioning	
Vessel disturbance	Divers, grebe, seaduck species	✓	X	✓	No
	Other marine bird species	X	X	X	No
Noise	All marine bird species	✓	✓	✓	No
Lighting (navigation lights excepted)	Manx shearwater	✓	X	✓	No
	Other marine bird species	X	X	X	No
Seabed habitat loss/change	Divers, grebe, seaduck species	✓	X	X	No
	All marine bird species	X	X	X	No
Accidental release of contaminants	All marine bird species	X	X	X	No

6.5.5.4 Cumulative Impacts

Vessel activity associated with these offshore wind energy projects, both within the vicinity of their respective offshore development sites and between these sites and ports, may act cumulatively to the potential disturbance impact on marine birds. In addition, there is known to be considerable vessel activity in the Firth of Forth from other commercial, military and recreational activities.

The potential for vessels to cause significant disturbance of birds is greatest in the inshore areas of the Firth of Forth frequented by wintering red-throated divers and seaduck and grebe species, and in the close vicinity (approximately within 2 km) of the island seabird colonies. All the consented windfarm projects have gone through a rigorous EIA process and have project-specific VMPs that include measures designed to prevent and reduce bird disturbance, such as avoiding ornithologically sensitive areas. The part of the SG1A Project that passes through inshore water and is therefore likely to be used by wintering seaduck, shares the same footprint as the Inch Cape cable route, therefore reducing the overall levels of disturbance to marine bird species. As both the SG1A Project and the consented Inch Cape will have approved VMPs prior to construction commencing, the cumulative disturbance from these two projects is not expected to

increase the potential effects of disturbance, construction noise or lighting impacts on nocturnal species and therefore **will not be included** in the Environmental Appraisal.

SG1A will contribute to the cumulative loss/change effect of seabed habitat. However, this is only anticipated to have potential for adverse effects on birds where the habitat loss/change affects areas of inshore water used by benthic-feeding seaduck species. The potential magnitude of this cumulative effect will be reduced because of the overlap and close proximity of the SG1A Project and the consented Inch Cape export cable corridor. Benthic habitats disturbed by cable laying operations are anticipated to rapidly recover their value as a foraging habitat for seaduck species, thus it is considered unlikely that there will be a cumulative seabed habitat loss/change impact in inshore waters and this **will not be included** in the Environmental Appraisal.

All projects identified as relevant to cumulative impacts are required to comply with MARPOL regulations. The offshore wind industry has an excellent track record for successfully avoiding accidental release of contaminants into the marine environment. For these reasons the cumulative impact on bird receptors from the accidental release of contaminants are unlikely to occur and **will not be included** in the Environmental Appraisal.

6.5.6 Conclusion and Proposed Methodology for the Environmental Appraisal

Taking account of selection criteria in Schedule 3 of the 2017 EIA Regulations the characterisation of potential impacts with respect to marine ornithology receptors is such that the proposed SG1A Project would not result in any significant adverse impacts to the environment. This finding supports a screening decision that the SG1A Project does not require an Environmental Impact Assessment.

It is concluded that the SG1A Project lies within an area of high value for a wide variety of breeding and non-breeding marine bird species, many of which are qualifying interests of sites designated for bird conservation. However, based on the extensive information available for the region and the justifications provided in Section 6.5.5, no potential impacts for marine bird receptors **will be considered** within the Environmental Appraisal.

6.6 Marine Mammals and Other Megafauna

This section provides a description of the marine mammals and other megafauna baseline and characterises any potential impacts which may affect these receptors during construction, operation and maintenance and decommissioning phases of the SG1A project.

6.6.1 Key Data Sources

The key data sources used to inform the marine mammal and other megafauna section include:

- Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys, (Hammond *et al.,* 2017);
- Atlas of cetacean distribution in north-west European waters, (Reid *et al.,* 2003);

- Estimated at-sea Distribution of Grey and Harbour Seals - updated maps 2017, (SMRU and Marine Scotland, 2017);
- Scientific Advice on Matters Related to the Management of Seal Populations: 2019; Report to the National Environment Research Council, (SCOS, 2019); and
- Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters (Hague *et al.,* 2020).

6.6.2 Study Area

The study area applied to this topic covers the proposed extent of the SG1A Project area and a wider region covering the outer area of the Firth of Forth, approximately between Arbroath in the north and Dunbar in the south (Figure 1.1).

6.6.2.1 Key Legislation and Guidance for Marine Mammals

Marine mammals are afforded varying levels of protection under international and national legislation depending upon their genus. Within UK waters, cetaceans (whales, dolphins and porpoises) protected through the listing of European Protected Species (EPS) under Annex IV of the Habitats Directive and are provided full protection within Scottish territorial waters through the Conservation (Natural Habitats, &C.) Regulations 1994 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in UK Offshore Waters . The deliberate or reckless injury or disturbance of these species is therefore prohibited.

Bottlenose dolphin *(Tursiops truncatus)*, harbour porpoise *(Phocoena phocoena)*, grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*) gain additional protections through Annex II of the Habitats Directive, which includes provisions for their consideration in designating SACs. While pinnipeds are not EPS, they also protected through provisions set out in Annex V of the Habitats Directive, which defines them as species of community interest, meaning that any taking of these species in the wild is subject to management measures. Additionally, seals are further protected at designated seal haul-outs, which are coastal habitat locations that seals use to breed, pup, moult and rest designated through the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014 (as amended). All haul-outs in Scotland are protected under Section 117 of the Marine (Scotland) Act 2010.

Additionally, all marine mammal species which regularly occur within Scottish waters are designated as PMFs (Tyler-Walters *et al.,* 2016). PMF are habitats and species that are considered to be marine nature conservation priorities in Scottish waters (NatureScot, 2020c). The following list of cetaceans are also protected under Schedule 5 of the Wildlife and Countryside Act (1981): all dolphin species, all whale species and harbour porpoise.

Basking sharks are afforded protection in numerous ways, in the UK they are protected under Schedule 5 of the Wildlife and Countryside Act (1981) and the Nature Conservation (Scotland) Act 2004, they are also listed as a PMF in Scottish waters. Globally they appear on the IUCN Red List meaning they are considered to have a high risk of extinction in the wild, they also appear on the Convention on International Trade in

Endangered Species (CITES) list, Appendices I and II on the Convention of Migratory Species (CMS) and Annex I (highly migratory species) of the United Nations Convention on the Law of the Sea (UNCLOS).

6.6.3 Baseline Description

6.6.3.1 Cetaceans

Seven cetacean species are known to frequently or seasonally visit the waters off the east coast of Scotland and the Firth of Forth including Atlantic white-sided dolphins (*Lagenorhynchus obliquidens*), killer whale (*Orcinus orca*), Risso's dolphin (*Grampus griseus*), fin whale *(Balaenoptera physalus)*, long-finned pilot whale (*Globicephala melas*), humpback whale (*Megaptera novaeangliae*) and short-beaked common dolphin (*Delphinus delphis*), but the occurrences of such sightings and densities of each species are very low (exhibiting densities of <0.01 individual/km^2) (Reid *et al.,* 2003; Robinson *et al.,* 2007; Robinson *et al.,* 2017; Hague *et al.,* 2020; NMPi, 2020).However, the following cetacean species have been recorded in the region covered by the SG1A Project: harbour porpoise; bottlenose dolphin; minke whale (*Balaenoptera acutorostrata*) and white-beaked dolphin (*Lagenorhynchus albirostris*).

Density estimates from the most recent Small Cetaceans in the European Atlantic and North Sea (SCANS-III) surveys indicated harbour porpoise as the most abundant species within the vicinity of the SG1A Project (Hammond *et al.,* 2017). This estimate is very high compared with density estimates of other cetacean species taken from these surveys, namely: bottlenose dolphin, white-beaked dolphin, white-sided dolphin and minke whale (Hammond *et al.,* 2017; Table 6.11).

Table 6.11 Cetacean densities in the vicinity of the SG1A Project (Hammond et al., 2017)

Cetacean name	Density estimates (animals/km^2)
Harbour porpoise	0.5-0.6
Bottlenose dolphin	0.025-0.050
White-beaked dolphin	0.20-0.25
White-sided dolphin	0.010
Minke whale	0.035 – 0.040

The density of white beaked dolphin and minke whale in the vicinity of the SG1A Project is considered high compared to other region of North Sea. While harbour porpoise, bottlenose dolphin and white-sided dolphin densities in the vicinity of the SG1A Project are considered moderate (Hammond *et al.,* 2017).

There are no protected sites immediately adjacent to the SG1A Project designated for cetaceans (Figure 6.8). The closest is the Southern Trench pNCMPA located 91.7 km from the SG1A Project which is designated for the protection of minke whales (NatureScot, 2019). Additionally, the Moray Firth SAC is located 147.7 km from the SG1A Project and is designated for supporting the only known resident

population of bottlenose dolphins in the North Sea (JNCC, 2020b). It is recognised that bottlenose dolphins from the Moray Firth are known to transit to the Firth of Forth.

Based on available survey data, the waters in the vicinity of the SG1A Project supports a high-low density of cetaceans (depending on the species), however the area is not considered to be of elevated importance to feeding, breeding, nursing or migrating cetaceans (Hammond *et al*., 2017; Reid *et al.,* 2003). In addition, the highly mobile nature of cetaceans and the temporary, spatially constrained conditions of the project dramatically reduce the likelihood of interactions between project activities and cetacean receptors.

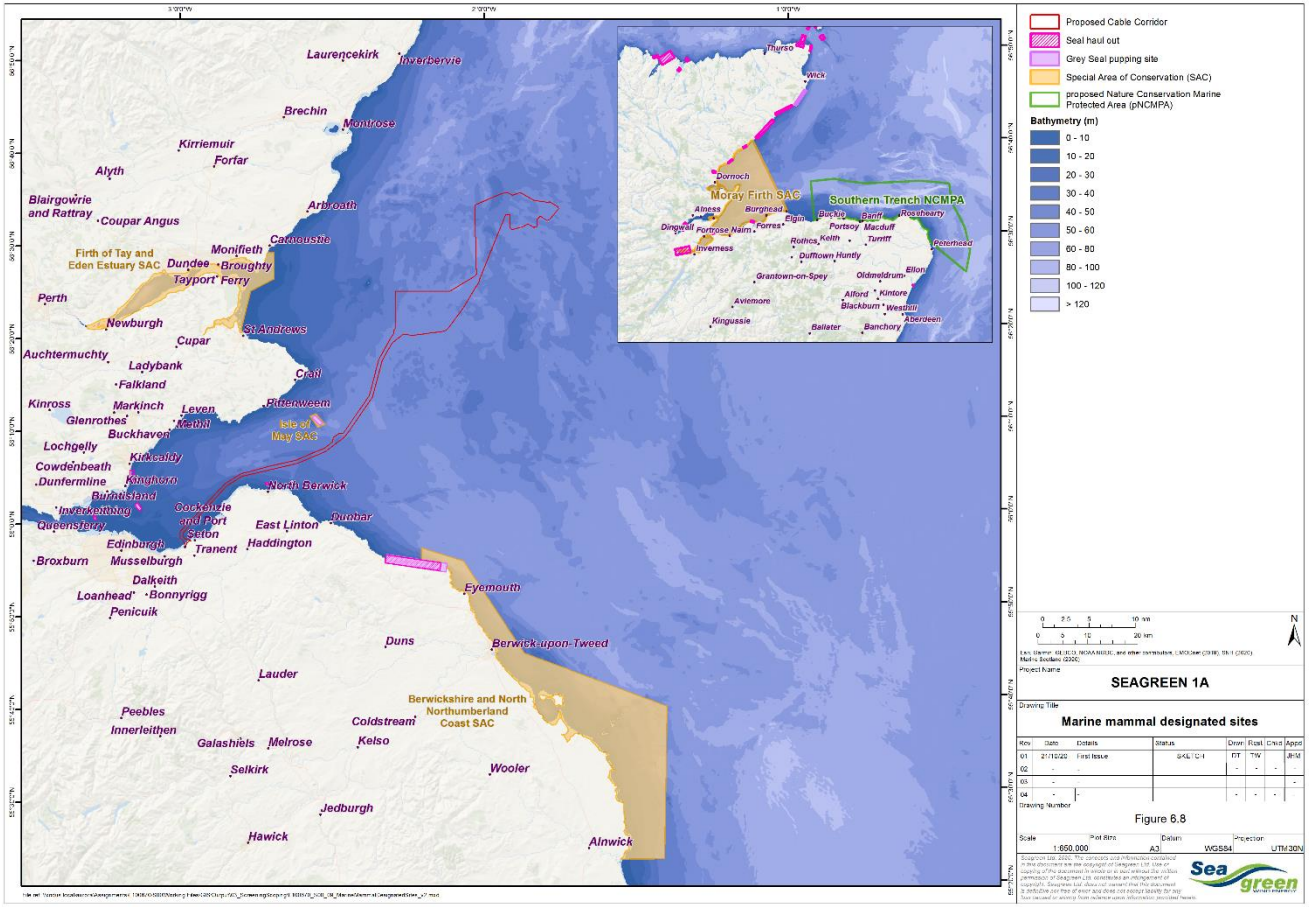

Figure 6.8 Marine mammal designated sites

6.6.3.2 Pinnipeds

Two species of pinniped regularly occur in the North Sea: grey and harbour seals. Scotland supports the greatest numbers of seals within the UK, providing habitat to approximately 80% of the grey seals and 81% of the harbour seals therein (SCOS, 2019).

Grey and harbour seals forage in coastal and offshore waters, depending on the seasonal distribution of their prey. However, both species tend to be concentrated close to shore, particularly during the pupping seasons which occurs from May to July for harbour seals and September to December for grey seals (Marine Scotland, 2014). Grey seals have larger foraging ranges than harbour seals, often travelling hundreds of kilometres, whereas harbour seals will generally forage within 50 km of their selected haul out sites (Cronin *et al.,* 2012; Thompson *et al*., 1996). Within 50 km of the SG1A Project, there are two SACs designated for the protection of grey seals (i.e. Isle of May SAC and Berwickshire and North Northumberland Coast SAC) and one for the protection of harbour seals (i.e. Firth of Tay and Eden Estuary SAC).

Tagging studies indicate that at-sea habitat use by harbour seals is estimated as an mean average of between 0-1 animals/25 km^2 across the majority of the SG1A Project, with the greatest densities of individuals likely to occur near the southwest landfalls where estimates increase to 5-10 animals/25 km^2 (Figure 6.9) (SMRU and Marine Scotland, 2017). At-sea density estimates for grey seals were higher further from shore than for harbour seals, with an estimated mean average of between 10-50 animals/25 km^2 across southwestern section of the SG1A Project. The majority of the SG1A Project falls within an area of lower grey seals usage of between 1-5 animals/25 km^2 (SMRU and Marine Scotland, 2017). Grey seal habitat use illustrated an opposite pattern to that of harbour seals, with the greatest density of individuals likely to occur near the southern landfalls (Figure 6.9). At-sea usage by grey seals is considered moderate to high across the SG1A Project area compared to other regions of the North Sea (SMRU and Marine Scotland, 2017).

Seals at designated haul-outs garner strict protection under Marine (Scotland) Act 2010, and it is an offence to cause disturbance to any hauled-out seals. One designated haul-out is located in the vicinity of the landfall of the SG1A Project, the Craigleith haul-out located 2 km to the south of the SG1A Project. Additionally, there are four other seal haulouts within 30 km of the SG1A Project, including Inchkeith, Kinghorn Rocks and Inchmickery and Cow & Calves located to the southwest, and Fast Castle located to the southeast. Figure 6.9 displays the location of this seal haul out and others referentially to the proposed SG1A project area.

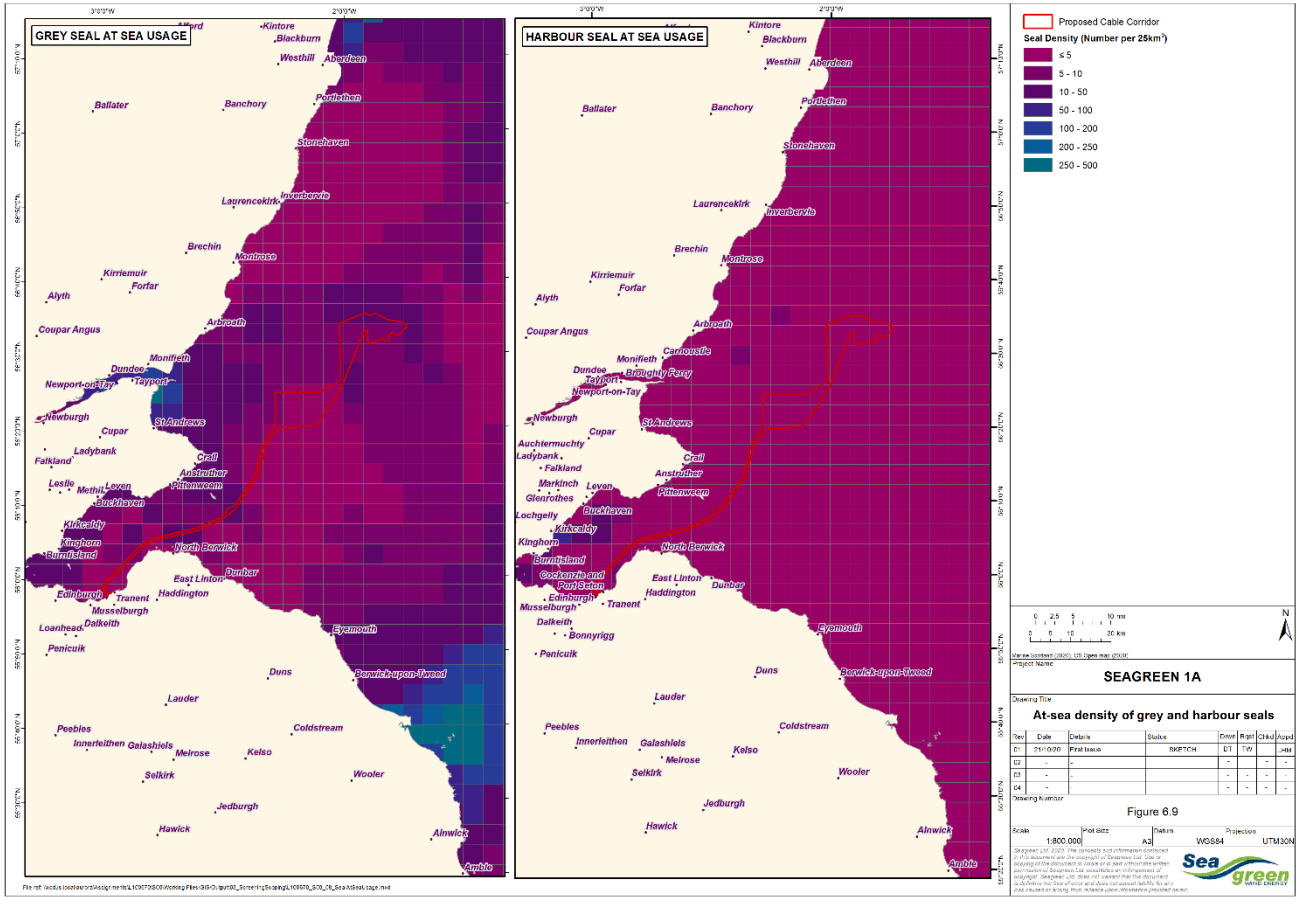

Figure 6.9 - At-sea density of grey and harbour seals

Due to the closest seal haul-out being located 2 km from the SG1A Project, the development is unlikely to result in disturbance of seals within a designated haul-out. Therefore, disturbance to seals onshore will not be included within the Environmental Appraisal.

6.6.3.3 Other Megafauna

Basking sharks have been sighted along the SG1A Project, however, there are no hotspots for basking shark sightings within the Firth of Forth (NatureScot, N.D). Basking sharks are only very rarely present within the Firth of Forth marine region (Paxton *et al.,* 2014). Considering information on their known distribution, it is considered extremely unlikely that interactions with basking sharks will occur, hence the potential for the proposed survey activities to result in intentional or reckless disturbance or harassment of this species is equally limited. Therefore, a derogation licence under the Wildlife and Countryside Act (1981) will not be required for basking sharks and this species is not considered further in this report.

6.6.4 Mitigation and Management Measures

SG1A Project mitigation and management measures are presented in Section 4.7 and have been included when characterising the potential impacts to marine mammals. There is no additional mitigation required specific to marine mammals and other megafauna.

6.6.5 Characteristics of Potential Impacts

This section characterises the potential impacts which have been identified for marine mammal receptors and provides recommendations on whether further consideration is required in the Environmental Appraisal to be submitted with the SG1A Project application for Marine Licence.

6.6.5.1 Underwater Noise

The most likely potential impact to cetaceans and seals from SG1A project activities is disturbance resulting from underwater noise generated by pre and post-installation surveys and cable installation vessels, including those involved in trenching and cable laying activities.

The underwater noise emissions from cable laying, trenching, jetting or burial activities will be negligible when compared to the noise levels resulting from survey activities and vessel noise (Inch Cape, 2018; Seagreen, 2018). Therefore, the potential for significant impacts on marine mammals from these noise sources is considered to be negligible, hence these activities **will not be included** within the Environmental Appraisal.

As detailed in Section 4.2.1, pre-construction geophysical surveys will take place at predefined locations within the SG1A Project using low to high frequency survey devices such as multibeam echosounders (MBES), side scan sonar (SSS) sub-bottom profilers (SBP). Additionally, subsea survey and cable installation equipment, such as ROVs, trenchers, and ploughs, may employ ultra-short baseline (USBL) technology to monitor their positions. These technologies all have the capacity to generate sounds which are audible to marine mammals, particularly high-frequency hearing specialists, such as harbour porpoise, therefore posing a potential risk of disturbance and injury.

However, survey activities will be limited to within the SG1A ECR, and are expected to be of short duration, meaning that potential impacts on marine mammals will be spatially and temporally limited, and are not anticipated to result in local or population level effects. In addition, any potential effects of pre-construction surveys to marine mammals and megafauna will be fully considered and assessed as part of the European Protected Species Licence (disturbance) application required for the surveys. In light of the above, the short-term and temporary duration of any construction activities, the highly localised extent of activity at any one time, and considering that the assessment of this impact was not significant in relation to the consented Inch Cape Project (Inch Cape, 2011; 2018) potential impacts of noise from geophysical surveys **will not be included** within the Environmental Appraisal.

It is recognised that vessel noise during installation may also be a source of disturbance to marine mammals. However, the number of vessels anticipated to undertake cable installation and associated survey works will be limited, in the context of existing vessel activity in the area (see Section 6.8). At present it is expected that up to two primary installation vessels will be operating during the installation phase at any one time (one dynamic positioning (DP2) cable lay vessel, approximately 150 m in length and one DP2 cable protection vessel approximately 100 m length), which will be assisted by a number of smaller support and guard vessels. The associated survey works are expected to utilise an offshore DP2 survey vessel of up to 100 m in length, accompanied by a smaller inshore survey vessel. The additional installation, support, and survey vessels in the project area is not considered to be a substantive change from baseline vessel activity in the Firth of Forth, considering the moderate to high density of shipping present in the area, as detailed in Section 6.8. As such, the project's vessel noise emissions will not be significantly above ambient vessel noise levels, and hence are not expected to result in significant adverse impacts to marine mammal receptors, and will not be considered further (Marine Scotland, 2019; Merchant *et al.,* 2016). Therefore, this impact **will not be included** within the Environmental Appraisal.

During the project's operational and decommissioning phases, the only activities that may result in underwater noise emissions with the potential to adversely affect marine mammals are routine inspection and maintenance utilising geophysical survey devices and USBL. Noise emissions will be broadly similar to those resulting from the installation phase, but the activities will be shorter in duration and more localised. As such the potential impacts on marine mammals resulting from the operation and decommissioning of the cable will be analogous to those resulting from installation, and **will not be included** within the Environmental Appraisal.

6.6.5.2 Collision Risk

Vessel presence during cable installation and associated survey activities poses a potential collision risk to marine mammals occupying the SG1A Project. Collision risk associated with vessel strikes are greatest for large vessels (i.e. greater than 80 m) travelling at speeds in excess of 14 knots (Laist *et al.,* 1997). Erratic vessel movement, such as short, sharp turning, is also thought to contribute to collision risk with marine megafauna (Laist *et al.,* 1997). Project vessels engaged in cable installation and survey activities will be moving at low speeds and where possible using indicative transit routes within the SG1A Project which will be detailed in the VMP. In addition, as detailed in Section 4.7, all vessels will adhere to the Scottish Marine

Wildlife Watching Code (NatureScot, 2017). As such, the risk of collision is minimal. Furthermore, as detailed above, the temporary, localised presence of two construction vessels and installation activities along with any maintenance works for the SG1A project will not result in a substantive change to baseline vessel activity in area, and as such no significant risks to marine mammals resulting from vessel collisions are expected, and no further consideration is necessary. Therefore, this impact **will not be included** within the Environmental Appraisal.

6.6.5.3 Electromagnetic Fields (EMF)

EMF emissions are generated from the transmission of electricity through subsea cables as discussed in Section 6.4.5.4.

Historical data has indicated some level of EMF sensitivity in cetaceans (Klinowska, 1985; Klinowska, 1988). However, experimental evidence of EMF detection in cetaceans has only recently been confirmed (Kremers *et al*., 2014). Dolphins have been shown to be able to detect and discriminate between magnetised objects, and it is likely that they are able to detect variations in magnetic fields (Kremers *et al*., 2014). These observations present the possibility that dolphins, and perhaps other cetaceans, may be able to detect the EMFs emitted from the subsea cable whilst in operation. The repercussions of this detection may range from negligible (i.e. acknowledgement of its presence) to potentially more dramatic, such as interference with navigation or broad scale movement which may result in stranding incidences (NIRAS, 2-15).

However, EMFs attenuate rapidly with distance from the cable, and considering the embedded mitigation that the cables will be trenched to a depth of 1 m or greater, or covered to an equivalent level through the use of external protection (e.g. rock placement), the range of EMF impacts is expected to be minimal (Section 4.7). Studies conducted for OWF HVAC export cables have shown that EMF densities at the seabed are expected to be less than the earth's magnetic field (assumed to be 50 µT in the Firth of Forth), assuming a 1m depth of cover (MORL, 2012, Neart na Goaithe, 2013). Given the extremely localised nature of the EMF expected to result from the operation of the SG1A Project, which will be limited to the immediate vicinity of the seabed in the SG1A Project area, and in consideration of the comparatively higher levels of EMF expected from the consented Inch Cape project (containing six offshore export cables compared to one export cable for the SG1A Project), EMF impacts on marine mammals are anticipated to be negligible, and **will not be included** within the Environmental Appraisal.

6.6.5.4 Water Quality

Seabed sediment disturbance from cable installation activities has the potential to generate localised, short term increases in sediment suspension, known as turbidity (Section 6.2.4). Increases in turbidity beyond ambient levels may reduce light penetration within the water column, thereby reducing visibility in species occupying those waters. Seals are most likely to be affected by such changes in visibility, as they are dependent upon visual cues to track prey (Scottish Executive, 2007). Grey and harbour seals have been identified as having a high sensitivity to reductions in light penetration, while cetaceans have a moderate sensitivity to this impact (Dunstone and Gorman, 1998). Nonetheless, seals can be found inhabiting areas

of near-persistent turbidity (e.g. the southern North Sea and The Wash, and the Thames Estuary on the south-east coast of England), so it appears unlikely that increased turbidity would place significant constraints on the foraging success of these species. In addition to using their eyesight to find prey and navigate, seals are also able to forage in turbid and unlit waters using tactile cues from their highly sensitive vibrissae (whiskers) (Mills and Renouf, 1986). There is evidence that harbour seals use their whiskers to sense very low frequency vibrations and minute movements in water, such as those generated by small fish (Dehnhardt *et al.,* 1998). Cetaceans supplement deficits in their ocular abilities with auditory information, including sophisticated call signatures and, for the toothed species such as dolphins and porpoises, the employment of echolocation when foraging. As increases in turbidity from cable-laying are expected to be short-term and highly localised (see Section 6.2.5), and the installation programme in Q2/Q3 is expected to avoid the pupping season of the nearby grey seal population on the Isle of May, the resulting impacts on marine mammals are expected to be negligible and **will not be included** within the Environmental Appraisal.

6.6.5.5 Accidental Pollution Events

All marine mammal species are considered to possess some level of sensitivity to accidental pollution events. However, the potential for an unplanned fuel release to result in an accidental pollution event from the proposed SG1A Project activities is very low (as described in Section 6.2.5). In the event of an accidental fuel release, appropriate standard management practice procedures will be implemented. Standard pollution prevention measures are laid out in the Schedule of Mitigation and/ or the CEMP and for all vessels over 400 GT (gross tonnage) a SOPEP will be in place, further reducing the magnitude of potential environmental impacts, in the unlikely event of an accidental pollution event (Section 4.7). As such, accidental pollution events resulting from the project are not considered to have the potential to result in significant adverse impacts to marine mammals, and **will not be included** within the Environmental Appraisal

A summary of the potential impacts associated with marine mammals and other megafauna have been summarised in Table 6.12.

Table 6.12 Summary of the characteristics of potential impacts to marine mammals and other megafauna receptors associated with SG1A

Potential impact	Relevant phase of Project			To include to Environment Appraisal
	Cable installation	Cable operation (maintenance and repair)	Decommissioning	
Temporary disturbance / displacement due to noise emissions	✓	✓	✓	No
Collision risk	✓	✓	✓	No
Increased sedimentation affecting ability to forage	✓	X	✓	No
Magnetic fields interfering with navigation	X	✓	X	No
Accidental pollution	✓	✓	✓	No
Disturbance at landfall	✓	X	X	No

6.6.5.6 Cumulative Impacts

The nearby developments considered for the cumulative impact assessment have been outlined in Section 0. The SG1A project is not expected to have any potential significant impacts on marine mammal receptors. In addition, the other nearby developments are expected to be required to follow the same industry guidance on mitigation and management measures, therefore, cumulative impacts on marine mammals **will not be** included in the Environmental Appraisal.

6.6.6 Conclusion and Proposed Methodology for the Environmental Appraisal

Taking account of selection criteria in Schedule 3 of the 2017 EIA Regulations the characterisation of potential impacts with respect to marine mammals and megafauna is such that the proposed SG1A Project would not result in any significant adverse impacts to the environment. This finding supports a screening decision that the SG1A Project does not require an Environmental Impact Assessment.

No potential impacts associated with marine mammals and other megafauna will be included for further consideration in the Environmental Appraisal. Any potential changes and impacts would be less than or within the bounds of the determined effects associated with the consented Inch Cape export cable corridor. Furthermore, mitigation that would be employed during cable installation activities would further reduce the potential or scale of any impacts. These aspects mean that the characterisation of potential impacts with respect marine mammals and other megafauna is such that the proposed SG1A Project would not result in any adverse impact to the environment.

6.7 Commercial Fisheries

This section provides a description of the commercial fisheries baseline and characterises any potential impacts which may affect commercial fisheries receptors during construction, operation and maintenance and decommissioning phases of the SG1A Project.

Commercial fisheries is defined for the purpose of this report as activity by licensed fishing vessels undertaken for the legitimate capture and sale of finfish and shellfish in the marine environment. Recreational fishing, salmon netting, rod and line fishing, fishing activities in rivers, and aquaculture are not considered here. This section should be read in conjunction with Section 6.4 Natural Fish and Shellfish Resources and Section 6.8 Shipping and Navigation.

6.7.1 Key Data Sources

A variety of publicly available desk-based data sources have been used to inform the commercial fisheries baseline, which are described in Table 6.13. In addition, where applicable reference was made to the existing EIAs which have been produced in the Forth and Tay region (Inch Cape, 2011; 2018; Seagreen 2012; 2018; Neart Na Goithe, 2012) along with the Berwick Bank OWF Scoping Report (Berwick Bank, 2020).

Table 6.13 - Key Data Sources

Data & Source	Description
Fisheries statistics per ICES Rectangle (Marine Management Organisation (MMO), 2019)	Landings values and effort for UK registered fishing vessels of all lengths, averaged per year for 2014-2018
Average intensity (effort) of fishing for Nephrops and crustaceans with bottom trawls (ICES/Marine Scotland, 2020)	Average effort from Vessel Monitoring System (VMS) data for vessels of 15m in length and above between 2009 and 2017
Average intensity (effort) of fishing with bottom trawls (ICES/Marine Scotland, 2020)	Average effort from VMS data for vessels of 15m in length and above between 2009 and 2016
Average intensity (effort) of fishing for with dredges (ICES/Marine Scotland, 2020)	

6.7.2 Study Area

The SG1A Project is located in ICES Division IVb (Central North Sea). ICES rectangles provide a standardised spatial scale for data on commercial fishing activity, and so have been used to delineate the commercial fisheries study area of ICES rectangles 40E7, 41E7, 41E8, 42E7 and 42E8 (Figure 6.10). Where relevant, commercial fishing activity from outside of the defined study area have been referred to for context.

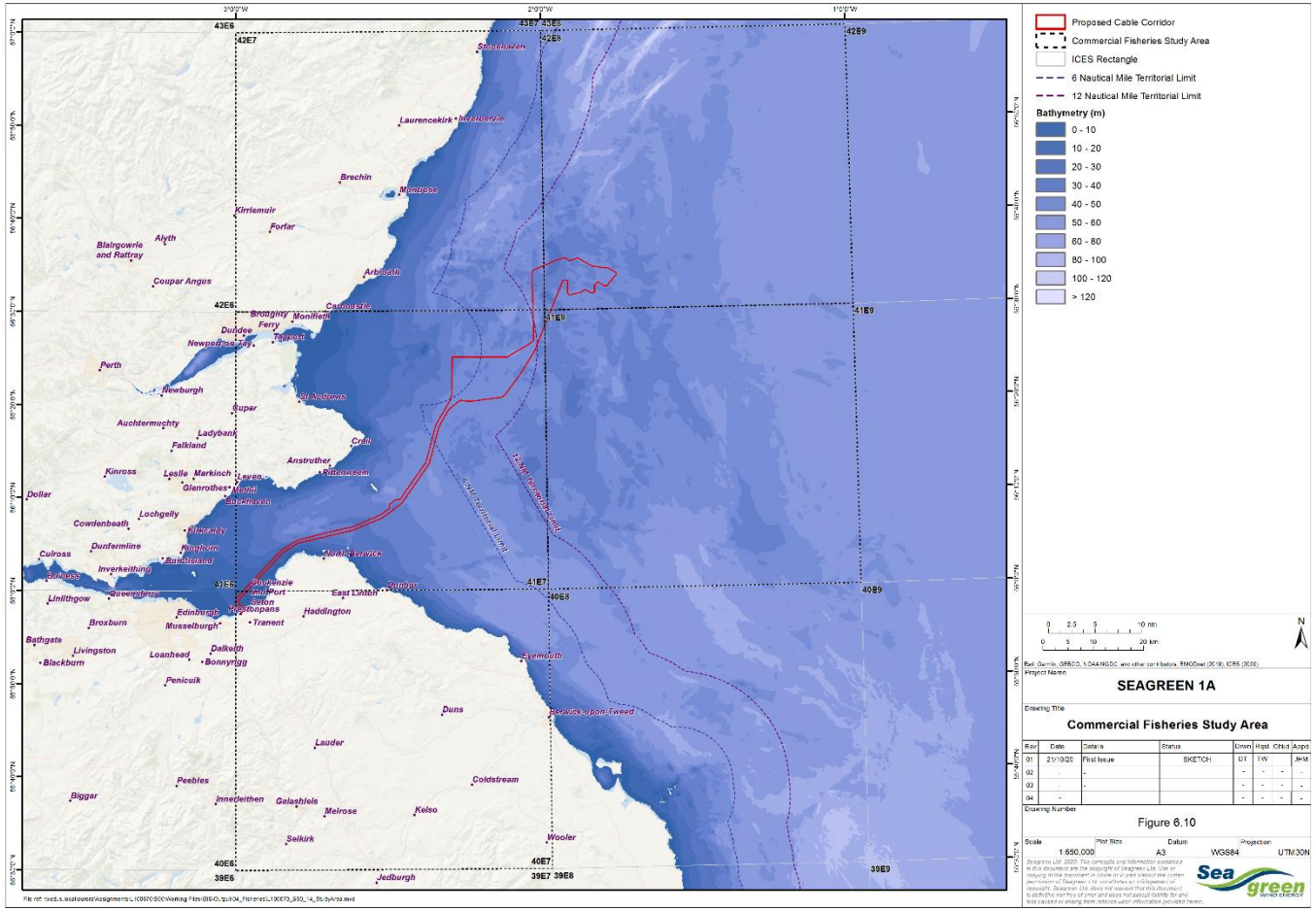

Figure 6.10 - Commercial Fisheries Study Area

6.7.3 Baseline Description

Landings values from 2014 to 2018 per ICES rectangle have been used to calculate the annual average by vessel length, fishing method and species, and are presented in Figure 6.11 to Figure 6.13. In the study area, overall average landings values are higher in ICES 41E7 compared with the surrounding ICES rectangles.

Average landings values by vessel length (< 10m and >10m in length) show that vessels of over 10m comprise the majority of landings values from ICES 41E7 (Figure 6.11). Proportionately more landings values from vessels of over 10m are recorded in the offshore ICES rectangles 40E8, 41E8, 42E8; (Figure 6.11), than those nearshore. As shown in Figure 6.12, the fishing method which comprises the majority of average landings values from ICES rectangle 41E7 is demersal trawls (average £5,093,438), followed by pots/traps and dredging at comparatively low values. The average value of demersal trawls from ICES 41E7 accounts for almost all of the average landings value of *Nephrops* from ICES 41E7 (average £5,112,492). Further analysis of the landings values by fishing method and vessel length illustrate that the majority (80.9%) of the landings values by demersal trawl from ICES 41E7 are from vessels of over 10m in length (MMO, 2020). Figure 6.12 indicates that average landings values are similar between ICES rectangles of vessels operating pots/traps from ICES 41E7, 40E8 and 42E7, with pots/traps comprising the majority of landings values recorded from 42E7 where the north western boundary line of the SG1A Project is located. As shown in Figure 6.12, in ICES 42E8 where the north eastern offshore section of the SG1A Project is located, most average landings values are recorded by dredging vessels which target scallops, at comparatively lower values than the prominent fishing methods operated in surrounding ICES rectangles.

As noted above and shown in Figure 6.13, landings values by species indicate that *Nephrops,* comprise the highest proportion of average landings values in ICES 40E7 and 41E7. Demersal trawlers also record comparably lower landings values of squid*,* primarily from ICES 42E7 and 42E8. Lobsters and to a lesser extent crab which are targeted by vessels operating static fishing gear, comprise the majority of landings values from ICES 40E8 and 42E7 (average £1,986,283 in 40E8 and £2,184,989 in 42E7). Scallops are recorded in the landings values at low levels in ICES 40E8, 41E7, 41E8 and 42E7, and comprise higher proportionate average value of landings from ICES 42E8 (average £1,738,641). Razor clams are also landed to a lesser degree from ICES 41E7, 42E7 and 40E7. Other species which are landed from the study area include demersal fish species such as haddock, monkfish and plaice and pelagic species such as mackerel and herring (MMO, 2020).

Average fishing intensity (effort) for three mobile fishing methods has been presented in Figure 6.14 and Figure 6.15. In relation to activity by fishing vessels operating demersal trawls which target *Nephrops*, in accordance with the landings values detailed above, there is an area of high intensity activity in ICES 41E7, especially within the 6nm territorial limit of Scotland. This activity corresponds with the existing seabed characterisation (Sections 6.2 and 6.3) which shows muddy sediment types, favoured by *Nephrops* as predominant habitat, in this area. Figure 6.15 shows the average fishing intensity (2009-2016) by vessels operating scallop dredges and indicates that there are areas of moderate scallop dredging activity in the north eastern proportion of the SG1A Project, which overlaps with ICES 41E7, 42E7 and 42E8. Most vessels

operating scallop dredges in the study area are over 15m in length, and many are nomadic, meaning they operate across the North Sea including intensively in the English Channel, to opportunistically fish in a pattern which corresponds to the cyclical and fluctuating nature of scallop density in a location over time.

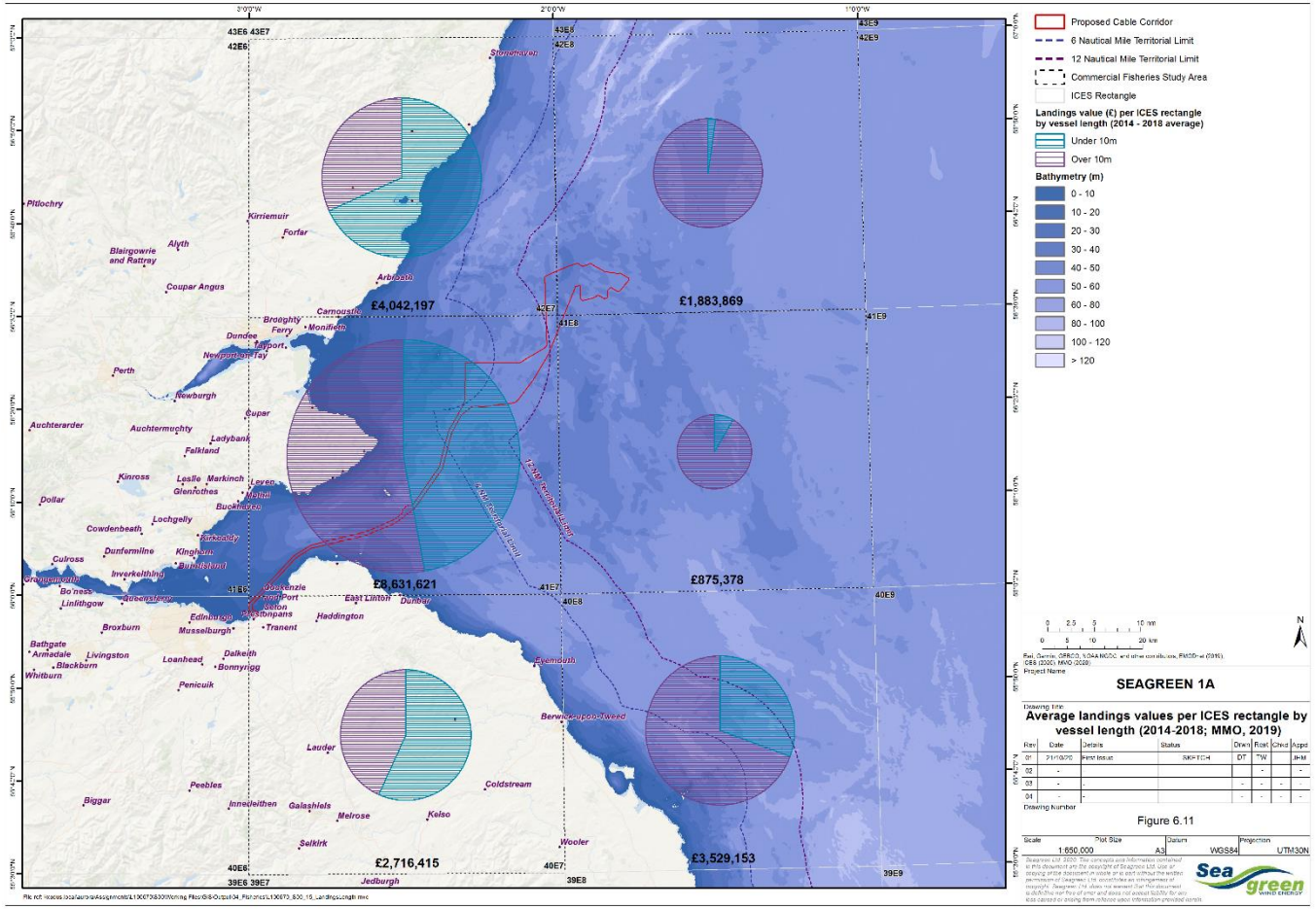

Figure 6.11 - Average landings values per ICES rectangle by vessel length (2014-2018; MMO, 2019)

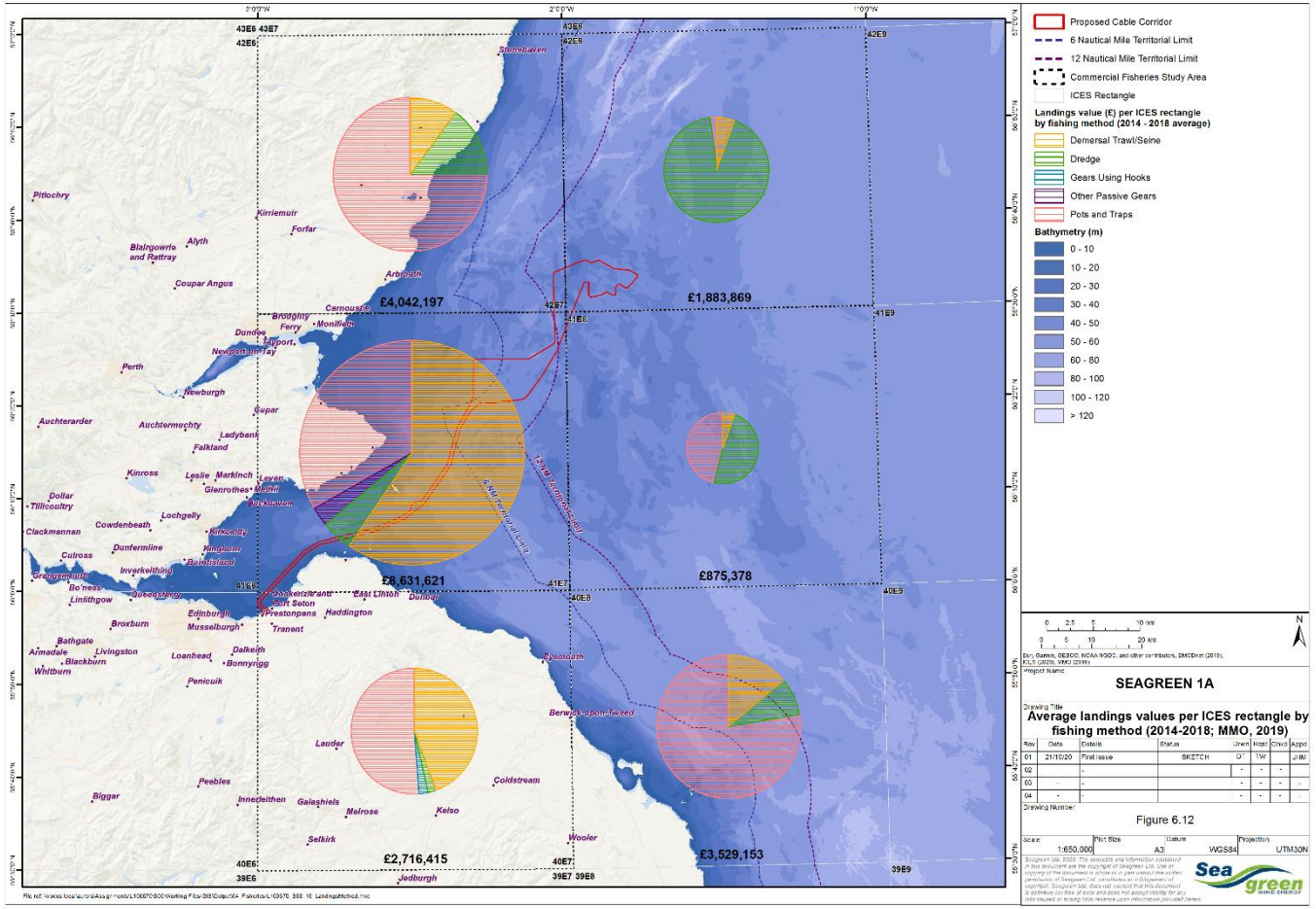

Figure 6.12 - Average landings values per ICES rectangle by fishing method (2014-2018; MMO, 2019)

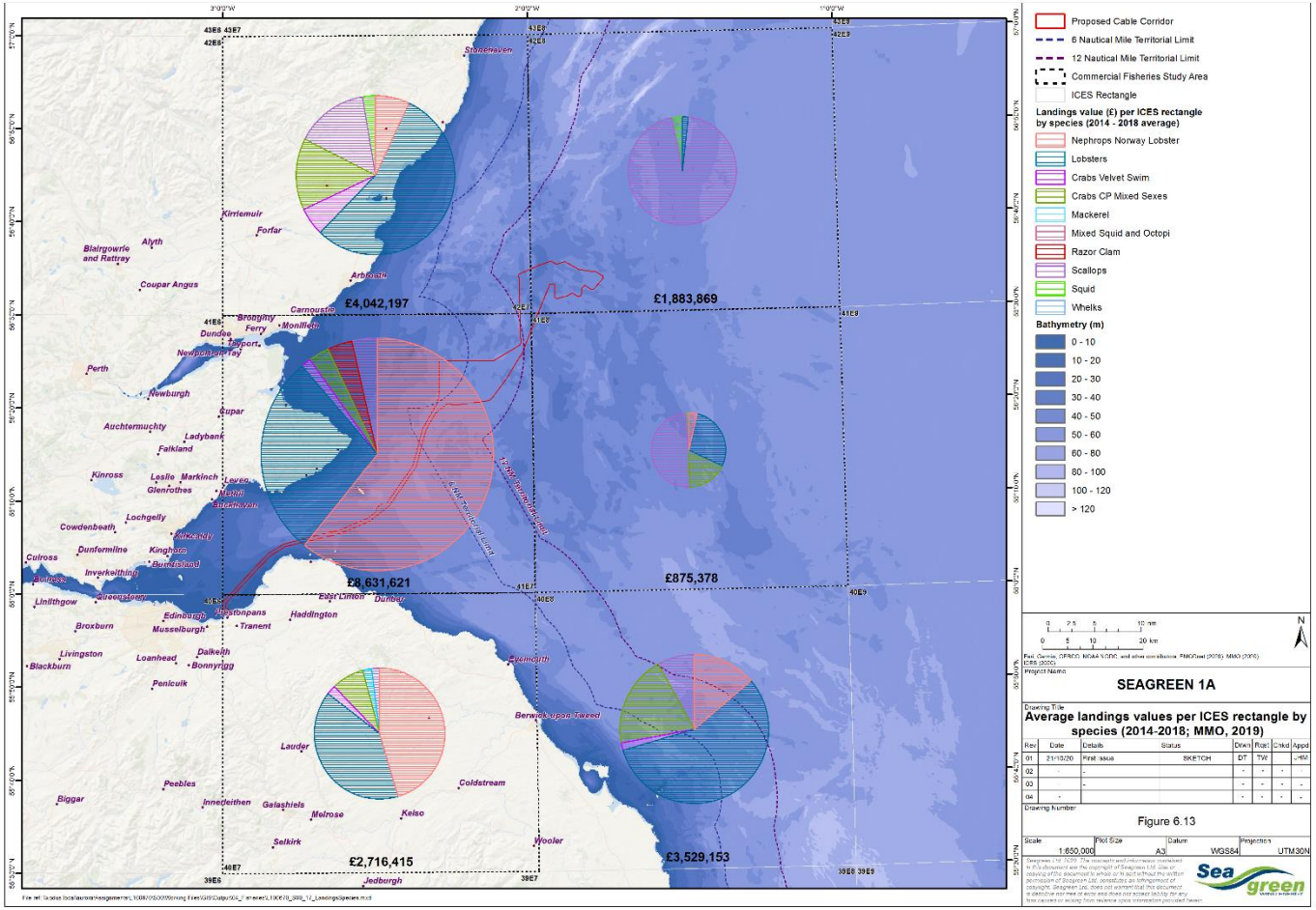

Figure 6.13 - Average landings values per ICES rectangle by species (2014-2018; MMO, 2019)

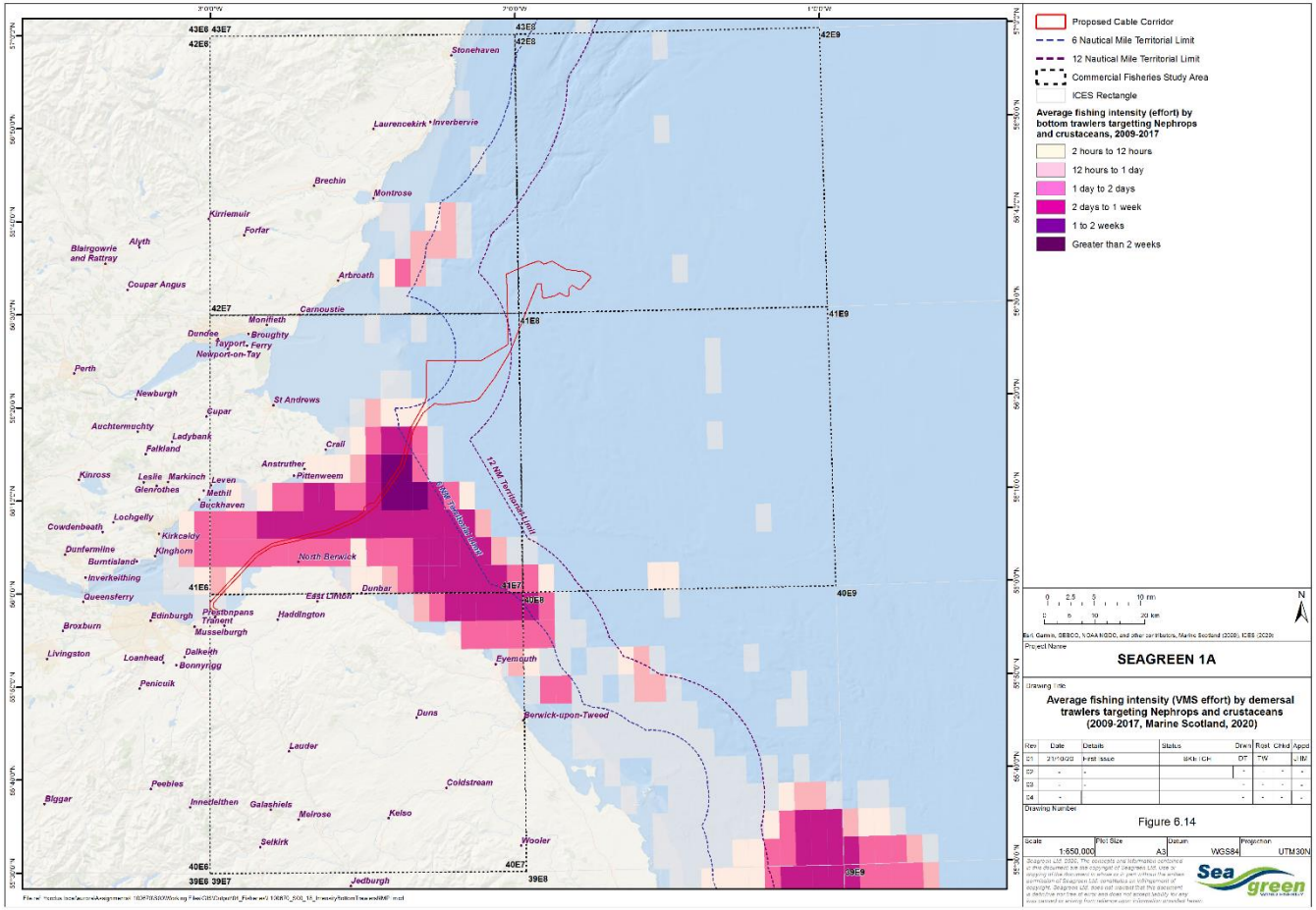

Figure 6.14 - Average fishing intensity (VMS effort) by demersal trawlers targeting Nephrops *and crustaceans (2009-2017, Marine Scotland, 2020)*

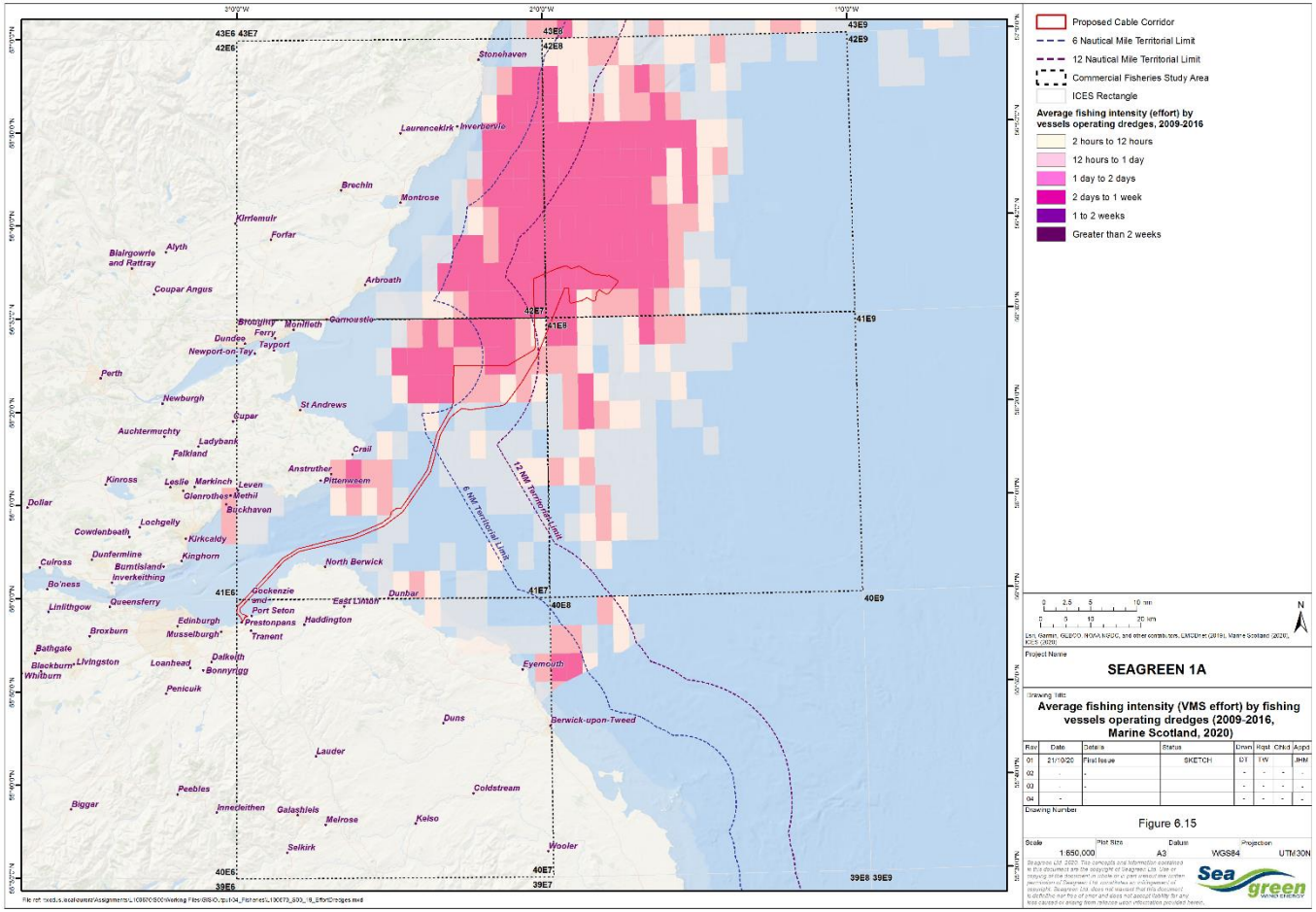

Figure 6.15 - Average fishing intensity (VMS effort) by fishing vessels operating dredges (2009-2016, Marine Scotland, 2020)

6.7.4 Mitigation and Management Measures

SG1A Project mitigation and management measures are presented in Section 4.7 and have been included when characterising the potential impacts to commercial fisheries. Detailed refinements of the SG1A Project design and engineering, along with reference to guidance have allowed the identification of mitigation measures. The following additional mitigation measures are proposed to be implemented to reduce or avoid potential impacts to commercial fisheries receptors:

- Ongoing proactive consultation with the fishing industry and the appointment of a FLO;
- The development of a FMMS;
- Adherence to best practice guidance with regards to fisheries liaison (e.g. FLOWW, 2014; 2015);
- Timely and efficient distribution of Notice to Mariners (NtM), Kingfisher notifications and other navigational warnings of the location, expected duration and nature of works associated with the SG1A Project;
- The use of guard vessels, where required, for example at exposed sections of cable;
- The appointment of Offshore Fisheries Liaison Officers (OFLOs) on board SG1A contracted vessels, as appropriate;
- The development of, and adherence to, a VMP;
- All vessels will comply with the provisions of the International Regulations for the Prevention of Collision at Sea (COLREGs), including the display of appropriate lights and shapes such as when vessels are restricted in their ability to manoeuvre;
- Procedures for dropped objects, and claim processes for loss/damage to fishing gear/vessels attributable to SG1A activities;
- Notification to the UK Hydrographic Office (UKHO)/Kingfisher of the proposed works /installed cable to facilitate the promulgation of maritime safety information and updating of nautical /admiralty charts and publications;
- Production of a CBRA and Cable Plan (CaP), which will include details on the planned approach for tasks such as post-installation and cable burial inspection surveys; and
- Maximise cable burial: the SG1A Project will endeavour to bury cable following installation where possible, and it is estimated that burial will be achieved for a minimum of 80% of the SG1A ECR.

6.7.5 Characteristics of Potential Impacts

This section characterises the potential impacts which have been identified for commercial fisheries and provides recommendations on whether further consideration is required in the Environmental Appraisal to be submitted with the SG1A Project application for Marine Licence.

The majority of the commercial fishing activity which is recorded in areas relevant to SG1A Project is due to:

- Vessels operating demersal trawls to target *Nephrops;*
- Vessels operating static fishing gear to target lobster and crab; and

- Vessels operating dredges to target scallop

It is acknowledged some pathways for potential impacts to commercial fisheries receptors are present as a result of various phases of development of the SG1A Project. These pathways for potential impacts require consultation with commercial fisheries stakeholders, including vessel operators and local fisheries associations to characterise. In recognition of this, some potential impacts to commercial fisheries will be considered in an Environmental Appraisal (Table 6.14) that will be submitted to accompany the Marine Licence application. Consultation will also permit the refinement of any relevant mitigation or management measures (as detailed in Section 6.7.4) which may reduce or avoid potential impacts.

6.7.5.1 Loss or restricted access to fishing grounds

In relation to the potential impacts of temporary loss or restricted access to fishing grounds, for the construction and decommissioning phase, any effects on commercial fisheries receptors are expected to be temporary, short term (a small number of months) and localised to the maximum working width of 100m, and will be mitigated through the measures outlined in Section 6.7.4. maintenance and operation activities. This impact is anticipated to be only applicable to safety zones around installation activities with access to fishing grounds expected to resume following construction. As described in the Project Description (Section 4), the SG1A Project will involve the construction and operation of a single export cable which overlaps considerably with the proposed Inch Cape OWF export cable corridor, within which installation and operation of six export cables have previously been consented. Therefore, the presence of installation vessels, safety zones or installed infrastructure associated with SG1A will be less than the already consented cable capacity of the corridor, and any associated impacts are expected to be localised, temporary in the case of construction and minimal in the case of installed infrastructure and maintenance vessel activities. However, acknowledging the variable sensitivity of fishing fleets dependent on their fishing method and the need for consultation data this potential impact **will be considered** further within the Environmental Appraisal.

6.7.5.2 Displacement of fishing activity into other areas

There is the potential that due to the effects of the temporary loss or access (Section 6.7.5.1) to fishing grounds which may occur, fishing activity may be temporarily displaced to surrounding areas. It is assumed that this would be temporary, short term and localised due to the reasons outlined in Section 6.7.5.1. In acknowledgement for the need of larger context of fishing activity distribution, the requirement of defined assumptions and extent for this impact **will be considered** further within the Environmental Appraisal.

6.7.5.3 Interference with fishing activity

The presence and transiting of construction vessels may have the potential to cause interference with fishing activity. Interference could include fouling of static gear surface markers. The mitigation measures of continued engagement with the commercial fishing sector and the development of a VMP and CEMP will reduce the likelihood of a significant impact of interference. In addition, the number of primary construction vessels which could cause interference will be limited to two at any one time. Taking into

consideration the existing environment and the findings of the Inch Cape ES (2011, 2018), Seagreen Project EIA (2011, 2018) and Neart Na Gaoithe ES (2011), which in each case predicted impacts to be not significant, this impact **will not be included** within the Environmental Appraisal.

6.7.5.4 Increased steaming times

The potential impacts described in Sections 6.7.5.1, 6.7.5.2 and 6.7.5.3 have the potential to result in changes to a chosen transit route to fishing grounds. However, in consideration of the maximum working width of 100m, along with the temporary nature of any construction activities or presence of construction vessels, any adjustments to transit routes or steaming times required to access fishing grounds is expected to be negligible. Taking into account the findings of the Inch Cape ES (2011, 2018), Seagreen Project EIA (2011, 2018) and Neart Na Gaoithe ES (2011), which in each case predicted impacts to be not significant, this impact **will not be included** within the Environmental Appraisal.

6.7.5.5 Safety issues for fishing vessels, including allision and collision and potential for snagging with project infrastructure

The safety issues associated with fishing activity in terms of potential risk of gear snagging and the manoeuvrability of vessels is given below. Safety risks associated with potential for collision with construction vessels and allision with project infrastructure are addressed in Section 6.8 Shipping and Navigation.

Pre-construction, Seagreen 1A will undertake a cable burial risk assessment when ground investigation results are available. This will determine the appropriate target cable burial depth to achieve sufficient protection of cables from any activity which crossed the SG1A Project which may pose a risk to cable integrity, including scallop dredging and trawling for *Nephrops*. The estimated minimum burial depth has been assigned at this stage to be between 1 and 3 m. Seagreen 1A will endeavour to maximise burial depth and has estimated this will be achieved for 80% of the SG1A ECR. In cases where burial is not possible, for example due to unsuitable ground conditions, cable protection, such as rock placement will be used. Cable burial depths and any protection measures will be confirmed post installation, and within the CaP to assist fishing vessel skippers in their individual assessments in respect of fishing over the cable. It is expected that any rock placement will be in line with industry standards in its composition and design which have been accepted and developed in consultation with fisheries representatives. It should be noted, however, that safety zones will be in place around construction works. In addition, in instances where sections of cables are exposed, a full protocol will be initiated, including distribution of the nature and location of the exposure to fisheries stakeholders and applied recommended safety zones. Based on the above, but in acknowledgment of the potential magnitude of this impact, safety issues for fishing vessels **will be considered** within the Environmental Appraisal.

6.7.5.6 Impacts to commercially exploited species

The potential impacts to commercially exploited fish and shellfish species have been identified and the subsequent recommendations for further assessment have been provided in Section 6.4.5. As described,

based on the highly localised and temporary nature of all activities associated with the SG1A Project which may affect commercially exploited species, it is not expected that potentially significant impacts will occur to commercially exploited species during any phase of the SG1A Project, therefore this impact **will not be included** within the Environmental Appraisal.

A summary of the potential impacts associated with commercial fisheries have been summarised in Table 6.14.

Table 6.14 - Summary of the characteristics of potential impacts to commercial fisheries receptors associated with SG1A

Potential impact	Relevant phase of Project			To be included in Environmental Appraisal
	Cable installation	Cable operation (maintenance and repair)	Decommissioning	
Temporary loss or restricted access to fishing grounds	✓	✓	✓	Yes
Displacement of fishing activity into other areas	✓	x	✓	Yes
Interference with fishing activity	✓	x	✓	No
Increased steaming times	✓	X	X	No
Safety issues for fishing vessels, including allision and collision and potential for snagging with project infrastructure	✓	✓	✓	Yes
Impacts to commercially exploited species	✓	✓	✓	No (Section 6.4.5)

6.7.5.7 Cumulative Impacts

It is assumed that all potential impacts which are considered within the Environmental Appraisal in relation to construction phase, will also be considered for cumulative effects with other developments, in line with the approach set out in Section 0. The projects or activities which are included in the cumulative assessment may vary depending on the fishery under consideration (e.g. depending on the extent of grounds and operational range of the vessels involved).

6.7.6 Conclusions and Proposed Methodology for the Environmental Appraisal

Taking account of selection criteria in Schedule 3 of the 2017 EIA Regulations the characterisation of potential impacts with respect to commercial fisheries receptors is such that the proposed SG1A Project would not result in any significant adverse impacts to the environment. This finding supports a screening decision that the SG1A Project does not require an Environmental Impact Assessment.

However, as presented above in Table 6.14, some impacts will be considered in further detail in support of the Marine Licence application. Further consideration of the following potential impacts will be included in the Environmental Appraisal:

- Temporary loss or restricted access to fishing grounds;
- Displacement of fishing activity to other areas; and
- Safety issues for fishing vessels.

On the basis of the localised and temporary nature of the proposed works during installation of the SG1A Project, the relatively small proportion of commercial fishing grounds which the operational SG1A cable will occupy and the extensive industry accepted mitigation that will be implemented, no potentially significant impacts are likely to occur to commercial fisheries receptors either from the project in isolation or when considered cumulatively with other plans or projects.

The proposed approach for considering potential impacts to commercial fisheries within the Environmental Appraisal will be defined following receipt of the screening opinion, initial consultation responses and discussions with MS-LOT.

6.7.6.1 Environmental Appraisal Data Sources

In addition to the data sources listed in Section 6.7.1, the following sources will be used to inform further development of the commercial fisheries baseline during production of the Environmental Appraisal:

- Data collected during consultation with commercial fisheries stakeholders;
- MMO VMS data;
- Automatic Information System (AIS) data on commercial fishing vessel tracks;
- Best practice guidance from the Fisheries Liaison Offshore Wind and Wet Renewables group (FLOWW, 2014; FLOWW, 2015);
- Best practice guidance for fishing industry financial and economic impact assessments (UK Fisheries Economics Network (UKFEN), 2012);
- Options and opportunities for marine fisheries mitigation associated with wind farms (Blyth-Skyrme, 2010); and
- Fishing and Submarine Cables - Working Together (International Cable Protection Committee (ICPC), 2009).

6.8 Shipping and Navigation

This section provides a description of the shipping and navigation baseline and characterises any potential impacts which may affect shipping and navigation receptors during construction, operation and maintenance and decommissioning phases of the SG1A Project.

6.8.1 Key Data Sources

The following data sources have been used to inform the shipping and navigation section of this Screening Report:

- Two months of AIS data from July and December 2019, covering seasonal variation;
- Admiralty Charts 734, 735, 1407;
- UKHO Admiralty Sailing Directions; North Sea (West) Pilot NP54 (UKHO, 2016)

AIS equipment is required to be fitted on all vessels of 300 Gross Tonnage (GT) and upwards engaged on international voyages, cargo vessels of 500 GT and upwards not engaged on international voyages, and passenger vessels irrespective of size, built on or after 1st July 2002. All European Union (EU) registered fishing vessels of length 15m and above are required to carry AIS equipment by EU Directive. Smaller fishing vessels (below 15m) as well as recreational craft are not required to carry AIS. It is also noted that military vessels are not obligated to broadcast on AIS at all times. Therefore, these vessels (e.g. fishing, recreational and military vessels) will be under-reported within the AIS data; however, it is noted that smaller vessels are increasingly observed to utilise AIS voluntarily, given the associated safety benefits.

6.8.2 Study Area

For the baseline vessel traffic analysis, a study area was defined to cover an area of 5 nautical miles (nm) around the SG1A Project, cropped to the coastline. This is considered sufficient to characterise the shipping activity and navigational features close to the SG1A Project and to encompass any vessel traffic that may be impacted by the cable and associated operations. Where appropriate, the 5nm buffer has been extended to consider navigational features outside the study area that may impact vessel activity. The study area is presented in Figure 6.16.

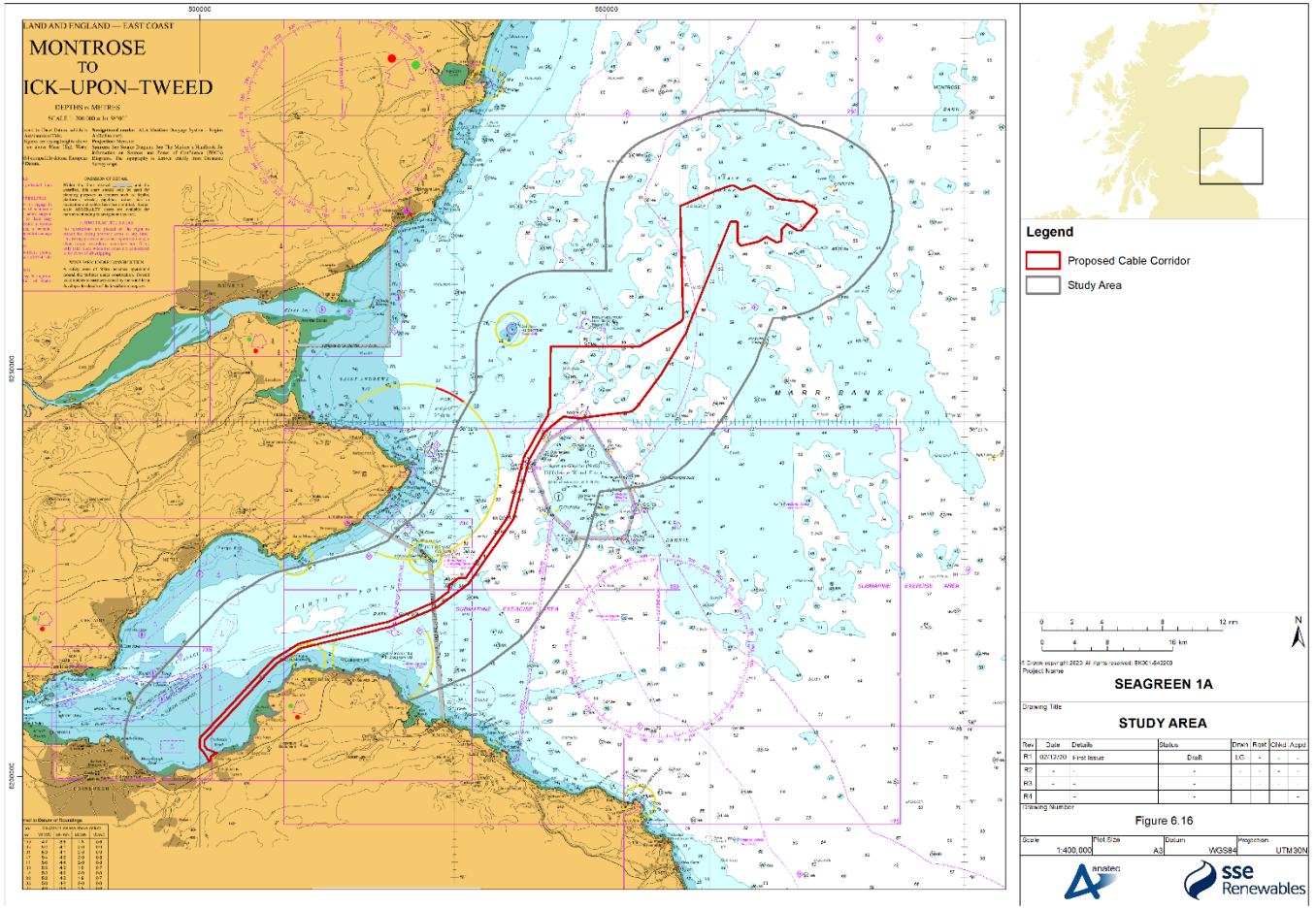

Figure 6.16 Study Area in relation to Shipping and Navigation

6.8.3 Baseline Description

6.8.3.1 Navigational Features

This section identifies the key navigational features in the vicinity of the SG1A Project, which have been identified via a review of Admiralty charts and the local UKHO Admiralty Sailing Directions as per Section 0.

There are two charted ammunition dumping grounds (disused) approximately 1km north of the SG1A Project. There is also a foul area located approximately 4nm north of the SG1A Project, on the western side of the Isle of May. Vessels are cautioned from anchoring or fishing within this area due to the existence of foul area and obstructions on the seabed.

A number of designated anchorage areas and anchor berths are located in the Firth of Forth and along the east coast of Scotland, one of which intersects the SG1A Project. Two anchorages are located south of the ECR at Firda (approximately 1nm from the ECR) and Craigleith (approximately 1.3nm from the ECR).

Neart na Gaoithe is the closest wind farm site in proximity to the SG1A Project, located 200m to the south. The Inch Cape development area is located 600m north of the SG1A Project. The SG1A Project is adjacent to the consented (but not yet constructed) Inch Cape Offshore Wind Farm cable corridor route to minimise disturbance across the Forth and Tay area.

The SG1A Project intersects a number of Ministry of Defence (MoD) practice and exercise areas (PEXA), including submarine exercise and firing practice areas. No restrictions are placed on the right to transit the firing practice areas at any time. Exercises and firing only take place when the areas are considered to be clear of all shipping.

Leith approach channel is located approximately 3nm north of the SG1A Project. Leith approach channel from Leith approach buoy to the entrance lock is maintained at a dredged depth of 6.71m below Admiralty chart datum. The Forth Deep Water Channel which runs through the North Channel is approximately 4nm north of the SG1A Project.

Within the area are the ports of Leith, Rosyth and Grangemouth, the oil terminal at Hound Point and the gas terminal at Braefoot. The Forth ports handle about 5,000 vessel movements and over 48 million tonnes of cargo annually. The most important commodities are oil, petro-chemicals and liquefied gases, which pass through the port of Grangemouth and the two marine terminals at Hound Point and Barefoot. There is also considerable trade in cargo and containers through Grangemouth. Port Edgar lies in proximity to the ECR and accommodates a yacht marina administrated by City of Edinburgh Council.

Forth Ports Limited exercises jurisdiction over all the waters of Firth of Forth and the River Forth. Approximately 31km of the ECR lies within the limit of authority of Forth Ports Ltd.

A Vessel Traffic Service (VTS) scheme, The Forth and Tay Navigation Service, with full radar and AIS surveillance, is operated from Grangemouth.

There are 5 pilot boarding areas in proximity to the SG1A Project. Pilotage is compulsory within the Forth area for:

- Vessels carrying 12 or more passengers;
- Vessels of 45m or more bound for the North Channel and Forth Deep Water Channel;
- Vessels of 45m or more carrying dangerous cargoes and all other vessels of 80m or more bound for the Leith Channel;
- Vessels of 45m or more carrying dangerous cargoes and all other vessels of 60m or more bound for Methil;
- Vessels of 45m or more carrying dangerous cargoes and all other vessels of 60m or more bound for Kirkcaldy.

There is one gas pipeline that intersects the SG1A Project, stretching across the mouth of the Firth of Forth. Anchoring is prohibited within an area covering approximately 1nm either side of this pipeline.

Based on admiralty charts of the Forth and Tay area, the locations of wrecks in the vicinity of the SG1A Project have been identified.

A plot of the navigational features is presented in Figure 6.17.

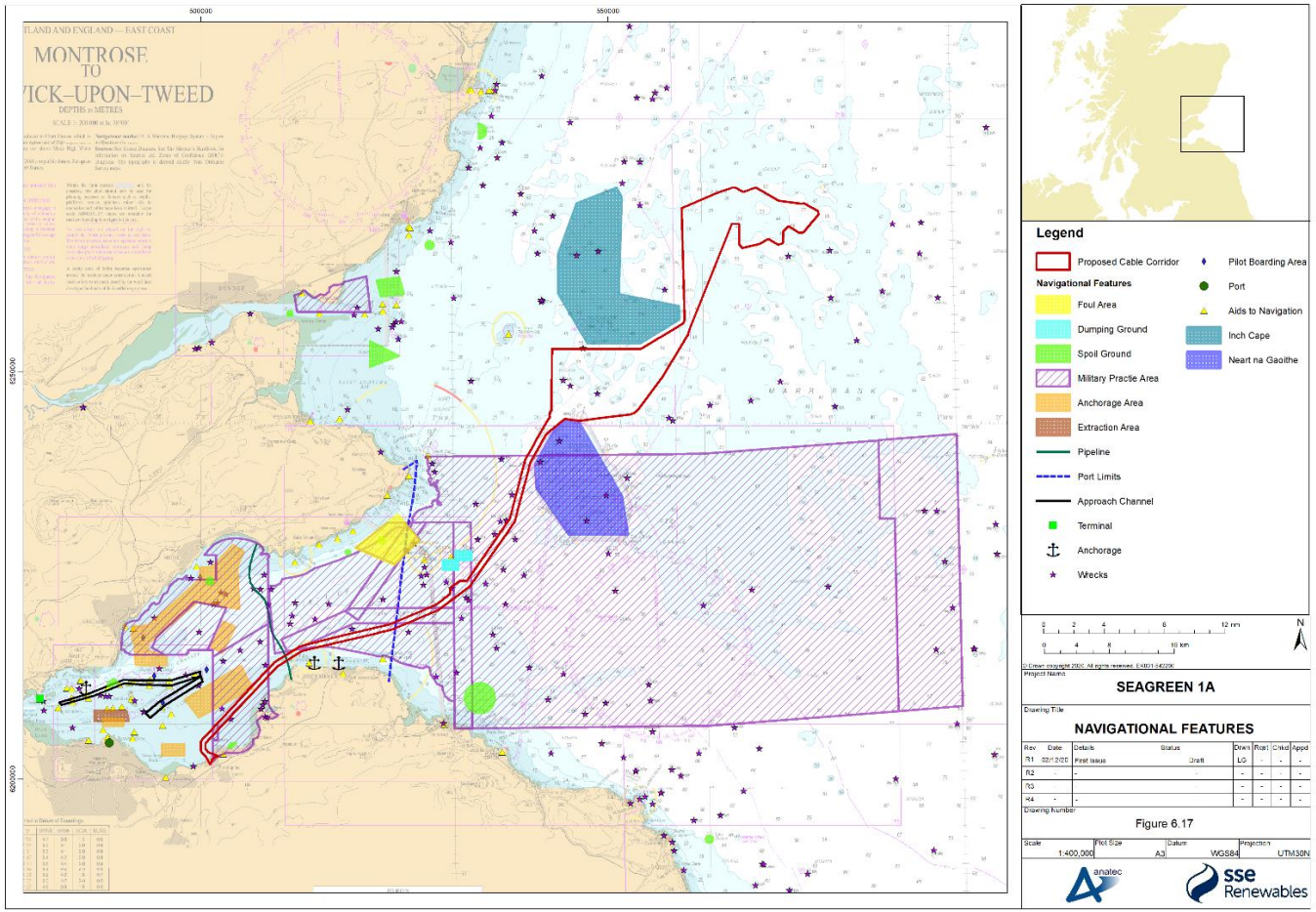

Figure 6.17 Navigational Features

6.8.3.2 AIS Analysis

A total of two months AIS data from 2019, one month in summer (July 2019) and one month in winter (December 2019), was analysed. 2019 data has been used as vessel numbers have been noted to significantly reduce during 2020 due to the Covid-19 pandemic and the 2019 data is therefore considered to be more representative of shipping activity.

An overview plot of the vessel tracks, colour-coded by vessel type, recorded within the study area for summer and winter are presented in Figure 6.19 and Figure 6.20 respectively. Figure 6.18 shows the type distributions for vessels passing within the study area during each month.

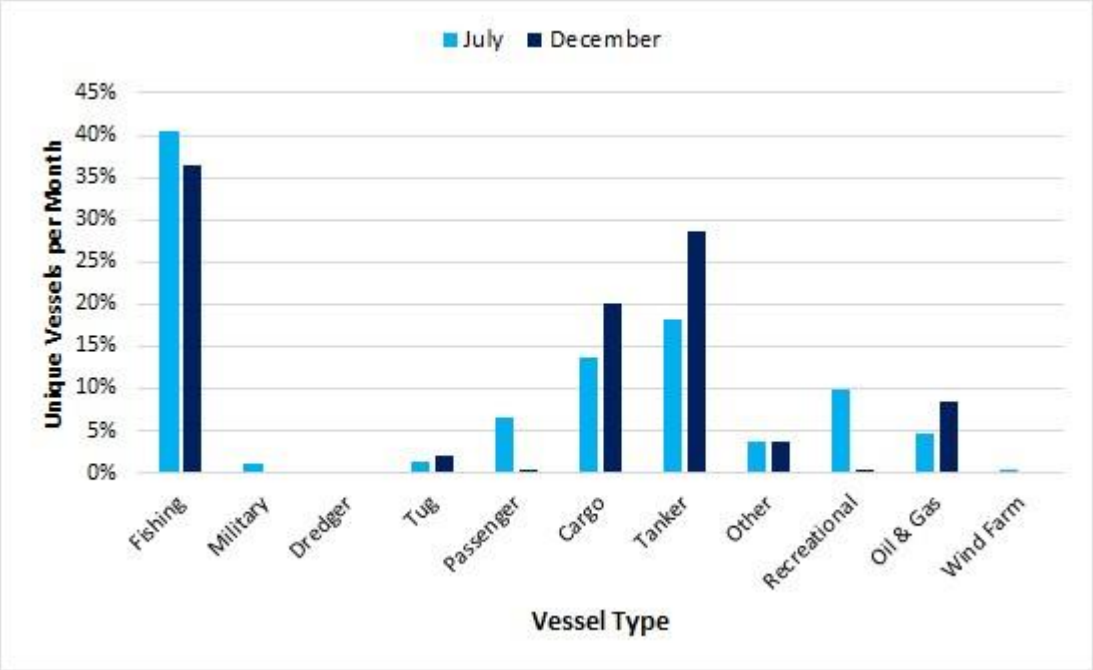

Figure 6.18 Vessel Type Distribution

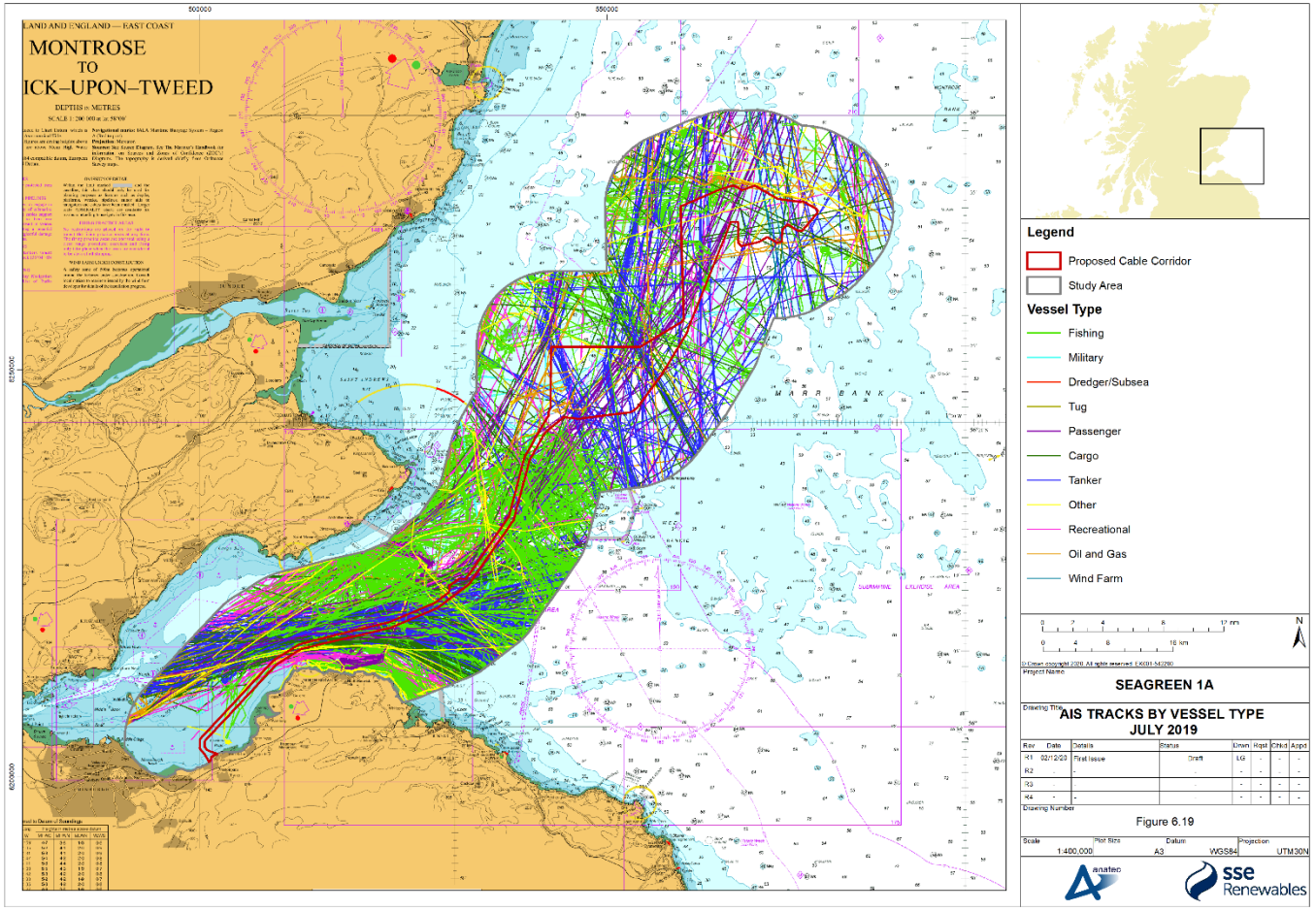

Figure 6.19 AIS tracks by vessel type in July 2019

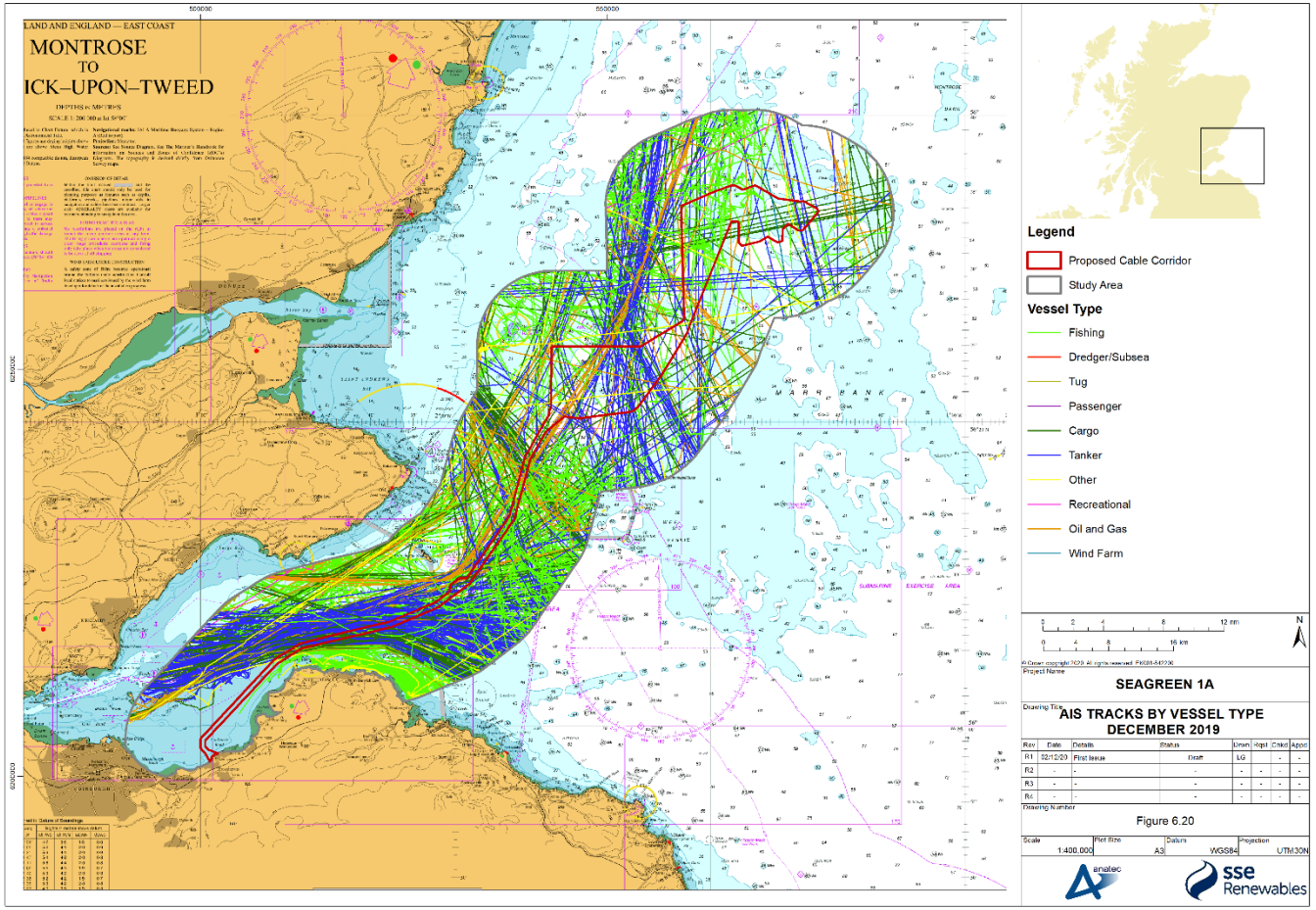

Figure 6.20 AIS tracks by vessel type in December 2019

In July, there was an average of 49 unique vessels per day recorded within the study area and an average of 25 intersecting the SG1A Project. The most common vessel types recorded during summer were fishing vessels (40%), tankers (18%) and cargo vessels (14%).

In December, there was an average of 34 unique vessels per day recorded within the study area and an average of 20 intersecting the SG1A Project. The most common vessel types recorded during winter were fishing vessels (36%), tankers (29%) and cargo vessels (20%). Vessel activity in winter was considerably lower due to a significant reduction in recreational and passenger vessels, both accounting for less than 1% of the overall distribution for the winter period.

The majority of vessels passing through the study area during the combined study periods were fishing vessels, tankers and cargo vessels. The average length of vessels passing through the study area was 61m in the summer period and 75m in the winter period. For vessels intersecting the cable corridor only, the average recorded lengths were 79m in the summer period and 89m in the winter period.

High levels of fishing activity was recorded in both the summer and winter periods. The majority of fishing vessels were found operating closer to the coast. It is noted that fishing vessels less than 15 m in length are not obliged to broadcast via AIS and as such are likely to be under-represented.

The majority of commercial (cargo and tanker) traffic within the study area was observed to be associated with Grangemouth Port and Aberdeen Harbour. As detailed in the navigational features section, the main commodities passing through the Port of Grangemouth are oil, petro-chemicals, liquified gases and containers.

The main destinations recorded by passenger vessels within the study area were Grangemouth Port, Pittenweem and Aberdeen Harbour. Passenger vessels can be seen transiting to the Isle of May and Bass Rock from destinations such as Anstruther, Dundee and Edinburgh.

The majority of recreational vessels were found operating closer to the coast. Only three unique recreational vessels were recorded during the winter period. Recreational vessels can mainly be associated with Port Edgar Marina which has a sailing school and 300 berths.

The highest density areas for both the summer and winter period can be seen in coastal waters, this can be associated with the large volume of fishing vessels transiting within the study area and tankers travelling between Pittenweem and North Berwick.

Vessel density plots for the summer and winter period are shown in Figure 6.21 and Figure 6.22 based on the number of track intersects per cell of a 500 m x 500 m grid.

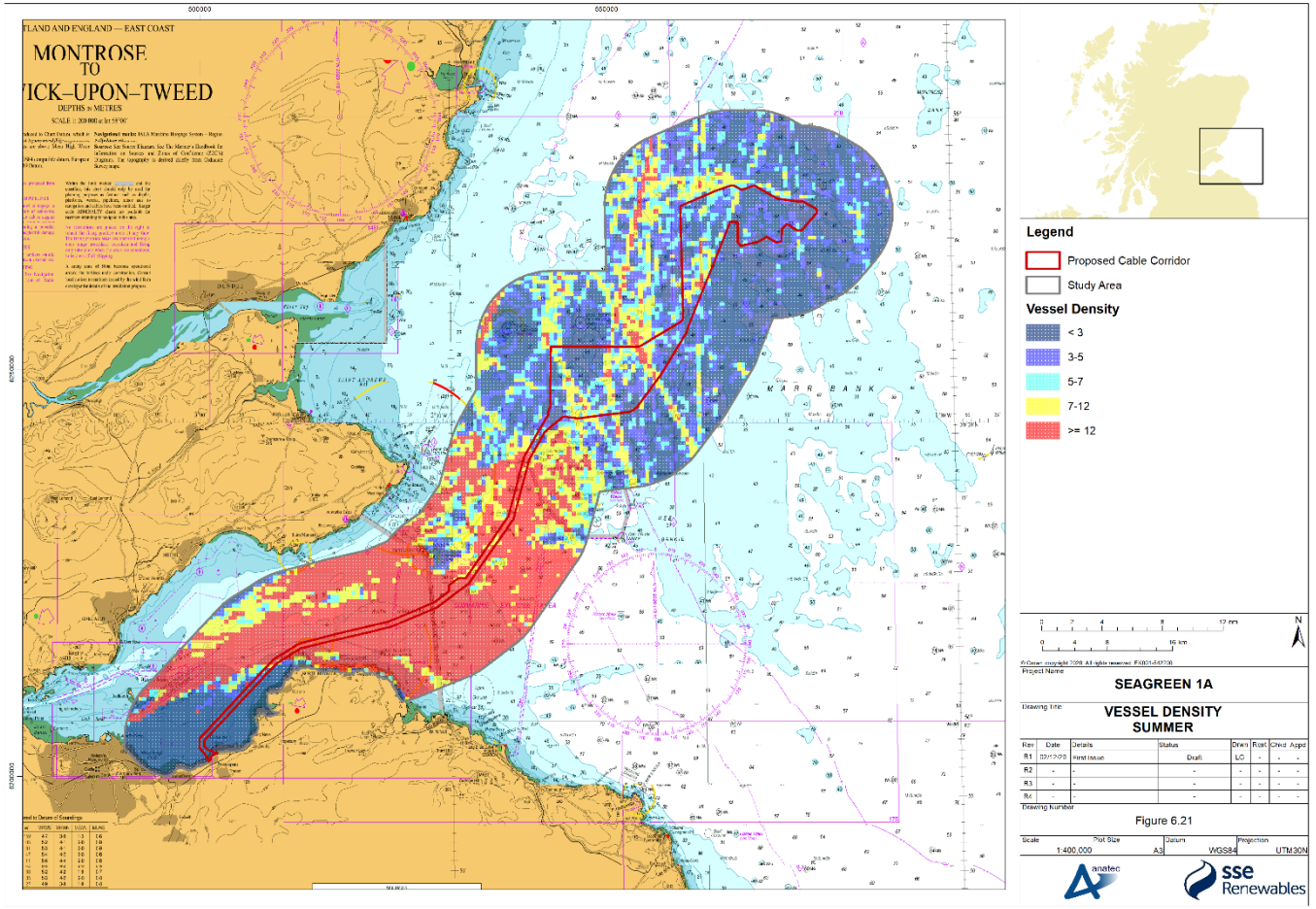

Figure 6.21 Vessel density in July 2019

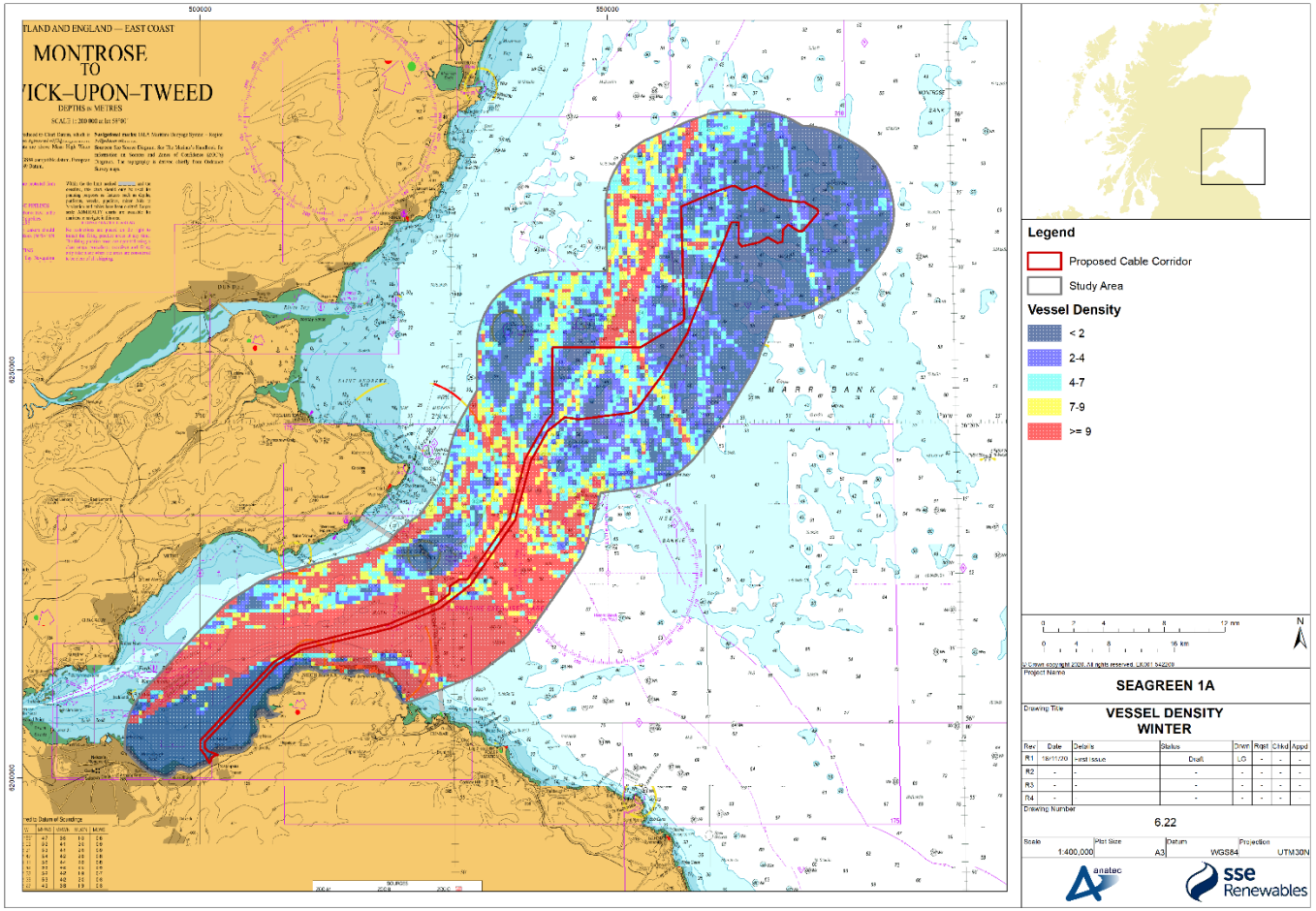

Figure 6.22 Vessel density in December 2019

6.8.3.3 Fishing Analysis

Based on the two months AIS data (July 2019 and December 2019), there are high levels of AIS tracks from fishing vessels within the study area. The AIS tracks recorded from fishing vessels during the combined two month study periods are presented in Figure 6.23. Commercial fishing activity in the vicinity of SG1A Project is detailed in Section 6.7.

It should be noted that fishing vessels below 15 m in length are not required to broadcast via AIS and thus are likely to be under-represented in the above figure. Additional satellite data (Vessel Monitoring System (VMS)) will be used in the Navigational Risk Assessment (NRA) to cover vessels 12 m and above, further validating the findings of the AIS data.

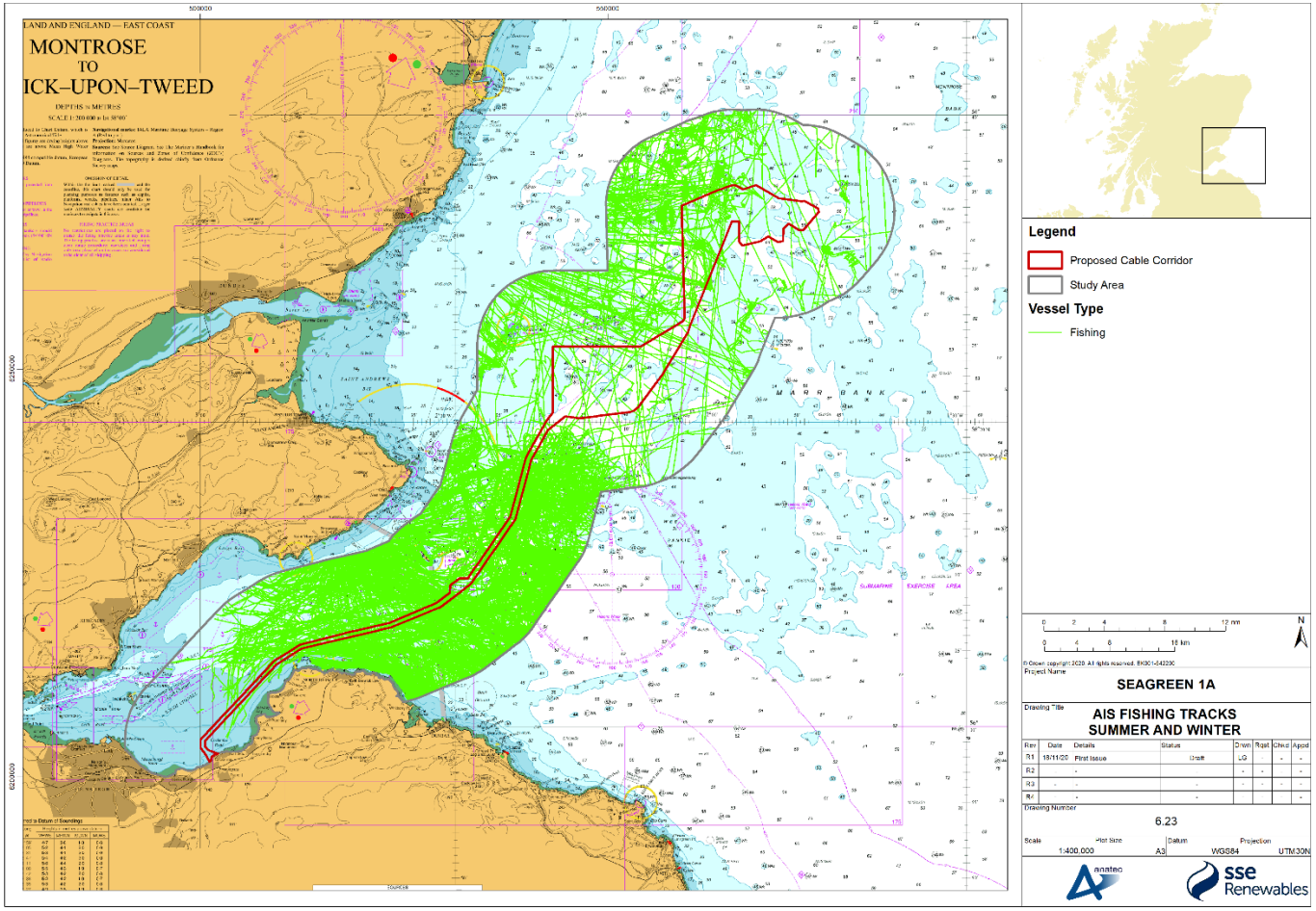

Figure 6.23 Fishing vessel AIS analysis

6.8.3.4 Anchoring Analysis

Vessels recorded at anchor within the study area, for the combined two month survey period, have been identified through the vessels' navigation status (transmitted via AIS).

The majority of anchored vessels were anchored in designated anchorage areas. A plot of anchored vessels, colour-coded by vessel type is presented in Figure 6.24.

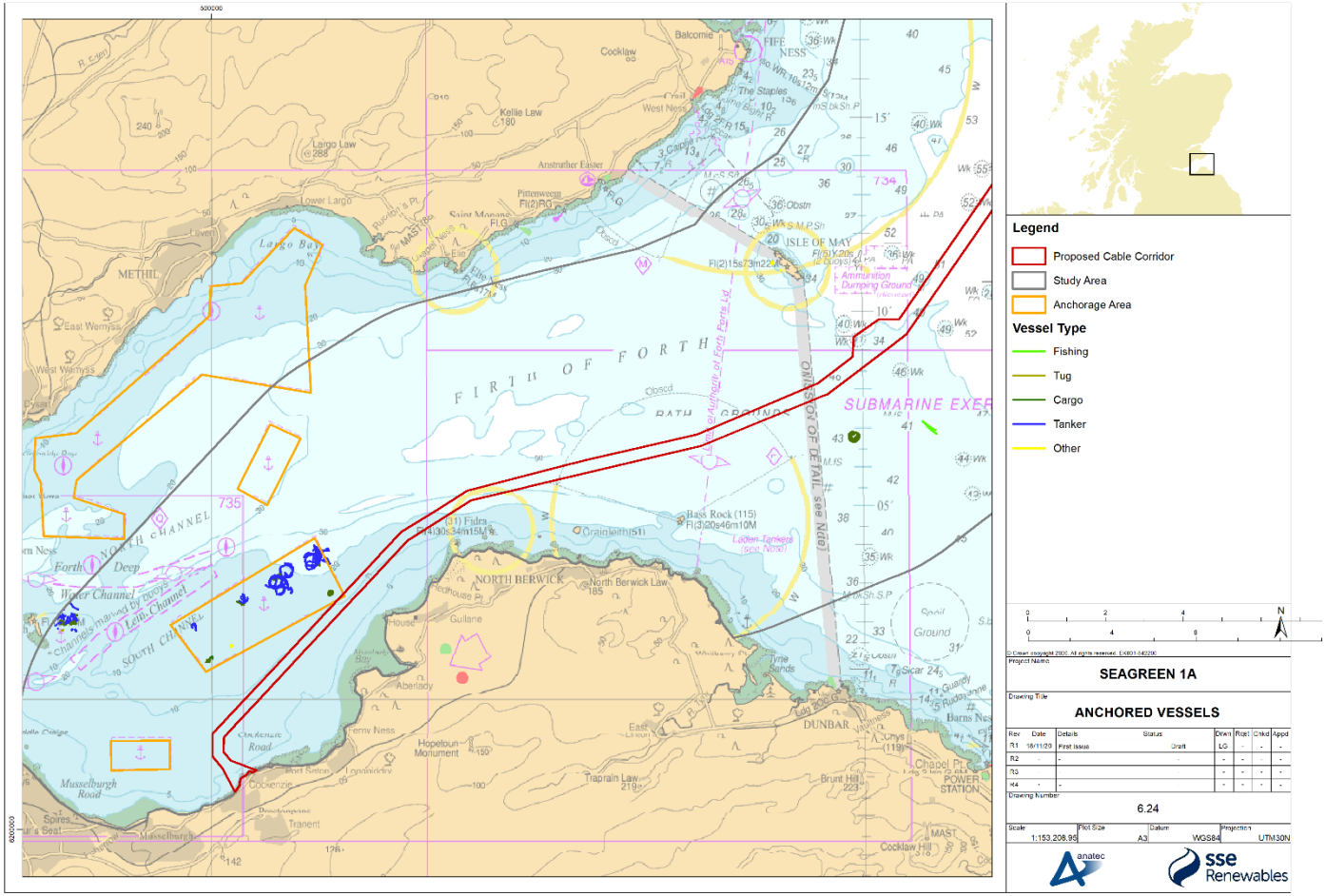

Figure 6.24 Anchored vessels

6.8.4 Mitigation and Management Measures

The SG1A Project mitigation and management measures are presented in Section 4.7 and have been included when characterising the potential impacts on shipping and navigation.

6.8.5 Characteristics of Potential Impacts

This section characterises the potential impacts which have been identified for shipping and navigation and provides recommendations on whether further consideration is required in the Environmental Appraisal to be submitted with the SG1A Project application for Marine Licence.

Following the results of the baseline review, and based on experience of other marine navigation assessments for wind farms and subsea cables, the following potential impacts have been identified for shipping and navigation receptors in relation to the SG1A Project. In line with guidance note MGN 543 (MCA, 2016) an NRA is expected to be carried out for a proposed subsea cable, and therefore SG1A will undertake a NRA to accompany the Environmental Appraisal, and to assess the potential impacts to shipping and navigation receptors.

6.8.5.1 Collision with Construction or Maintenance Vessel

An increased collision risk is created during the construction phase for all passing traffic due to the presence of the vessels associated with the construction of the cable. The nature of cable installation and other construction activities requires large, slow moving vessels which will be restricted in their ability to manoeuvre. The collision risk is likely to be greater in higher density shipping areas. The risk can be mitigated by promulgation of information about the works and minimum safe passing distances around vessels restricted in manoeuvrability. When considering the short term, temporary and localised nature of the SG1A works, any increased collision risk is anticipated to be low, however, in consideration of the need to carry out an NRA and the planned collection of additional AIS data this impact **will be considered** further within the Environmental Appraisal

A similar risk is created during the operational phase for vessels involved in maintenance works. However, this is expected to be a reduced risk than for construction vessels as maintenance works are likely to be shorter in duration. In consideration however of the need to carry out a NRA, and the planned collection of additional AIS data for use in the Environmental Appraisal, this impact **will be considered** further within the Environmental Appraisal.

6.8.5.2 Disruption to Vessel Routeing/Timetables

During the construction phase, regular traffic will be required to alter their planned route due to the presence of construction vessels. These vessels have limited manoeuvrability and will request a minimum passing distance in which no other vessel can enter to reduce the likelihood of incidents. Since this will cause disruption to shipping activity, to mitigate this potential impact, notice to mariners should be issued on a frequent basis before and during the cable installation period. This will inform the nautical community of locations of proposed works which may require vessels to temporarily make slight diversions to avoid

specific areas. Considering the temporary and localised nature of activities, any increased risk of disruption is anticipated to be low but noting the approach of obtaining additional AIS data and the need to carry out an NRA, this impact **will be considered** further within the Environmental Appraisal.

6.8.5.3 Increase in Vessel-to-Vessel Collision Risk

The presence of construction vessels may increase the risk of a vessel-to-vessel collision, if vessels are required to deviate around the construction work. Standard mitigations including promulgation of information and compliance with COLREGS will be in place to mitigate this risk. Considering the temporary and localised nature of any increased in vessels, and the low number of construction vessels likely to be present at any one time, any increased collision risk is anticipated to be low, but noting the approach of obtaining additional AIS data and the need to carry out an NRA this impact **will be considered** further within the Environmental Appraisal.

6.8.5.4 Disruption to Fishing and Recreational Activities

Installation vessels may cause a disruption to local fishermen and recreational sailors along the ECR, particularly in coastal waters. The baseline description showed that fishing and recreational activity does occur within the study area, however, further data assessment will be undertaken as part of the NRA. It is expected that embedded mitigation such as presence of guard vessels and promulgation of information will notify sea users of construction works. Considering the temporary and localised nature of any disruption, and the low number of construction vessels likely to be present at any one time, any increased disruption is anticipated to be low, but noting the approach of obtaining additional AIS data and the need to carry out an NRA this impact **will be considered** further within the Environmental Appraisal.

6.8.5.5 Displacement of Third Party Marine Activities

The SG1A Project lies within close proximity to MoD PEXA areas (with two areas intersecting the corridors, see Figure 1.9) which have no current restrictions on the right to transit through them. Firing practice and exercises only take place when areas are considered to be clear of all shipping. However, potential impacts could include the disruption of installation activities if the timing coincides with firing practices. These potential impacts could be mitigated by on-going consultation with the MoD to determine the frequency and nature of activities so as to avoid unnecessary disruptions. Considering the temporary and localised nature of the anticipated low levels of potential displacement, and the low number of construction vessels likely to be present at any one time, but noting the approach of obtaining additional AIS data and the need to carry out an NRA this impact **will be considered** further within the Environmental Appraisal.

6.8.5.6 Vessel drags anchor over cable

There is a risk to the cable during the operational phase from vessels dragging anchor (due to poor holding ground or bad weather).Vessels were noted to anchor close to the cable and a wider anchoring assessment within the NRA will determine the extent and positions of anchoring activity near the cable. Mitigation measures include marking of the cable on Admiralty Charts and suitable protection of the cable, such as burial or rock dump.During the operational phase, interaction between anchors and cables will depend on

the cable protection. Therefore, a CBRA study will need to be undertaken (at the appropriate stage), taking into account the seabed sediment characteristics and external risks to determine optimal burial depths and additional protection methods if deemed necessary. Considering the highly localised nature of the operational SG1A export cable, but noting the approach of obtaining additional AIS data and the need to carry out an NRA, this impact **will be considered** further within the Environmental Appraisal.

6.8.5.7 Vessel anchors in an emergency over cable

Due to the high level of shipping which will cross over the cable route on a daily basis and the size of vessels that regularly transit the Firth of Forth, an anchor dropped accidentally, in an emergency or negligently, may pose a risk to the cable.

A wider anchoring assessment within the NRA will determine the volume of vessels passing over the cable that might present a risk of emergency anchoring.

Mitigation measures include marking of the cable on Admiralty Charts and suitable protection of the cable, such as burial or rock dump.

During the operational phase, interaction between anchors and cables will depend on the cable protection. Therefore, a CBRA study will need to be undertaken (at the appropriate stage), taking into account the seabed sediment characteristics and external risks to determine optimal burial depths and additional protection methods if deemed necessary. Considering the highly localised nature of the operational SG1A export cable, but noting the approach of obtaining additional AIS data and the need to carry out an NRA, this impact **will be considered** further within the Environmental Appraisal.

6.8.5.8 Fishing gear snagging

The baseline assessment showed that fishing activity does occur within the study area, however further data assessment will be required as part of the NRA to identify fishing levels and gear types in operation near the cable.

The charted presence of the cable should dissuade fishing activity to some extent, however previous experience suggests some vessels may continue to fish over installed cables, and there is therefore still a snagging risk during the operation and maintenance phase. It is noted that penetration of fishing gear is limited, and that this will therefore not necessarily lead to interaction, assuming the cable is suitably monitored and maintained.

This risk of snagging will be mitigated by clear marking of the cable on Admiralty Charts and suitable protection of the cable. Considering the highly localised nature of the operational SG1A export cable, but noting the approach of obtaining additional AIS data, further information on commercial fishing gears and activity levels, and the need to carry out an NRA, this impact **will be considered** further within the Environmental Appraisal.

6.8.5.9 Reduction in under keel clearance resulting from laid cable and associated protection

The cable, and associated protection, may lead to a reduction in under keel clearance. It should be ensured that the relevant policy guidance is followed. Considering the highly localised nature of the operational SG1A export cable, along with the expectation of maximising burial of the SG1A export cable where possible, but noting the relevant guidance, proposed approach of obtaining additional AIS data and the need to carry out an NRA, this impact **will be considered** further within the Environmental Appraisal.

6.8.5.10 Interference with Marine Navigational Equipment

The electromagnetic field created by buried direct current cables has the potential to create interference on a vessel's magnetic compass, in particular on smaller recreational vessels, as such vessels may lack more sophisticated navigational equipment on-board. As previously discussed, the installed single SG1A cable will be buried where possible and protected by a minimum of 1m of protection elsewhere, and so the expected EMFs emitted by the operational cable are expected to be minimal (as discussed in Section 6.4.3.5 and 6.6.5.3). In light of the proposed approach of obtaining further AIS data and consultation, this impact **will be considered** further within the Environmental Appraisal.

Table 6.15 summarises the impacts that will be considered further within the Environmental Appraisal that will accompany the SG1A Project Marine Licence application.

Table 6.15 Summary of the characteristics of potential impacts to shipping and navigation receptors associated with SG1A Project

Potential impact	Relevant phase of Project			To include in Environmental Appraisal
	Cable installation	Cable operation (maintenance and repair)	Decommissioning	
Collision of a passing (third party) vessel with a vessel associated with cable installation, maintenance or decommissioning	✓	✓	✓	Yes
Cable installation / decommissioning causing disruption to passing vessel routeing/timetables.	✓	X	✓	Yes
Increase in the risk of a vessel-to-vessel collision due to construction / decommissioning vessel activity	✓	X	✓	Yes
Cable installation / decommissioning causing disruption to fishing and recreational activities.	✓	X	✓	Yes

Potential impact	Relevant phase of Project			To include in Environmental Appraisal
	Cable installation	Cable operation (maintenance and repair)	Decommissioning	
Cable installation / decommissioning causing disruption to third party marine activities (military, dredging)	✓	X	✓	Yes
Vessel drags anchor over the cable	X	✓	X	Yes
Vessel anchors in an emergency over the cable	X	✓	X	Yes
A vessel engaged in fishing snags its gear on the cable	X	✓	X	Yes
Reduction in under keel clearance resulting from laid cable and associated protection	X	✓	X	Yes
Interference with Marine Navigational Equipment	X	✓	X	Yes

6.8.5.11 Cumulative Impacts

The nearby developments considered for cumulative impacts assessment have been outlined in Section 0, Table 6.15. Cumulative impacts will be considered within the Navigational Risk Assessment that will be undertaken as part of the Environmental Appraisal.

6.8.6 Conclusions and Proposed Methodology for the Environmental Appraisal

Taking account of selection criteria in Schedule 3 of the 2017 EIA Regulations the characterisation of potential impacts with respect to shipping and navigation is such that the proposed SG1A Project would not result in any significant adverse impacts to the environment. This finding supports a screening decision that the SG1A Project does not require an Environmental Impact Assessment.

The potential impacts on shipping and navigation arising from SG1A Project are not expected to be significant. It is considered that the installation of an additional single offshore export cable, which will involve temporary and short-term construction activities and the associated low levels of vessel activity required for SG1A Project (Table 4.1) will not give rise to any potential impacts either project alone or cumulatively. As discussed in Section 6.8.5, although there are not anticipated to be any significant risks associated with shipping and navigation, in light of the potential safety risks associated with several of the potential impacts identified for shipping and navigation receptors, the need for additional collection of further AIS data to develop a fully comprehensive resource and in consideration of the guidance and legislation for this topic, all the identified impacts **will be considered** further within the Environmental Appraisal.

In addition, in line with guidance note MGN 543 (MCA, 2016) an NRA is expected to be carried out for a proposed subsea cable, and therefore SG1A will undertake a NRA to accompany the Environmental Appraisal, and to assess the potential impacts to shipping and navigation receptors. This will use additional AIS data (12 months) and other sources (defined below) to define the baseline and will include consultation to verify desk-based data sources and fill in any gaps in information. Consultation will also be required to verify that there are no conflicts in the cable corridors with other marine users. Hazards will be identified and ranked and quantified where appropriate to inform the level of impact during construction, operation / maintenance and decommissioning with appropriate mitigation measures identified.

The proposed approach for considering potential impacts to shipping and navigation within the Environmental Appraisal will be defined following receipt of the screening opinion, initial consultation responses and discussions with MS-LOT.

6.8.6.1 Environmental Appraisal Data Sources

The primary input to the NRA will be 12 months of up-to-date marine traffic survey data, taking into account seasonal variations.

Additional data and information sources that will be reviewed include:

- Up to date hydrographic charts for the area
- Maritime incident data in the area (20 years)
- RYA coastal atlas and reference materials such as sailing almanacs
- Environmental statement studies for developments in close proximity
- Fishing vessel activity data (AIS and VMS satellite data)

6.8.6.2 Consultees

During the NRA, consultation with key navigational stakeholders in UK waters will be undertaken in order to obtain supplementary information. Parties consulted will include:

- Maritime and Coastguard Agency (MCA)
- Northern Lighthouse Board
- Chamber of Shipping
- Cruising Association
- Royal Yachting Association Scotland
- Forth Ports
- Scottish Fishermen’s Federation (SFF)
- Ministry of Defence

6.9 Marine Archaeology

This section provides a description of the marine archaeology baseline and characterises any potential impacts which may affect marine archaeology receptors during construction, operation and maintenance and decommissioning phases of the SG1A Project.

6.9.1 Key Data Sources

The key sources used to inform the marine archaeology section include:

- The Historic Environment and Cultural Heritage section on the Marine Scotland Information website, http://marine.gov.scot/themes/historic-environment-and-cultural-heritage [accessed 16-17/11/2020].
- Statutory lists, registers and designated areas, including List of Designated Wrecks and Historic Marine Protected Areas;
- UKHO wreck register and relevant nautical charts;
- The EIAs for offshore windfarms and transmission infrastructure in the Forth – Tay area (Inch Cape, 2011; 2018; Neart na Goaithe, 2012; Seagreen, 2012); and
- Other readily available website databases and publications were consulted for information and, where used, are cited in the text.

6.9.2 Study Area

The study area for marine archaeology (see Figure 1.1) comprises the SG1A Project area split into three distinct areas:

- Between Inch Cape and Seagreen Project;
- South of Inch Cape and north of Neart na Gaoithe offshore wind farms; and
- Where the western boundary of the SG1A Project extends out with the Inch Cape export cable corridor.

The remaining SG1A ECR to landfall has been excluded from the marine archaeology study area because the route design overlays that of the consented Inch Cape export cable corridor, for which an assessment has already been undertaken, and no significant impacts were predicted after mitigation.

6.9.3 Baseline Description

6.9.3.1 Statutory Designations

No marine cultural heritage statutory designations are present within the study area. However, if the Phantom jet (Section 6.9.3.4) or any other military aircraft are discovered, they would automatically fall under the Protection of Military Remains Act 1986 (PoMRA).

6.9.3.2 Submerged Prehistoric Archaeology and Landscapes

No evidence of prehistoric remains or submerged palaeolandscapes is known from the study area, partly at least due to a lack of data. Current research indicates that there is potential for submerged Holocene sediments and prehistoric remains to survive in this part of the North Sea, but the chances of survival are low for remains of moderate or higher importance (Bicket and Tizzard 2015; Dawson *et al* 2017; Flemming 2004; Sturt 2013).

However, the archaeological analysis of the geotechnical (borehole, Cone Penetrometer Tests and vibrocore logs) and geophysical surveys (bathymetry and sub-bottom profiling) conducted for the Seagreen Project (Seagreen, 2012) identified no organic sediments of any palaeoenvironmental interest, no relict land surfaces and no prehistoric remains. There were similar results from the geotechnical and geophysical datasets for the Neart na Goaithe Offshore Wind Farm (Neart na Goaithe, 2012), and the Inch Cape export cable area immediately south of the OWF boundary (Inch Cape, 2018), which covers part of the same area as the SG1A Project. Only three cores from close to the Lothian coastline, where the Inch Cape route and the proposed SG1A ECR are the same, were of high interest, containing definite organic material.

Therefore, the potential for the discovery of palaeoenvironmental evidence in the study area appears negligible and there is limited potential for residual artefacts in marine sediments.

6.9.3.3 Shipwrecks

Coastal archaeological evidence suggests exploitation of the marine environment in the North Sea for fishing and transport purposes from prehistoric times. There are many trading and fishing ports along the east coast of Scotland, and shipping along this coast and across the North Sea is well documented from the medieval period onwards (Wessex 2012). Therefore, there is a high probability for unknown, unrecorded vessels to have sunk in the general area over the centuries, although the likelihood of encountering wrecks dating before the 18th century is low (op. cit.). There are a significant number of known maritime losses from the 19th and 20th centuries, aircraft as well as vessels, with unknown or arbitrary locations in the wider Forth and North Sea basin. Therefore, there is a moderate potential for the discovery of unrecorded assets.

Appendix C provides an overview of known marine cultural heritage losses that may be or are known to be in the study area from the data sources listed in Section 6.9.1. Those with verified locations are plotted on Figure 6.25, as are losses that have been assigned locations that are unverified and may be in the study area. Without further investigation, wrecks of unknown identity must be considered of unknown importance. Dead wrecks (a UKHO term for located wrecks that have not been found on later surveys) should be considered as still potentially present.

Whilst some vessels in the study area were sunk by torpedo during wartime, their crews were all saved except for the SS *Avondale Park*. None of the vessel types or cargoes are of significant importance.

The reviews of geophysical survey datasets (sidescan sonar, magnetometry, multibeam echo sounding and swath bathymetry) collected for the Seagreen Project, Neart na Goaithe and Inch Cape developments identified anomalies or targets on the seabed in all development areas. All identified targets of high or moderate potential, some of which could be related to known sites, others not, including sites of high

importance such as submarines. Therefore, along with the assets identified by these surveys, there is known potential for the survival of heritage assets on the seabed of the SG1A Project that fall outwith the Inch Cape Export Cable geophysical survey area.

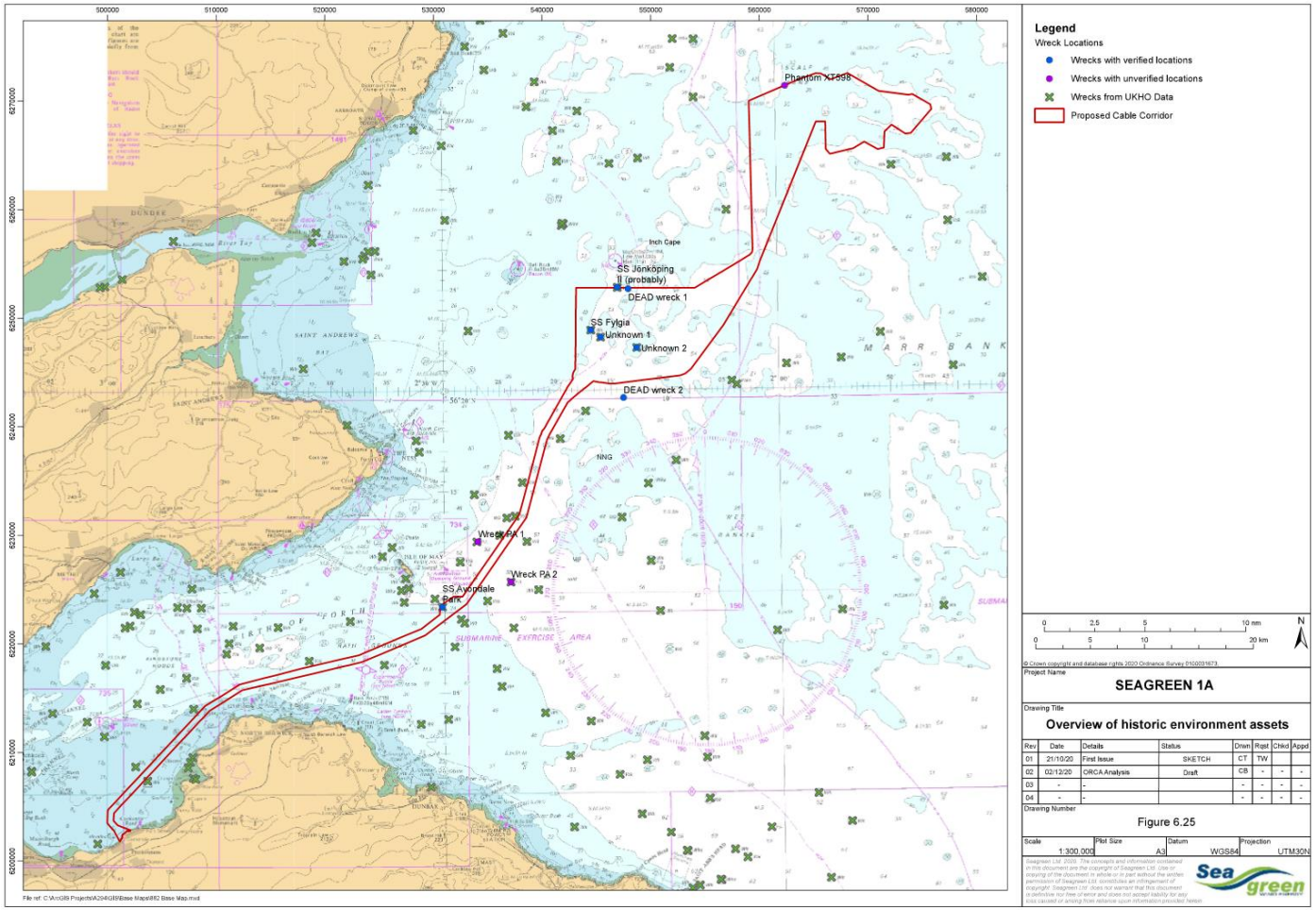

Figure 6.25 Marine Cultural Heritage Loss Locations

6.9.3.4 Aircraft

There is one aircraft potentially lost in the Study Area (Appendix C) – a Phantom FG1 from RAF Leuchars went missing in the area and was never located.

A number of aircraft did go missing without trace off eastern Scotland while on military service throughout the 20th century, though mostly during World War II (WWII). Although the likelihood of finding one within the Study Area is low, any such aircraft would automatically fall under the Protection of Military Remains Act 1986 (PoMRA).

The reviews of geophysical survey datasets (sidescan sonar, magnetometry, multibeam echo sounding and swath bathymetry) collected for the Seagreen Project, Neart na Goaithe and Inch Cape developments identified anomalies or targets on the seabed in all development areas. All identified targets of high or moderate potential, some of which could be related to known sites, others not, including a possible aircraft. Therefore, there along with the assets identified by these surveys, there is known potential for the survival of heritage assets on the seabed of the SG1A Project that fall outwith the Inch Cape Export Cable geophysical survey area.

6.9.3.5 Historic UXO

Although wartime losses have been identified, the study area is outside the main north-south shipping lanes up the east side of Scotland and east-west into the major ports, and so was not particularly prone to offensive mine activity in wartime.

During World War I, there was extensive mine laying off the Isle of May, the entrance to the Tay and Firth of Forth and in 1918 four large minefields with over 320 mines were laid offshore west of the study area (Bi Monthly mine sweeping report 1st Aug- 18th Aug 1918 (National Archives Kew: ADM 116-1518)). Between March 1917 and February 1918, the Granton minesweeping flotilla reported sinking several British mines off Bell Rock lighthouse.

In World War II there were several defensive minefields in the waters east of the Firth of Forth up to Rattray Head and in the Moray Firth, with the nearest being the British field SN 17 laid on 2 February 1942 (National Archives OCB M.6500A: British Islands and Adjacent Waters Minefield Index Chart 1945). The SS Einar Jarl, a charted wreck just south of the Study Area, struck what is thought to be a floating mine and not part of a German offensive mine field.

6.9.4 Mitigation and Management Measures

SG1A Project mitigation and management measures are presented in Section 4.7 and have been included when characterising the potential impacts to marine archaeology. Potential impacts for marine historic environment receptors have been identified, alongside additional mitigation measures, in Table 6.16. This extensive list has been used to ensure that all relevant development activities have been considered and to provide appropriate additional mitigation measures that will result in no significant impacts.

Table 6.16 - Potential environmental impacts and mitigations for marine historic environment receptors

Impact	Description of Impact	Mitigation Measures
Construction		
Surveys: Geotechnical coring	Seabed disturbance resulting in loss or damage to submerged deposits, wrecks, aircraft or anthropogenic geophysical anomalies	None required in relation to submerged deposits because other studies have shown that the potential for the discovery of palaeoenvironmental evidence in the study area appears negligible. Cores will be located to avoid any known seabed heritage assets.
Dredging / seabed clearance	Seabed disturbance resulting in loss or damage	Avoidance of any identified seabed heritage assets and geophysical anomalies
Trenching / Jetting	Seabed disturbance resulting in loss or damage	Avoidance of any identified seabed heritage assets and geophysical anomalies
Installation of cable protection / crossings	Seabed disturbance resulting in loss or damage	Avoidance of any identified seabed heritage assets and geophysical anomalies
Installation vessel anchoring	Seabed disturbance resulting in loss or damage	Use of Dynamic Positioning Systems, or if anchors necessary, avoidance of any identified seabed heritage assets and geophysical anomalies
Operation & Maintenance		
Use of cable protection, such as rock armour	Seabed compression / scouring resulting in loss or damage	Use of protection systems that do not result in seabed scouring. Avoidance of any identified seabed heritage assets and geophysical anomalies
Surface-laid cable dragging / scouring	Seabed disturbance resulting in loss or damage	Use of cable protection systems to weigh down cable to prevent movement
Anchoring of maintenance and inspection vessels	Seabed disturbance resulting in loss or damage	Use of Dynamic Positioning Systems, or if anchors necessary, avoidance of any identified seabed heritage assets and geophysical anomalies
Decommissioning		
Dragging / scouring	Seabed disturbance resulting in loss or damage	Ensure cable is lifted cleanly and not dragged across the seabed
Exposing trench	Seabed disturbance resulting in loss or damage	Ensure the trench created during installation is not widened on removal. Installation trench will have avoided any seabed assets

Impact	Description of Impact	Mitigation Measures
Anchoring of decommissioning vessels	Seabed disturbance resulting in loss or damage	Use of Dynamic Positioning Systems, or if anchors necessary, avoidance of any identified seabed heritage assets and geophysical anomalies

6.9.5 Characteristics of Potential Impacts

This section characterises the potential impacts which have been identified for marine archaeology receptors and provides recommendations on whether further consideration is required in the Environmental Appraisal to be submitted with the SG1A Project application for Marine Licence. A summary of the potential impacts and conclusions are included in Table 6.17.

6.9.5.1 Seabed disturbance

No evidence of prehistoric remains, deposits or submerged palaeolandscapes is known from the sub-bottom profile survey data or analysis of the geotechnical cores from any of the developments that surround the SG1A Study Area. Therefore, it is concluded that seabed disturbance will not result in loss or damage to paleoenvironmental deposits or prehistoric remains and **will not be included** within the Environmental Appraisal.

6.9.5.2 Seabed compression or scouring

The project design will have embedded engineering solutions to the potential impacts of scouring on the seabed, using appropriate cable protection. Therefore, no potential impacts are predicted on marine historic assets on the seabed from this pathway and therefore **will not be included** within the Environmental Appraisal.

6.9.5.3 Seabed disturbance to shipwrecks, aircraft or anthropogenic anomalies

Avoidance of known seabed assets will be embedded in the project design. Therefore, no potential significant impacts are predicted on shipwrecks, aircraft or anthropogenic geophysical anomalies. It is acknowledged however, that to allow for the identification of seabed assets that require avoidance and consultation with the statutory authorities to ensure avoidance of any direct disturbance, this impact **will be considered further** within the Environmental Appraisal.

Table 6.17 - Summary of the characteristics of potential impacts to marine archaeology receptors associated with SG1A Project

Potential impact (after management and mitigation)	Relevant phase of Project			To include in Environmental Appraisal
	Cable installation	Cable operation (maintenance and repair)	Decommissioning	
Seabed disturbance resulting in loss or damage of prehistoric remains or submerged palaeolandscape deposits	X	X	X	No
Seabed compression / scouring resulting in loss or damage to shipwrecks, aircraft or anthropogenic geophysical anomalies	X	X	X	No
Seabed disturbance resulting in loss or damage to shipwrecks, aircraft or anthropogenic geophysical anomalies	✓	X	X	Yes

6.9.5.4 Cumulative Impacts

It is highly unlikely that the installation, operation or decommissioning of the SG1A Project presents any potential for significant cumulative impacts on historic marine assets on the seabed, since the named projects (see Section 6.1.1) have been, are, or will be designed to avoid any significant impacts on marine archaeology assets. Therefore, cumulative impact for the SG1A Project in relation to the marine historic environment **will not be included** within the Environmental Appraisal.

6.9.6 Conclusion and Proposed Methodology for the Environmental Appraisal

Taking account of selection criteria in Schedule 3 of the 2017 EIA Regulations the characterisation of potential impacts with respect to marine archaeology receptors is such that the proposed SG1A Project would not result in any significant adverse impacts to the environment. This finding supports a screening decision that the SG1A Project does not require an Environmental Impact Assessment.

However, as presented above, one impact will be considered in further detail in the Environmental Appraisal in support of the Marine Licence application:

- Seabed disturbance resulting in loss or damage to shipwrecks, aircraft or anthropogenic geophysical anomalies.

The proposed approach for considering potential impacts to marine archaeology within the Environmental Appraisal will be defined following receipt of the screening opinion, initial consultation responses and discussions with MS-LOT. For any marine archaeology impacts, the appraisal will be conducted based on analysis of desk-based sources and geophysical data that already exists.

The appraisal would address the identification of any marine historic assets on the seabed, so that avoidance of impact can be embedded in the project design, and if avoidance is not possible, then an

evidence-based approach will be used to design suitable mitigation strategies in consultation with MS-LOT and Historic Environment Scotland (HES).

The SG1A Project will prepare a marine heritage Written Scheme of Investigation and Protocol for Accidental Discoveries to avoid or mitigate accidental impacts and manage any accidental discoveries of archaeological interest. This would be based on standard professional guidelines, including The Crown Estate's 2010 *Model Clauses for Written Schemes of Investigation: Offshore Renewables Projects* (this is currently under revision, so the revised edition if issued in time will be utilised instead).

7. Proposed supporting information required for Marine Licence application

7.1.1 Environmental Appraisal

An Environmental Appraisal will be developed to support the SG1A Project Marine Licence application. This will build upon the information and conclusions provided within this Screening Report. Table 7.1 provides a summary of the potential impacts that will be considered further in the Environmental Appraisal.

Table 7.1 - Summary of impacts to be considered in the Environmental Appraisal

Potential Impacts	**Relevant phase of SG1A Project Installation**		
	Cable installation	**Cable operation**	**Cable decommissioning**
Commercial Fisheries			
Temporary loss or restricted access to fishing grounds	✓	✓	✓
Displacement of fishing activity into other areas	✓	x	✓
Safety issues for fishing vessels, including allision and collision and potential for snagging with project infrastructure	✓	✓	✓
Shipping and Navigation			
Collision of a passing (third party) vessel with a vessel associated with cable installation, maintenance or decommissioning	✓	✓	✓
Cable installation / decommissioning causing	✓	X	✓

disruption to passing vessel routeing/timetables.			
Increase in the risk of a vessel-to-vessel collision due to construction / decommissioning vessel activity	✓	**X**	✓
Cable installation / decommissioning causing disruption to fishing and recreational activities.	✓	**X**	✓
Cable installation / decommissioning causing disruption to third party marine activities (military, dredging)	✓	**X**	✓
Vessel drags anchor over the cable	**X**	✓	**x**
Vessel anchors in an emergency over the cable	**x**	✓	**X**
A vessel engaged in fishing snags its gear on the cable	**x**	✓	**X**
Reduction in under keel clearance resulting from laid cable and associated protection	**x**	✓	**X**
Interference with Marine Navigational Equipment	**X**	✓	**x**
Marine Archaeology			
Seabed disturbance resulting in loss or damage to shipwrecks, aircraft or anthropogenic geophysical anomalies	✓	**X**	**X**

Seagreen 1A will review the Screening Response received and will incorporate any comments from MS-LOT and other stakeholders provided in the Screening Response into the Environmental Appraisal, to ensure that the information provided in the Environmental Appraisal meets MS-LOT requirements with respect to the Marine Licence application.

7.1.2 Nature Conservation Appraisal (NCA)

In support of the Marine Licence Application, a Nature Conservation Appraisal (NCA) will also be produced and submitted as an appendix to the Environmental Appraisal. The NCA will consider the potential effects to key protected sites and species. This will provide Marine Scotland with the information they require in order to undertake a HRA and a NCMPA appraisal (as required). The NCA will incorporate the following:

- HRA as required under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended):
  - Screening to determine whether there is a potential for a LSE on designated Natura 2000 sites, and consideration of proposed SPAs.
  - If an LSE is identified, then the HRA will provide additional information in order to allow Marine Scotland to carry out an appropriate assessment.
- NCMPA Appraisal as required under the Marine (Scotland) Act 2010:
  - Initial screening to determine whether a project is reasonably capable of affecting a protected site; and
  - If it is concluded that a project is capable of affecting a protected site, the main assessment to determine whether the exercise of a function would or might significantly hinder, or there is or may be a significant risk of the act hindering the achievement of the conservation objectives.

As presented in this Screening Report, no adverse impacts are considered likely from any phase of the SG1A Project in relation to the physical environment, benthic ecology, ornithology, natural fish and shellfish and marine mammals. Therefore, no LSE on a designated Natura 2000 site and no effect on an NCMPA is expected and this will be clearly documented in the NCA submitted in support of the SG1A Marine Licence application.

7.1.3 Navigation Risk Assessment (NRA)

In order to assess potential risks associated with the SG1A Project in terms of shipping and navigation, it is proposed that a desk-based NRA is carried out. Further details of the proposed approach to the NRA are provided in Section 6.8.6.

8. Conclusions

On the basis of the information presented in this Screening Report, Seagreen 1A is requesting that Scottish Ministers make a determination that an EIA under the 2017 EIA Regulation is not required to support the SG1A Project Marine Licence application.

The proposed works for the SG1A project may be considered to represent a change or extension to an authorised project and therefore may be considered to fall under the description of projects provided at Paragraph 13 of Schedule 2 of the 2017 EIA Regulations (i.e. a change to an installation for the harnessing of wind power for energy production (wind farms) where those works are already authorised). The 2017

EIA Regulations specify that in making a determination as to whether or not a Schedule 2 project is an EIA project, the relevant criteria set out in Schedule 3 must be considered together with the results of any relevant assessment.

In summary, having considered the matters outlined within Schedule 3 of the 2017 EIA Regulations in terms of the characteristics and location of the project and the characteristics of the potential impacts, the content of this Screening Report has determined that the proposed SG1A Project is not likely to have significant adverse effects on the environment and supports a screening decision that the SG1A Project does not require an Environmental Impact Assessment.

Although it is expected that no significant impacts will occur to any offshore receptor due to the SG1A Project, in consideration of further studies which are required to provide a comprehensive set of desk based resources, consultation which is needed and in light of specific guidance and legislation some potential impacts will be considered further within the Environmental Appraisal, in support of the Marine Licence application. These are presented in Section 6 and summarised in Section 7.1.1 of this document.

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Appendix A. Spawning and nursery periods of fish and shellfish species in the vicinity of the SG1A Project

(S = spawning, S*=peak spawning, N = nursery, species= high spawning intensity as per Ellis et al., 2012, species = high nursery intensity as per Ellis et al., 2012

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Anglerfish	N	N	N	N	N	N	N	N	N	N	N	N
Blue Whiting	N	N	N	N	N	N	N	N	N	N	N	N
Cod	SN	S*N	S*N	SN	N	N	N	N	N	N	N	N
Common Skate	N	N	N	N	N	N	N	N	N	N	N	N
European Hake	N	N	N	N	N	N	N	N	N	N	N	N
Herring	N	N	N	N	N	N	SN	S*N	S*N	N	N	N
Lemon Sole	N	N	N	SN	SN	SN	SN	SN	SN	N	N	N
Ling	N	N	N	N	N	N	N	N	N	N	N	N
Mackerel	N	N	N	N	N	N	N	N	N	N	N	N
Nephrops	SN	SN	SN	S*N	S*N	S*N	SN	SN	SN	SN	SN	SN
Plaice	S*N	S*N	SN	N	N	N	N	N	N	N	N	SN
Saithe	N	N	N	N	N	N	N	N	N	N	N	N
Sandeel	SN	SN	N	N	N	N	N	N	N	N	SN	SN
Spotted Ray	N	N	N	N	N	N	N	N	N	N	N	N
Sprat	N	N	N	N	N	N	N	N	N	N	N	N
Spurdog	N	N	N	N	N	N	N	N	N	N	N	N
Tope Shark	N	N	N	N	N	N	N	N	N	N	N	N
Whiting	N	SN	SN	SN	SN	SN	N	N	N	N	N	N

Appendix B. The status of marine bird species in the Marine Ornithology Study Area, and their vulnerability to vessel disturbance and potential for connectivity to SPAs

Species	Seasonality			Status in offshore marine areas	Status in inshore marine areas	SPAs with potential for connectivity
	Breeding locally	Passage migrant	Wintering			
Eider	Yes		Yes		Regular	Firth of Forth SPA, non-breeding Outer Firth of Forth and St Andrews Bay pSPA, non-breeding Firth of Tay & Eden Estuary SPA, non-breeding Montrose Basin SPA, non-breeding
Long-tailed duck			Yes		Regular	Firth of Forth SPA, non-breeding Outer Firth of Forth and St Andrews Bay pSPA, non-breeding Firth of Tay & Eden Estuary SPA, non-breeding
Common scoter			Yes		Regular	Firth of Forth SPA, non-breeding Outer Firth of Forth and St Andrews Bay pSPA, non-breeding Firth of Tay & Eden Estuary SPA, non-breeding
Velvet scoter			Yes		Regular	Firth of Forth SPA, non-breeding Outer Firth of Forth and St Andrews Bay pSPA, non-breeding Firth of Tay & Eden Estuary SPA, non-breeding
Goldeneye			Yes		Regular	Firth of Forth SPA, non-breeding Outer Firth of Forth and St Andrews Bay pSPA, non-breeding Firth of Tay & Eden Estuary SPA, non-breeding

Species	Seasonality			Status in offshore marine areas	Status in inshore marine areas	SPAs with potential for connectivity
	Breeding locally	Passage migrant	Wintering			
Red-breasted merganser			Yes		Regular	Firth of Forth SPA, non-breeding Outer Firth of Forth and St Andrews Bay pSPA, non-breeding Firth of Tay & Eden Estuary SPA, non-breeding
Red-throated diver			Yes		Regular	Firth of Forth SPA, non-breeding Outer Firth of Forth and St Andrews Bay pSPA, non-breeding
Black-throated diver			Yes		Scarce	None likely
Fulmar	Yes	Yes	Yes	Regular	Scarce	Fowlsheugh SPA, breeding
Manx shearwater	Recent breeding on Isle of May	Yes		Scarce		Outer Firth of Forth and St Andrews Bay pSPA, breeding
Gannet	Yes		Yes	Regular	Regular	Forth Islands SPA, breeding
Cormorant	Yes		Yes		Regular	Forth Islands SPA, breeding Firth of Forth SPA, non-breeding
European shag	Yes		Yes	Scarce	Regular	Forth Islands SPA, breeding Outer Firth of Forth and St Andrews Bay pSPA, breeding & non-breeding
Little grebe			Yes		Scarce	None likely
Great-crested grebe			Yes		Scarce	Firth of Forth SPA, non-breeding Outer Firth of Forth and St Andrews Bay pSPA, non-breeding

Species	Seasonality			Status in offshore marine areas	Status in inshore marine areas	SPAs with potential for connectivity
	Breeding locally	Passage migrant	Wintering			
Red-necked grebe			Yes		Scarce	Firth of Forth SPA, non-breeding
Slavonian grebe			Yes		Scarce	Firth of Forth SPA, non-breeding Outer Firth of Forth and St Andrews Bay pSPA, non-breeding
Puffin	Yes		Yes	Regular	Scarce	Forth Islands SPA, breeding Outer Firth of Forth and St Andrews Bay pSPA, breeding
Razorbill	Yes		Yes	Regular	Regular	Forth Islands SPA, breeding Fowlsheugh SPA, breeding St Abb's Head to Fast Castle SPA, breeding Outer Firth of Forth and St Andrews Bay pSPA, breeding & non-breeding
Guillemot	Yes		Yes	Regular	Regular	Forth Islands SPA, breeding Fowlsheugh SPA, breeding St Abb's Head to Fast Castle SPA, breeding Outer Firth of Forth and St Andrews Bay pSPA, breeding & non-breeding
Little auk			Yes	Regular	None likely	
Pomarine skua		Yes		Scarce	Scarce	None likely
Arctic skua		Yes		Scarce	Scarce	None likely
Great skua		Yes		Scarce	Scarce	None likely
Sandwich tern	Yes	Yes	Yes	Scarce	Regular	Forth Islands SPA, breeding Firth of Forth SPA, passage

Species	Seasonality			Status in offshore marine areas	Status in inshore marine areas	SPAs with potential for connectivity
	Breeding locally	Passage migrant	Wintering			
Common tern	Yes	Yes	Yes	Scarce	Regular	Forth Islands SPA, breeding Imperial Dock Leith SPA, breeding Outer Firth of Forth and St Andrews Bay pSPA, breeding
Arctic tern	Yes	Yes	Yes	Scarce	Scarce	Forth Islands SPA, breeding Outer Firth of Forth and St Andrews Bay pSPA, breeding
Roseate tern	Yes			Scarce	Scarce	Forth Islands SPA, breeding
Kittiwake	Yes		Yes	Regular	Scarce	Forth Islands SPA, breeding Fowlsheugh SPA, breeding St Abb's Head to Fast Castle SPA, breeding Outer Firth of Forth and St Andrews Bay pSPA, breeding & non-breeding
Black-headed gull	Yes		Yes	Scarce	Regular	Outer Firth of Forth and St Andrews Bay pSPA, non-breeding
Common gull	Yes		Yes	Scarce	Regular	Outer Firth of Forth and St Andrews Bay pSPA, non-breeding
Lesser black-backed gull	Yes		Yes	Regular	Regular	Forth Islands SPA, breeding
Herring gull	Yes		Yes	Regular	Regular	Forth Islands SPA, breeding St Abb's Head to Fast Castle SPA, breeding Outer Firth of Forth and St Andrews Bay pSPA, breeding & non-breeding
Great black-backed gull	Yes		Yes	Regular	Regular	None likely
Little gull		Yes		Scarce	Scarce	Outer Firth of Forth and St Andrews Bay pSPA, non-breeding

Appendix C. Overview of identified marine historic environment assets

Name	UKHO Wreck Number	Canmore ID	Description	Circumstance of loss	Date Lost	Lat (WGS84)	Long (WGS84)	Source	Importance
SS Jönköping II (probably)	3003	121116, 201634, 325983	Swedish Steamship. Built 1888. Gourlay Brothers & Co. (Dundee) Ltd., Dundee. 1274 tons. Steel. 74.8m x 10.4m x 4.9m. Cargo: Göteborg to Hull with general cargo. Ex-SS Ardle	Sunk by torpedo from UC49 (Hans Kükenthal) Crew survived.	24/01/1918	56 25.073N	02 14.348W	1,2,3,5,6	Low
DEAD wreck 1	3002		Located in 1955 by HMS Welcome. Not located by Guardline survey in 2008. Amended to ''DEAD''			56 24.994N	02 13.395W	4	
SS Fylgia	2997	201631, 322309	Swedish Steamship, Built 1889. William Dobson & Co., Newcastle-Upon-Tyne. 1741 tons. 81.1m x 11.3m x 4.9m. Göteborg to Rouen with a general cargo including wood pulp & steel ingots	Sunk by torpedo from UC49 (Hans Kükenthal) Crew survived.	24/01/1918	56 22.966N	02 16.763W	1,2,3	Low
Unknown 1	2995		Unknown wreck 19m long lying 048/228			56 22.61N	02 15.894W	3	Unknown

Name	UKHO Wreck Number	Canmore ID	Description	Circumstance of loss	Date Lost	Lat (WGS84)	Long (WGS84)	Source	Importance
Unknown 2	2994		Unknown wreck 26m x 8m x 4.1m lying 140/220			56 22.077N	02 12 .676W	3	Unknown
DEAD wreck 2	2990		Located in 1975 but not located by Guardline survey in 2008. Amended to ''DEAD''. Location from 1975 may not have been accurate and so missed by the 2008 survey.			56 19.594N	02 13.894W	3	Unknown
Phantom XT598	3179	315446	Aircraft. McDonnell Douglas] Phantom FG1. 111 Sgn RAF Leuchars	Crashed 056 deg, 16.1 miles Bell Rock. Two crew lost. Not located.	23/11/1978	56 34.99N	01 59.097W	1,3,4,7	High
SS Avondale Park	2934	102069	British Steamship. Built 1944. Foundation Maritime Ltd., Pictou, Pictou Canada. 2878 tons. Hull for Belfast	Torpedoed by U-2336. Part of Convoy EN-91. Last U boat action on WW2. Two crew lost	07/05/1945	56 09.279N	02 30.215W	1,2,3,5,6,8	Medium
Ulundi DE 107		315245	Dundee Steam Trawler, iron. Built 1894 by Cook, Welton & Gemmell Ltd., Beverley (Hull) 131 tons.28.5 x 6.2 x 3.4.	Sunk following a collision off Bell Rock. Crew survived	02/10/1911			1,4,7	Low

Name	UKHO Wreck Number	Canmore ID	Description	Circumstance of loss	Date Lost	Lat (WGS84)	Long (WGS84)	Source	Importance
Wreck PA 1	2960		Unknown wreck located by sonar in 1960.			56 12,500N	02 27.000W	3	Unknown
Wreck PA 2	2948		Wreck located in 1919. Listed as a bad obstruction in the Kingfisher Book of Tows Vol 1 (1979)			56 10,495N	02 24,092W	3	Unknown

1 = Whittaker (1998); 2 = Larn & Larn (1998); 3 = UKHO; 4 = Wrecksite.eu; 5 = Baird B (1993); 6 = Baird B (2016); 7 = Britishnewspaperarchive.com; 8 = Ridley, G. (1992).