TotalEnergies E&P UK Ltd

Culzean Floating Wind Pilot

EIA Scoping Report

ASSIGNMENT A100811-S00
DOCUMENT A-100811-S00-A-REPT-001

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1 INTRODUCTION

1.1 Purpose of this Report

This Scoping Report has been generated in support of the request for a formal Scoping Opinion under The Marine Works (Environmental Impact Assessment) Regulations 2007 (the EIA regulations) in relation to the Culzean Floating Wind Pilot Project (hereafter referred to as the 'Project') from the Scottish Ministers. The Project infrastructure is located within the Scottish Economic Exclusive Zone (EEZ) between 12 nautical miles (NM) and the EEZ boundary. As such, the Scottish Ministers are the relevant decision maker in respect of the necessary offshore consents and licences required for the construction and operation of the Project.

This Scoping Report identifies the impact pathways and key sensitive receptors that will be considered in the Environmental Impact Assessment (EIA) and aims to provide a structure for consultation and content in the EIA that will support the consenting application for the Project. The approach to the Project consents required is set out at Section 1.5. Within this Scoping Report several environmental and human receptors are identified, and the predicted impacts of the Project on these receptors are considered. Receptors have been scoped in or out of this report through an analysis of available data for the Project, using professional judgement and through applying lessons learned from previous Scoping Opinions for offshore wind farms in Scotland.

1.2 Company Background

TotalEnergies E&P UK Limited (TEPUK) is one of the largest offshore oil and gas operators on the UK continental shelf. TEPUK has three main asset groups in Scottish Offshore Waters:

- West of Shetland – four producing fields with further exploration potential;
- Northern North Sea – a core production hub with growth opportunities; and
- Central North Sea – including the Culzean field (which came onstream in 2019) and Elgin Franklin field.

TotalEnergies (TEPUK's parent company), is targeting installation of 35 Gigawatts (GW) of renewables by 2025 and 100 GW by 2030 worldwide. TotalEnergies is developing a portfolio of offshore wind projects in the UK through TotalEnergies Renewables UK Limited (TRUK). TEPUK and TRUK are both based in Aberdeen, and work closely together.

TEPUK is eager to secure leasing rights and consent for the construction and deployment of a Culzean Floating Wind Pilot (CFWP) in Scottish Marine Waters, demonstrating TEPUK's commitment to support the growth of cleaner energy production and its ability to deliver it, and to meet the North Sea Transition Authority (NSTA) net zero targets.

1.3 Project Overview

TEPUK is proposing to demonstrate the possibility of electrifying existing oil and gas assets in the North Sea via the installation of a floating turbine, which would connect to the existing oil and gas platform (Culzean Field). The aims of the Project are to deploy one floating wind turbine with a capacity of 3 MW, test floater and mooring system technologies for offshore floating wind and to demonstrate the feasibility of platform electrification. The current Culzean Field comprises a Well Head Platform (WHP), a Central Processing Facility Platform (CPF) and a separate Utilities and Living Quarter Platform (ULQ). It is proposed that the floating turbine will be linked to the CPF via a 2 km export cable (Figure 1-1).

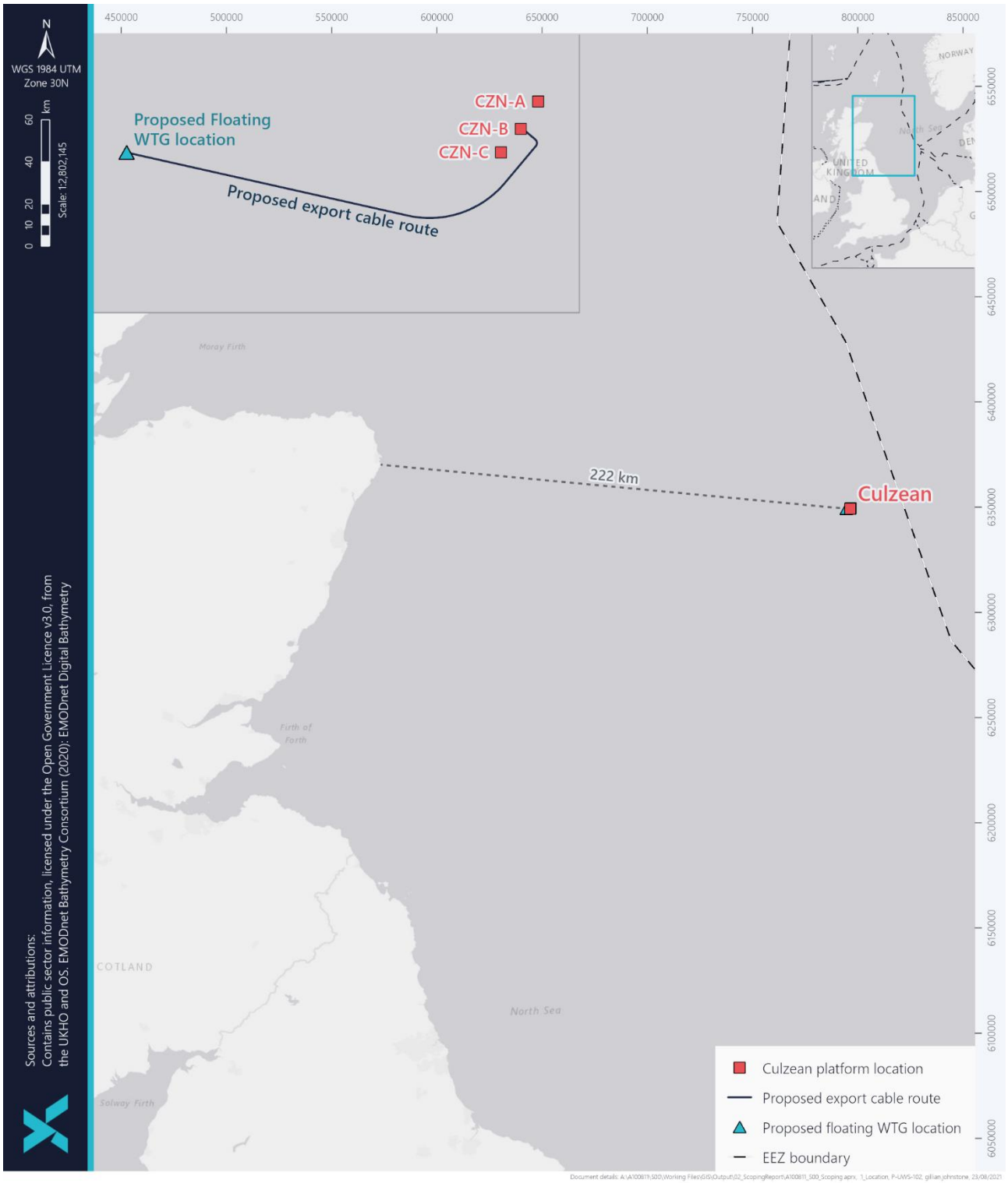

Figure 1-1 Location of the Project

TotalEnergies will combine the knowledge gained through its stakes in Seagreen and the West of Orkney wind project to test and develop the feasibility of electrification for their platforms in UK offshore waters but also worldwide. The

Project does not require a grid connection to shore, and the Project Development Area will be entirely within the offshore region between 12 NM and EEZ boundary.

The rationale of the project is to trial the new floater technology using a readily available turbine design. The new floater technology will deliver opportunities for significant cost savings, industrialisation of larger projects, and provide TEPUK with valuable experience in the hybridization of assets; with the Culzean Field providing an additional opportunity to pilot the integration with an oil and gas installation for the provision of power. The water depth at Culzean facilities (circa 90 m) provides an ideal environment to trial the pilot floating technology. Furthermore, TEPUK has extensive knowledge of the Culzean Field and surrounding area which will facilitate rapid deployment.

The pilot will ensure the validation of harsh environment experience through operational feedback prior to any further developments. The pilot also provides an opportunity for environmental monitoring in the offshore environment. TEPUK are currently investigating participation in several ongoing projects with the potential to provide the Project as a test site for a number of environmental monitoring projects. TEPUK have issued a letter to Strathclyde University expressing our intention to support the Engineering and Physical Sciences Research Council (EPSRC) project proposal, which focuses on visualizing electromagnetic fields (EMF). As part of our contribution, we will provide an EMF dataset recorder around the Culzean floating pilot.

TEPUK believes establishing an innovative, net zero transition flagship project in the UK would demonstrate the commitment to energy transition and unlock further development potential. This project would lead to an immediate UK supply chain engagement, enable proof of the concept, support cost reduction initiatives, foster cross sector learnings and reinforce the offshore wind net zero ambition whilst further developing Scotland as a centre for innovation and technical excellence.

1.4 Location and Extent

The Culzean Field is located in the Central North Sea (CNS), in an area of important oil and gas activities. Culzean Field is also located in proximity to several TEPUK operated assets, such as Elgin Franklin. The CNS is a dynamic environment, providing opportunities for electrification and decarbonisation. Culzean is within the offshore wind Innovation and Targeted Oil and Gas (INTOG) lease area E-a, and the Project's application was confirmed in March 2023 (Figure 1-2).

TEPUK proposed to install a floating turbine (around 3 MW) approximately 222 km east of Aberdeen (Figure 1-1).

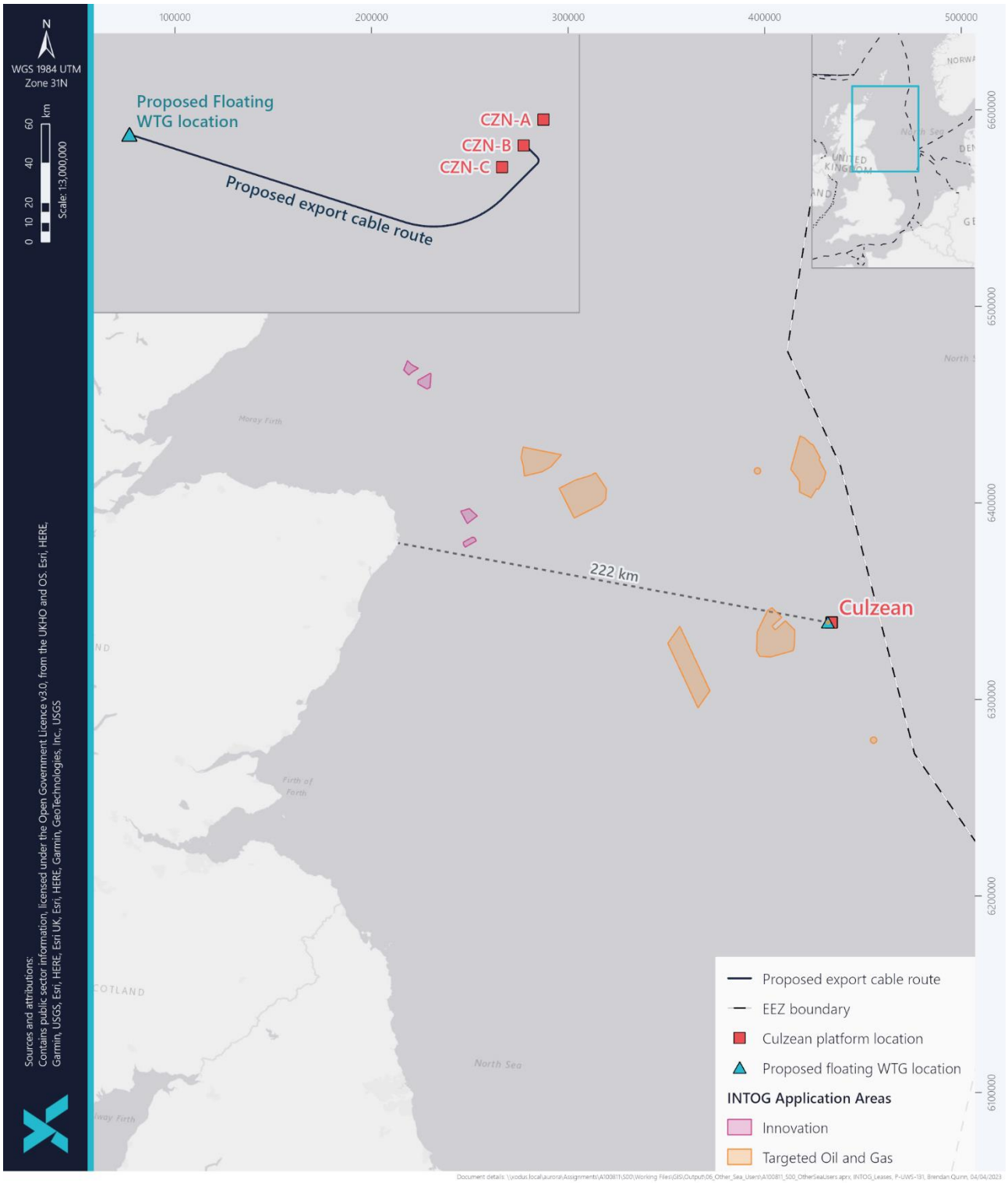

Figure 1-2 INTOG Lease Areas

1.5 Consenting Approach

As TEPUK is proposing to install the Project with a capacity of 3 MW in Offshore Scottish waters, the following key consent and licence is required from the Scottish Ministers:

- Marine Licence under the Marine and Coastal Access Act 2009 (developments between 12 and 200 NM).

The Marine Licence will cover the installation and operation of the floating turbine and the export cable to the Culzean Field.

Other licences and declarations that may be applied for include:

- Marine Licences for enabling works and ancillary activities under the Marine and Coastal Access Act 2009;
- European Protected Species (EPS) Licences under the Conservation (Natural Habitats, &c) Regulations 1994; and
- Safety Zones under the Energy Act 2004.

The Project would qualify as requiring an EIA under, the Marine Works (EIA) Regulations 2007. For this reason, the Project team has elected not to undergo the Screening stage of the EIA process and proceeded straight to scoping.

Any modifications to the Culzean Field will be consented directly with the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED). This may include:

- Changes to the platform height, under Part 4A of the Energy Act 2008;
- Changes related to power generation, under the Offshore Combustion Installations (Pollution Prevention and Control) Regulations 2013 (as amended).

TEPUK will liaise with OPRED directly on the issues relating to changes to the existing platform.

1.6 Innovation and Targeted Oil and Gas Decarbonisation Leasing Approach

The INTOG Initial Plan Framework sets out a spatial plan to which the INTOG leasing process is aligned. Crown Estate Scotland (CES) announced a new leasing round for INTOG projects. Under the INTOG process, seabed lease rights will be awarded to offshore wind farm projects that provide low carbon electricity to power oil and gas installations (to help to decarbonise the sector) or to small-scale innovation projects. The spatial planning exercise was confirmed in August 2020 and initial information on the leasing process was published in February 2022 along with the Initial Plan Framework for a Sectoral Marine Plan for INTOG (Marine Scotland, 2022); seabed lease applications were then submitted to CES in November 2022. There are two lease types available:

- IN - Small scale innovation projects of less than 100 MW; and
- TOG - Projects connected directly to oil and gas infrastructure to support the decarbonisation of the oil and gas sector (no minimum or maximum capacity per TOG project; the maximum total installed capacity across all TOG projects is up to 5.7 GW).

TEPUK successfully submitted a TOG lease application to the CES in 2022. An exclusivity offer was awarded to TEPUK in March 2023.

1.7 Document Structure

This Scoping Report follows the structure outlined in Table 1-1 and sets out the chapters and approach relevant to each EIA topic.

Table 1-1 Scoping Report Document Structure

CHAPTER	CHAPTER TITLE	OVERVIEW
1	Introduction	Provides an introduction to the applicant and the Project, outlines the objective of the Scoping Report and the consenting strategy for the Project.
2	Legislative Context and Regulatory Requirements	Sets out the need for the Project and the relevant policy and legislative context.
3	Project Description	Provides a description of the key components of the Project.
4	Stakeholder Engagement	Outlines stakeholder consultation conducted to date and the proposed approach to further consultation.
5	Approach to Scoping and EIA	Outlines the approach taken for Scoping and the methodology proposed for the EIA.
6	Offshore Physical Environment Topics - specific EIA Scoping chapters	Topic specific sections cover: An outline of the baseline characterisation; • Scoping of impacts, including embedded mitigation; • Identification of potential cumulative and transboundary effects; and • An outline of the proposed approach to the EIA.
7	Offshore Biological Environmental Topics - specific EIA Scoping chapters	
8	Offshore Human Environment Topics - specific EIA Scoping chapters	
9	Summary of Potential Impacts	Summarises the approach taken to Scoping and the key findings of the Report.
10	Suggested Structure of the EIA Report (EIAR).	Outlines the proposed structure of the EIAR.

1.8 References

Marine Scotland (2022). Sectoral Marine Plan – Offshore Wind for Innovation and Targeted Oil and Gas Decarbonisation (INTOG): initial plan framework. https://www.gov.scot/publications/initial-planframework-sectoral-marine-plan-offshore-wind-innovation-targeted-oil-gas-decarbonisation-intog/

2 LEGISLATION AND POLICY

Table 2-1 outlines the key relevant legislation and policy for the Project relating to international obligations, the need for the Project (UK and Scottish climate change and renewable energy policy and legislation), planning policy and legislation, consent requirements and nature and conservation.

Table 2-1 Legislation and policy Relevant to the Project

LEGISLATION AND/OR POLICY	SUMMARY
Climate Change and Renewable Energy – International	
Kyoto Protocol under the United Nations Framework Convention on Climate Change	The Kyoto Protocol 'operationalised' the United Nations Framework Convention on Climate Change by committing state parties to reduce greenhouse gas emissions. The protocol came into effect in 2005 and its commitments were transposed into UK law by the Climate Change Act 2008, which then required the net UK carbon account for the year 2050 to be 80% lower than the 1990 baseline. The Climate Change Act 2008 (2050 Target Amendment) Order 2019 has since been passed to require the net UK carbon account for the year 2050 to be 100% lower than the 1990 baseline.
Paris Agreement under the United Nations Framework Convention on Climate Change	The Paris Agreement aims to reduce the emission of gases that contribute to global warming by limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C. The Paris Agreement set out to improve upon the Kyoto Protocol. It entered into force on 4 November 2016 and was ratified by the UK in November 2016. Under the UN Framework Convention on Climate Change, the annual Conference of Parties (COP) brings governments together to discuss and review how climate change is being managed domestically and internationally. It is the main decision-making body of the United Nations Framework Convention on Climate Change.
Climate Change and Renewable Energy – National	
Scottish Emissions Targets	The Climate Change (Scotland) Act 2009 sets legally binding targets for the reduction of greenhouse gas emissions. The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 amended the 2009 Act to set Scottish emissions reductions targets, including a reduction of all greenhouse gas emissions to net zero by 2045, with interim targets for reductions of at least 75% by 2030 and 90% by 2040.
Scottish Energy Strategy	The Scottish Energy Strategy: The Future of Energy in Scotland (Scottish Government, 2017) sets out a vision for the energy system in Scotland until 2050. The strategy sets a 2030 target for the equivalent of 50% of the energy for Scotland's heat, transport and electricity

LEGISLATION AND/OR POLICY	SUMMARY
	consumption to be supplied by renewable sources. This has since been supplemented by the Scottish Government Offshore Wind Policy Statement (Scottish Government, 2020a).
Scottish Government Offshore Wind Policy Statement	The Offshore Wind Policy Statement (Scottish Government, 2020a) sets out ambitions to capitalise on offshore wind development and discusses the role this technology could play in meeting the net zero target by 2045. It builds upon the ambitions outlined in the 2017 Scottish Energy Strategy, which establishes the 2050 energy vision. The 2017 Strategy is integral to the implementation of the Offshore Wind Policy Statement, through the identification of suitable offshore wind farm development areas.
Scotland's Energy Strategy Position Statement 2021	In accordance with the 2017 Strategy, Scotland's Energy Strategy Position Statement (Position Statement) was published in 2021 (Scottish Government, 2021). The Position Statement notes that: "*Since the publication of the 2017 strategy, the Scottish Government has committed to achieving our ambitious targets of net zero greenhouse gas emissions by 2045 and a 75% reduction by 2030. In light of the economic crisis created by the COVID-19 pandemic, the Scottish Government is now striving to deliver a green economic recovery aligned to those net zero ambitions.*" The Position Statement sets out the programme of work required across the energy sector to support the energy targets and outlines key energy priorities for Scotland, including priorities for renewable energy. The priority of relevance to the offshore Project is the delivery of the actions from the Offshore Wind Policy Statement, which was published in October 2020 (Scottish Government, 2020a). The Position Statement also states that the 2017 Strategy will remain in place until an Energy Strategy refresh is adopted by the Scottish Ministers.
North Sea Transition Deal	The North Sea Transition Deal, announced in 2021, sets out an ambitious plan to deliver investment of up to £14-£16 billion by 2030 in new energy technologies.
Draft Energy Strategy	The Draft Energy Strategy (Scottish Government, 2023) was released in January 2023. One of the strategy's key ambitions includes more than 20 GW of additional renewable electricity on- and offshore by 2030. The strategy specifically mentions INTOG as one of the key leasing rounds supporting the scale up of offshore wind energy in Scotland.
Planning Policy	
National Marine Plan	In March 2015, the Scottish Government published 'Scotland's National Marine Plan – a Single Framework for Managing our Seas' (the NMP) (Scottish Government, 2015). The NMP sets out strategic policies for the sustainable development of Scotland's marine resources out to 200 NM. It is required to be compatible with the UK Marine Policy Statement and existing marine plans across the UK.

LEGISLATION AND/OR POLICY	SUMMARY
Sectoral Marine Plan for Offshore Wind Energy	The first Sectoral Marine Plan for Offshore Wind Energy for Scottish Territorial Waters (Blue Seas Green Energy) (Marine Scotland, 2011) (the Sectoral Plan) was adopted in 2011. In November 2017, The Crown Estate Scotland (CES) announced their intention to run a further leasing round for commercial scale offshore wind energy projects in Scottish Waters. To inform the spatial development of this leasing round, Marine Scotland, as Planning Authority for Scotland's Seas, undertook an extensive marine planning exercise, in accordance with relevant EC, UK and Scottish legislation. The final Sectoral Marine Plan for Offshore Wind Energy (SMP) was published in October 2020 (Scottish Government, 2020b). The SMP builds on the work of earlier sectoral planning and incorporates recent technological, policy, regulatory, and market developments to develop a new strategic planning process. The SMP has been developed in accordance with the strategic aims of the NMP (Scottish Government, 2015), which addresses the potential for interactions between renewable energy development and other marine users. The SMP seeks to contribute to the achievement of Scottish and UK climate change policy objectives and targets through the provision of a spatial strategy to inform the seabed leasing process for commercial offshore wind energy in Scottish territorial waters and offshore marine area. It aims to maximise the benefits for Scotland, its communities and people, whilst minimising the potential adverse effects on other marine users, economic sectors, and the environment that may result from further commercial-scale offshore wind development. The SMP identified 15 plan options across four Scottish regions that are capable of generating several GW of renewable energy, and the supporting assessments considered up to 10 GW of offshore wind development. The SMP guides the relevant consenting bodies when making decisions on individual licence and consent applications but is not considered to pre-determine those decision-making processes. The outputs of future project-level assessments will be used to support the iterative plan review process for the SMP. The CES ScotWind leasing initiative in 2021 was the first offshore wind leasing round in Scottish waters for a decade. Twenty ScotWind projects were awarded seabed option agreements by Crown Estate Scotland: 17 in April 2022, and a further three projects in October 2022 through the Clearing process, resulting in up to 28 GW of leased capacity.
Initial Plan Framework Sectoral Marine Plan for Offshore Wind for Innovation and Targeted Oil and Gas Decarbonisation (INTOG)	The Initial Plan Framework Sectoral Marine Plan for Offshore Wind for Innovation and Targeted Oil and Gas Decarbonisation (INTOG) encompasses spatial opportunities and a strategic framework for future offshore wind developments within sustainable and suitable locations that will help deliver the wider UK and Scottish Government Net Zero targets. INTOG provides an opportunity to enable small scale (less than 100 MW) innovation projects. The benefits of tis leasing round include; enabling projects which support cost reduction in support of commercial deployment of offshore wind, and to further develop Scotland as a destination for innovation and technical development which will lead to risk reductions and supply chain opportunity.

LEGISLATION AND/OR POLICY	SUMMARY
Consenting Requirements	
Marine and Coastal Access Act 2009	The Marine and Coastal Access Act 2009, which applies between the 12 and 200 NM limit, states that a Marine Licence is required to construct, alter or improve any works, or deposit any object in or over the sea, or on or under the seabed. As the Project is beyond the 12 NM limit, a Marine Licence under this legislation will be required to deposit project components in/on the seabed. The Marine Licence application will be made to MS-LOT. The EIAR shall also be prepared in accordance with the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017, as amended, and the Marine Works (Environmental Impact Assessment) Regulations 2007, as amended.
Environmental Impact Assessment (EIA) Legislation	
The Marine Works (EIA) Regulations 2007	These EIA regulations apply to applications for a Marine Licence from 12 to 200 NM. Schedule A1 and A2 list the types of projects which may require an EIA. Schedule A2 includes "Installations for the harnessing of wind power for energy production". An EIA is required for Schedule A2 activity either (i) if the Developer so agrees with the appropriate authority, or (ii) if the appropriate authority concludes that the project in question is likely to have significant effects on the environment. Schedule 1 of these regulations is then used to understand whether the project is likely to have significant effects on the environment. Matters requiring consideration include the characteristics (e.g. size, design, waste, pollution, risks etc.) and location (e.g. environmental sensitive areas) of the project as well as the types and characteristics of the potential impact (e.g. magnitude and spatial extent). Given the nature and scale of the Project, it is considered that an EIA must be undertaken.
Habitats Regulations	
The Conservation of Offshore Marine Habitats and Species Regulations 2017	The Conservation of Offshore Marine Habitats and Species Regulations 2017 ("the Habitats Regulations"), transpose the requirements of European Union Directive 92/43/EEC (the Habitats Directive) and Directive 2009/147/EC (the Birds Directive) for developments in Scotland. The Habitats Regulations require that where a plan or project that is not directly connected with, or necessary to the management of a European (formerly Natura 2000) site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.

2.1 References

Marine Scotland (2011). Blue Seas - Green Energy: A Sectoral Marine Plan for Offshore Wind Energy in Scottish Territorial Waters. https://webarchive.nrscotland.gov.uk/3000/https://www.gov.scot/Resource/Doc/346375/0115264.pdf

Scottish Government (2015). Scotland's National Marine Plan. https://www.gov.scot/publications/scotlands-national-marine-plan/

Scottish Government (2017). The Future of Energy in Scotland: Scottish energy strategy. https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland9781788515276/documents/

Scottish Government (2020a). Offshore Wind Policy Statement. https://www.gov.scot/publications/offshore-wind-policy-statement/

Scottish Government (2020b). Sectoral Marine Plan for Offshore Wind Energy. https://www.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy/

Scottish Government (2021). Energy Strategy: Position Statement. https://www.gov.scot/publications/scotlands-energy-strategy-position-statement/pages/2/

Scottish Government (2023). Draft Energy Strategy and Just Transition Plan. https://www.gov.scot/publications/draft-energy-strategy-transition-plan/

3 PROJECT DESCRIPTION

This chapter presents a description of the site selection, consideration of alternatives and design of the Project. It sets out the design and components for the Project infrastructure, as well as the main activities associated with the construction, operation and maintenance, and decommissioning of the Project.

3.1 Site Selection and Consideration of Alternatives

The rationale of the Project is to trial the new floater technology using a readily available turbine design. The new floater technology will deliver opportunities for significant cost savings, industrialisation of larger projects, and provide TEPUK with valuable experience in the electrification of an oil and gas asset. TEPUK has selected the Culzean Field to pilot this floating technology as the water depth is circa 90 m, providing an ideal environment to trial the technology. Furthermore, TEPUK has extensive knowledge of the site given the Culzean Field started production as recently as 2019, and the surrounding area which will facilitate rapid deployment.

A preliminary-Front End Engineering Design (pre-FEED) study for the integration works on the Culzean Facilities for the tie-in of the Project was undertaken. the selection of the Project location considered:

- Environmental impact of the potential Project seabed footprint;
- TEPUK's knowledge of the seabed conditions around the Culzean platform;
- Logistics, in particular helicopter approaches and tanker operations, near Ailsa Floating Storage and Offloading (FSO);
- Future seismic survey(s) requirements and future development(s);
- Platform approach (crossings); and
- Potential collision Risk with the Culzean platform (e.g. drift of the floating turbine in case of a broken anchor).

The pre-FEED study was followed by a further quantitative assessment on site location. The following parameters were considered as part of the selection process; environmental, consenting and stakeholder, technical, safety and commercial. A total of four locations were evaluated and scored against these parameters. Out of the four locations, one was narrowed down for this Scoping Report (see Figure 1-1).

3.2 Design Envelope

The Project is adopting a Design Envelope approach due to the innovative nature of the Project, recognising that some of the final design details are likely to be unknown at the time of consent application, such as:

- The number of mooring/anchors and the systems used; and
- Export cable parameters.

The Design Envelope approach will present EIA topic specific Maximum Design Scenarios (MDS) for the Project for which significant effects can be established for each impact pathway and receptor to allow meaningful assessments to be undertaken for the Project, while retaining reasonable flexibility for future Project design. The following

considers the realistic worst-case parameters for the Project from an environmental impact perspective. Any modifications to the host installation (i.e. the Culzean platform) are not considered in this Scoping report.

3.3 Project Location and Layout

The floating wind turbine will be located circa 2 km west of the Culzean facilities. The circa 2 km export cable will be connected to the Culzean facility via an existing J-tube[1] on the platform (Figure 3-1). The location has been selected to optimise both wind yield and safety considerations.

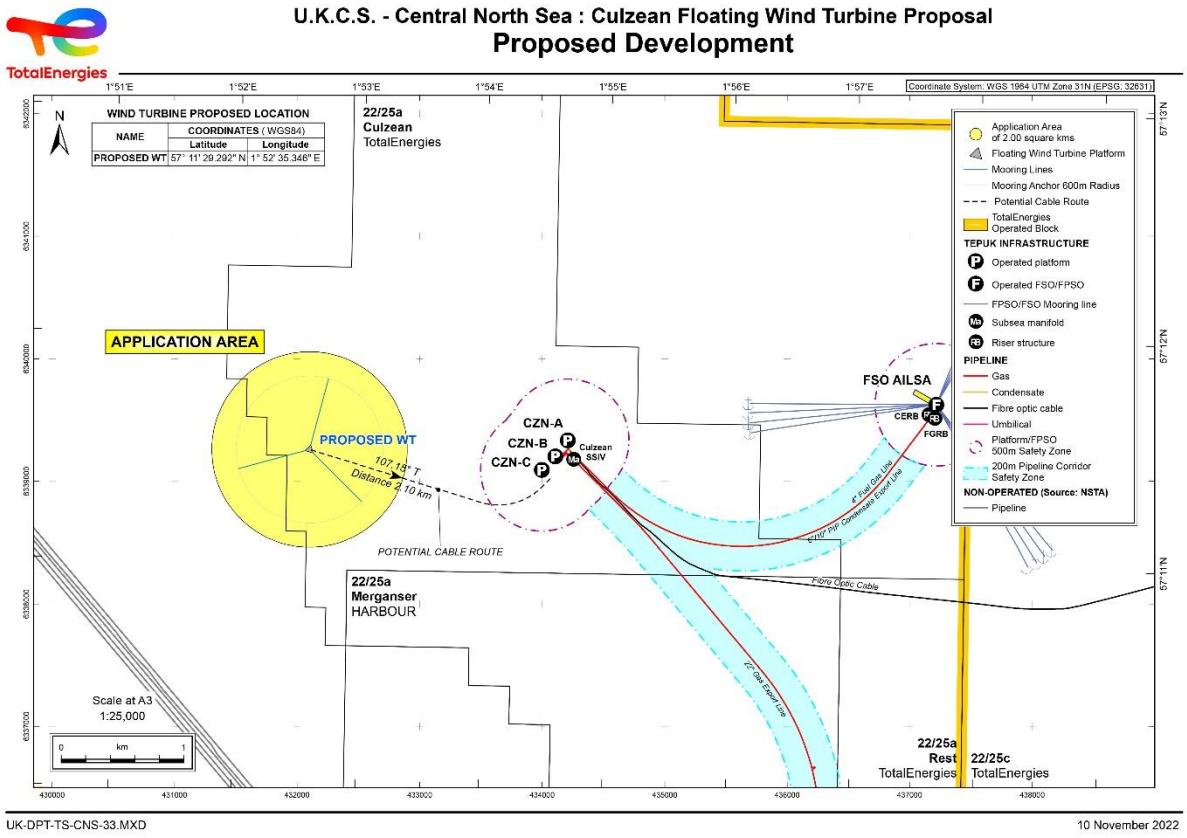

Figure 3-1 CFWP preliminary layout

3.4 Key Project components

The Project will have an installed capacity of around 3 MW and comprise of the following components:

- A single wind turbine;
- A floater to support the wind turbine;
- A single export cable from the turbine to the Culzean platform; and

[1] *J-Tubes are located on the platform and allow for cables to be connected to the installation. Typically they consist of steel tube, and are called J tubes due to the shape.*

- Mooring and anchoring systems to connect the floating substructure to the seabed.

The key project components are outlines in Table 3-1.

Table 3-1 Key Project Components

PARAMETER	MAXIMUM DESIGN ENVELOPE
Pilot duration	Minimum 5 years Design life: 10 years
Total Offshore Project Area (km^2)	2
Total Installation Capacity (MW)	3
Number of turbines	1
Wind Turbine Generator (WTG) Capacity (MW)	-3
Rotor Diameter (m)	112
Upper Tip Height (m)	134
Minimum Blade Clearance from Sea-Level (m)	22
Hub Height (m)	78
Floating substructure Type	Semi-Submersible – Ocergy design
Floating substructure Height (m)	23 height (draft: 13.7 + 9.3 above mean water level)
Floating substructure area (m^2)	area of approx. 2,500
Maximum height above water level of the floating substructure (if any) (m)	9.3
Number of mooring line(s)	Base case: 3 (Worst case 5).
Length of mooring line(s) (m)	589
Mooring line total footprint (m)	Mooring radius of ~ 600m around the floater centre
Number of anchors	3
Anchor options	Drag anchor
Anchor Dimensions (m)	Not defined yet
Number of transmission cable(s)	1
Length of transmission cable (m)	2,500
Length of transmission cable in the water column (m)	455
Length of transmission cable on the seabed (m)	2,200
Cable protection	Trenched (subject to survey results)
Turbine light requirements	Not yet defined
Distance between the Culzean platform and the floating WTG (km)	2

3.5 Project Infrastructure

3.5.1 Wind Turbine

A Vestas a V112 3 MW floating wind turbine will be used based on its immediate availability and proven track record:

- A model largely operated onshore since 2013; and
- More than 385 offshore units in operation (bottom-fixed see Figure 3-2).

Figure 3-2 Vesta V112

TEPUK has secured a refurbished turbine (nacelle, hub and blades) and will build a new tower, specifically designed for the Project location, metocean conditions, and the loads induced by the floater motions.

3.5.2 Floater

OCG-WIND is a floater designed and commercialized by Ocergy, which is a company formed to develop new competitive floater designs. OCG-WIND is a semi-submersible design with four-slender columns (Figure 3-3). The wind turbine is installed on the centre column. The three outer columns contribute to the stability of the unit and are linked by tendons, which are designed to stiffen the structure, reduce the fatigue, and optimize the structural weight. The weight of the floating substructure is 975 tonnes and it covers an area of approx. 2500 m^2.

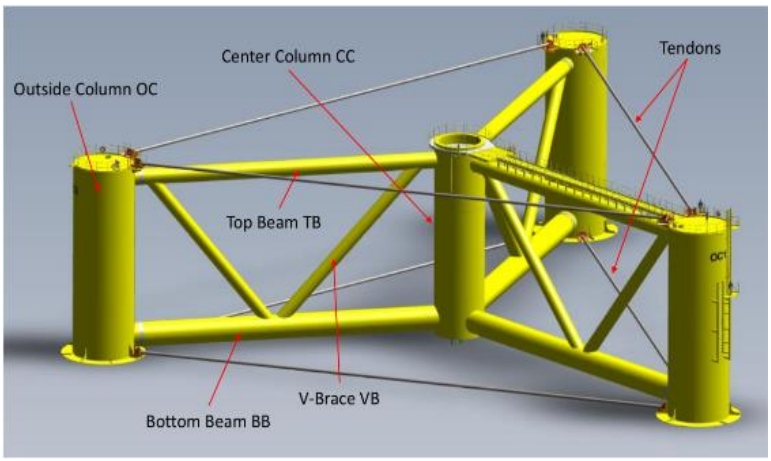

Figure 3-3 OCG-WIND floater design

OCG-WIND is designed on a modular-based approach with four column modules and three truss frames (see Figure 3-4). The modules are assembled using mechanical connections based on compact flanges.

Culzean FEED Phase 1 sizing	
CC – OC	39 m
OC diameter	5,05 m
CC diameter	4,5 m
Col. height	23 m
TB diameter	1,8 m
BB diameter	2,2 m
Hull weight	975 t

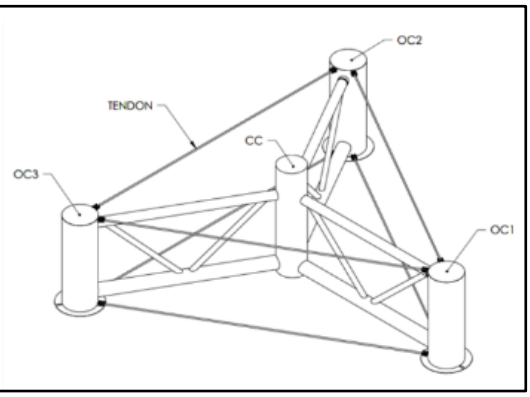

Figure 3-4 OCG-WIND Technical data

The Project objectives are to:

- Develop a hull that informs the design basis of a commercial Floating Offshore Wind Turbine with low weight and flexibility in quayside and offshore installation;
- Industrialise, with minimum redevelopment of existing local infrastructure therefore enabling supply chain development and quick assembly features; and
- Operate with low maintenance and maximum availability.

3.5.3 Mooring

The Project proposes to use a typical offshore mooring design as shown in Figure 3-5.

- Catenary lines with a mix of polyester and heavy chain sections;
- Clump weight at the touch down point; and
- Drag embedment anchors.

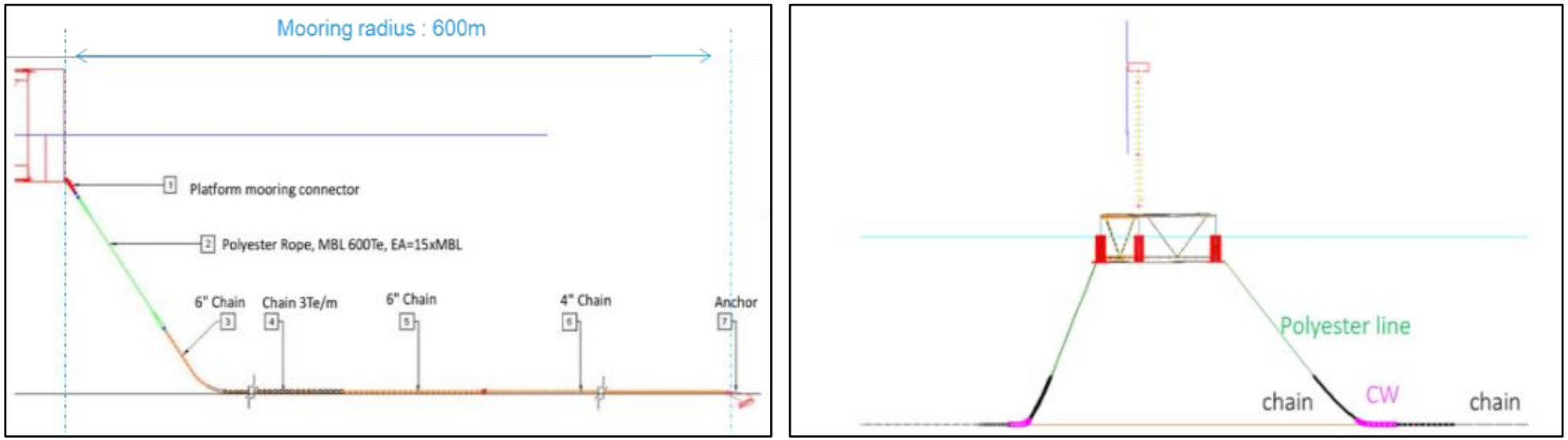

Figure 3-5 Culzean Wind Pilot project mooring system

The Project will have a mooring radius of ~ 600 m around the floater centre. The design of the drag anchors will be confirmed based on the results of a geophysical and geotechnical survey yet to be performed. The mooring base case is three lines with contingency for a five lines configuration. Piling has never been envisaged for the Project as there is 99% chance that dragging anchors will be used. However, it can be mentioned as a contingency that pin piling may be used if an alternative anchor is required and will therefore be assessed as the worst-case option within the scoping assessment.

3.6 Offshore Construction

It will take approximately one month for the construction/installation of the turbine, moorings and cable Installation activities are proposed to take place early Q3 2024.

It is anticipated during the construction of the Project, that a variety of vessels and vehicles will be used for installation, support and transport of equipment and infrastructure to the Project.

During construction activities, appropriate safety zones will be required to be in place around the Project. The Project intends to apply for a 500 m safety zone around offshore infrastructure that is under construction, at the same time as applying for the Project's main consents. It should be noted that there is an existing 500 m safety zone around the Culzean platform that is always present. During this period there may be a requirement to wet store the export cable and mooring lines. Safety zones of 50 m will be sought for incomplete structures including the export cable, anchors and mooring lines, at which construction activity may be temporarily paused (and therefore the 500 m safety zone has lapsed) such as the installed foundation without wind turbine or where construction works are completed but the Project has not yet been commissioned.

The safety requirements of the Maritime and Coastguard Agency (MCA) will be satisfied by the Project, as well as the marking, lighting and fog-horn specifications of the Civil Aviation Authority (CAA) and the Northern Lighthouse Board (NLB). Lighting and marking of subsea structures will be discussed with the NLB, having a statutory duty as a General Lighthouse Authority, where there may be a risk to shipping. In this case, the marking would be based on the recommendations of the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA, 2013).

3.7 Operation and Maintenance

Once constructed, the Project is expected to remain in operation for around 10 years, with possible extension should the infrastructure prove to still be in an acceptable condition at the end of this period.

During the operations period, the following classifications of maintenance may be required:

- Routine maintenance: activities that are carried out on a regular basis based on the original equipment manufacturer (OEM) recommendations and good industry practice, for example inspections, testing investigation of minor faults;
- Unscheduled maintenance: activities that may be required to carry out repairs or remedial works to return the asset to serviceable condition; and

- Major component replacement/repair: Faults that could trigger emergency repairs requiring large component replacements and extensive remedial works.

The operation and maintenance strategy may rely on an crew transport vessels (CTVs), service operation vessels (SOVs), supply vessels, cable and remedial protection vessels, and helicopters for the operation and maintenance services that will be performed at the wind turbine. Unmanned, remotely operated or autonomous vessels may also be used for inspection. The final operational and maintenance strategy chosen may be a combination of the above solutions.

3.8 Decommissioning

At the end of the operational lifetime of the Project, it is anticipated that all structures above the seabed or ground level will be completely removed in line with the Scottish Government's position on the decommissioning of Offshore Renewable Energy Installations (OREI). The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.

The Energy Act 2004 and the Scotland Act 2016 require a Decommissioning Programme to be submitted to Marine Scotland-Licensing Operations Team (MS-LOT) for consultation and approval by the Scottish Ministers, a draft of which would be submitted prior to the construction of the Project, supported by appropriate financial security. The approach employed at decommissioning will be compliant with the legislation and policy requirements at the time of decommissioning. The Decommissioning Programme will be updated during the Project's lifespan to take account of changing best practice and new technologies.

Best practice will be followed when developing a Decommissioning Programme. The overarching principles of a Decommissioning Programme are derived from Marine Scotland's Guidance Note (2022) (Scottish Government, 2022), and will consider:

- Environmental impacts;
- Safety of surface and subsurface navigation;
- Other uses of the sea; and
- Health and safety considerations.

3.9 References

IALA (2013). International Association of Marine Aids to Navigation and Lighthouse Authorities: Guidance & Publications. https://www.iala-aism.org/guidance-publications/

Scottish Government (2022). Offshore renewable energy: decommissioning guidance for Scottish waters. https://www.gov.scot/publications/offshore-renewable-energy-decommissioning-guidance-scottish-waters/pages/12/

4 STAKEHOLDER ENGAGEMENT

4.1 Engagement Strategy Overview

Engagement with stakeholders is an important part of the development of any project; early and ongoing consultation throughout the lifecycle of the Project is important in allowing integration of stakeholder feedback and data into the decision-making and design processes and for the Developer to communicate progress.

Engagement with stakeholders during the Environmental Impact Assessment (EIA) process, including scoping, has already begun.

Using experience from previous similar projects, an overview of the Project EIA stakeholder engagement strategy is presented in Figure 4-1.

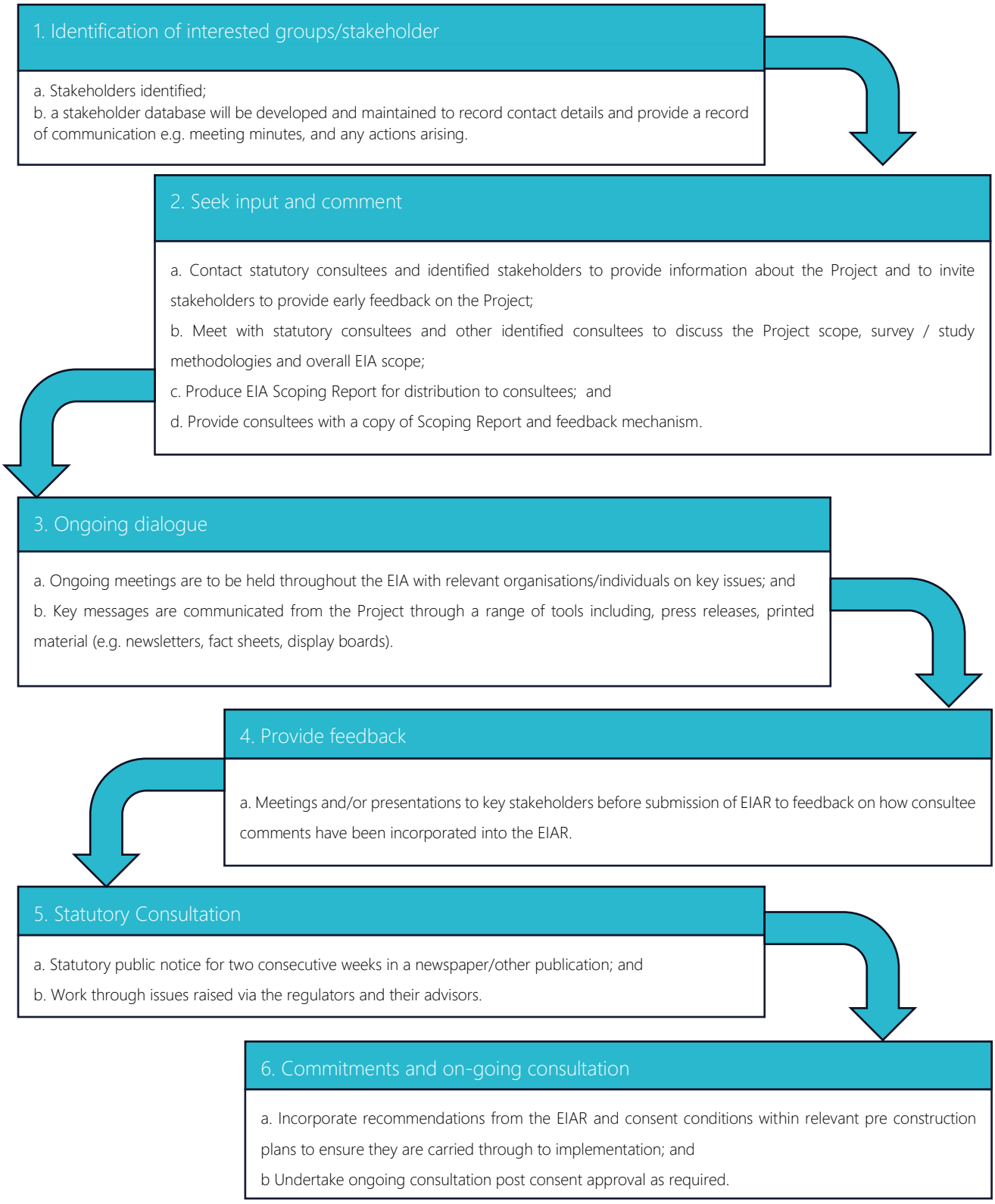

Figure 4-2 Engagement Strategy

4.2 Engagement to Date

The Developer undertook three early engagement meetings to introduce the key stakeholders to the Project. The meeting outcomes are detailed in Table 4-1.

Table 4-1 Early stakeholder engagement summary

CONSULTEES	DATE	DISCUSSION SUMMARY	NEXT STEPS
Marine Scotland	22nd June 2022	• 1 year bird survey data would be adequate from September to September • Provide an outline proposal of bird survey method to NatureScot (NS) for their comment/input • Typically would review survey data after each season, however NS will review proposed bird survey assessment and provide comment as to any reviews required • Suggested key receptors as birds, predator/prey relationships and potentially noise (noted this may not be an impact as floating turbine rather than fixed) • Nature of project has potential precedent setting, NS advice is to be very clear about process, decision making and justifications behind the decisions taken • NS expressed interest in eDNA sampling • Confirmed as floating however if fixed then would require noise modelling and noise monitoring • NS keen to have discussions on use of Unmanned Aerial Vehicles (UAV) as part of bird monitoring proposal • UAV could be used to gather data as part of monthly aerial survey requirements • Other areas NS expressed interest (from earlier discussions) are; kittiwake nesting and lighting • Marine Scotland (MS) provided following advice on scoping report • Include as much information as possible • Ensure provide sufficient evidence to scope out receptors	• Engage contractor to carryout bird survey • Engage with RSPB for input into bird survey methodology proposal • Prepare bird survey methodology for comment by NS/MS • Engage contractor to kick off scoping report • Update data on fishing activities (e.g. Vessel Traffic Survey (VTS) reports)

CONSULTEES	DATE	DISCUSSION SUMMARY	NEXT STEPS
		• Scoping opinions are valid for 12 months, if beyond 12 months must contact MS to determine whether remains valid or requires updating • NS/MS asked to be kept in the loop on final decision on location.	
NatureScot Marine Scotland	28th July 2022	Bird Survey • NS agreed that a year's monitoring was sufficient considering the Project comprises a single turbine • NS expressed a preference for the survey to run from September to September to cover non breeding & breeding populations • Requires a monthly Digital Aerial Survey • Methodology approval not required however suggested that TEPUK submit for comment to both NS & MS • Post construction monitoring to be agreed following initial monitoring Seabed Survey • NS advised that if TEPUK are conducting an additional survey in the summer TEPUK should try to include eDNA as well as benthic EIA / Scoping • NS agreed that a 'light touch' EIA would be enough and suggest TEPUK go back to MS to formally agree this. • EIA scoping / screening document to focus on Birds (density, distribution, displacement & collision) and predator / prey relationships • EIA to comment on potential kittiwake nesting • EIA to define other installations in the area, and lighting on these installations	• NS suggest TEPUK consult with RSPB in the early stages to avoid potential delay further down the line • NS advise there are EIA's available on the Marine Scotland Portal for similar operations that might be useful (West Orkney Scoping EIA)
RSPB	9th August 2022	• RSPB may request to extend survey into next breeding season (look to review after first year)	-

CONSULTEES	DATE	DISCUSSION SUMMARY	NEXT STEPS
		• Main concerns: avoidance behaviour, collision, transiting (looking to demonstrate there is no avoidance behaviour • Suggested use of FAME and Star databases and Seabird Trail (tagging studies) - Look at tracking data which is already available.	

4.3 Planned Engagement

4.3.1 Public Engagement

Once the application is accepted by the relevant authority or authorities, the public shall have the opportunity to make formal representations in accordance with the regulations applicable to the application via the public notice. The timescales and procedure for making representations will be confirmed as part of the application process.

4.3.2 Post-application consultation

Consultation will continue beyond the submission of the consent application to address any comments raised during the application determination stage and during the discharge of consent conditions ahead of construction (assuming a successful Project consent).

Further consultation will also be undertaken as the Project progresses, during which it may be appropriate to consider alternative means of broader public consultation including press releases and public notice.

5 APPROACH TO SCOPING AND EIA

5.1 Introduction

An EIA is the method of determining the potential impacts to the environment which could occur from a project, development and the associated survey works. This section will provide an overview of the Projects approach to scoping that has been conducted for the EIA Scoping Report. The EIA will be an ongoing process through its lifecycle, and this approach to scoping will allow for the following:

- Project acquiring an overview of the baseline environment and collection of data to support survey methods;
- Identify which potential impacts can be scoped in and scoped out of the Project; and
- Identify impacts which will have a positive or negative effect and determine the steps which can be taken to either avoid, reduce, or offset the potential impacts from the identified mitigation measures proposed.

5.2 Scoping Overview

The scoping stage of the EIA is how the potential impacts are identified in the Project. The scoping is conducted by gathering data from the following sources:

- Relevant publicly available data;
- Previous project scoping reports; and
- Expert professional opinion.

A review from the information listed above will be conducted with a review of the potential environmental and human impacts which are a direct result from the Project activities. The impacts will be evaluated from all phases of the Project which includes the construction, operation and maintenance, and decommissioning. It should also be noted that any inputs from stakeholders will also be considered when determining potential impacts from the project.

5.3 EIA Methodology

The EIA methodology will be conducted in a four-stage assessment summarised in Figure 5-1, the information gained from the baseline environment, project design, and stakeholder engagement will be applied through the assessment. Initially the impacts will be identified from the scoping process which will highlight the potentially significant impacts and effects, this will also take into consideration any secondary, indirect, cumulative, and/or transboundary effects. The second stage will be determining the magnitude of the identified impacts arising from the project activities. Determining this magnitude will take into account the potential impacts from the Project and the relevance to each receptor. The third stage will be evaluating the significance of the potential impact from the Project on the receptors. The evaluation will be standardised across the receptors using a significance matrix detailed in Table 5-1. Finally stage four will be reporting the impacts and addressing any impacts which may require different or further mitigation measures.

Table 5-1 EIA Methodology Significance Matrix

		MAGNITUDE OF IMPACT			
		Negligible	Low	Medium	High
Receptor sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	High	Negligible	Minor	Moderate	Major

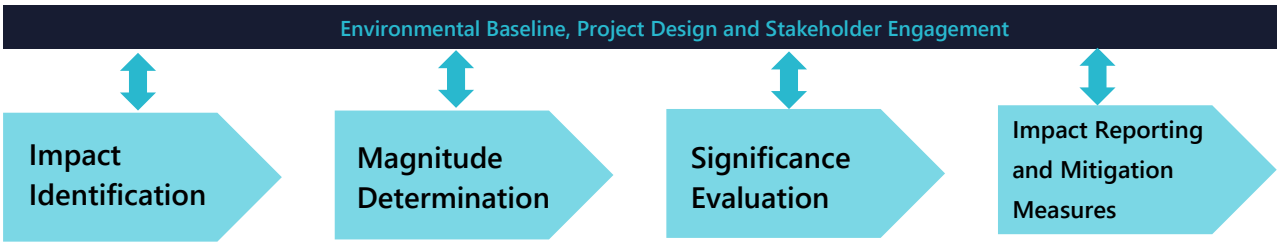

Figure 5-1 EIA Methodology Summary

5.4 Cumulative Effects

A Cumulative Effects Assessment (CEA) forms part of the EIA process. The scope of the CEA will be determined by consultees throughout the progression of the EIA, with additional experience from previous projects contributing to decisions on cumulative impacts.

The EIAR will consider projects which are defined as:

- Already constructed;
- Under construction;
- Permitted application(s), but not yet implemented; and
- Submitted application(s) not yet determined.

Plans and projects which are "reasonably foreseeable" (i.e. developments that are being planned, including, for example, offshore renewable energy projects which have a Crown Estate Agreement for Lease, offshore renewable energy projects that have been scoped). The approach accords with the Renewable UK Cumulative Impact Assessment Guidelines (RUK, 2013), and Marine Scotland Consenting and Licensing Guidance for Offshore Wind, Wave and Tidal Energy Applications (Marine Scotland, 2018). In addition, other project including oil and gas and INTOG will also be considered.

Once the relevant receptors and data sources have been identified, the pathways linking the receptor and data will be identified. Where no pathway between a source (other than as a direct result of the Project) and a receptor can be identified, the cumulative impacts can be dismissed. This process allows the Project receptors to be refined and inform the spatial extent of the CEA.

In addition, MS-LOT are developing a cumulative effects framework (CEF) tool that is due to be released by spring 2023. This tool will be used to inform the relevant chapters of the EIAR including marine mammals and ornithology.

5.5 Inter-related and Transboundary Impacts

The EIA will consider inter-related effects, the potential effects of multiple impacts from the construction, operation and decommissioning of the Project, on one receptor. Inter-related effects are assessed through consideration of all effects on a single receptor by the Project.

Transboundary effects arise when impacts from a development within one European Economic Area (EEA) state's territory affects the environment of another EEA state(s). The EIA Directive, which has been transposed into Scottish law through domestic legislation prior to the UK's withdrawal from the EU, requires the assessment of transboundary effects. This Scoping Report will identify relevant transboundary impacts to be considered within the EIAR or state if no transboundary impacts are anticipated.

5.6 Additional EIA Matters

5.6.1 Consideration of Human Health

Under the EIA Regulations the EIA must identify, describe and assess the direct and indirect significant effects of a proposed development (including any operational effects if appropriate) on a number of factors which now includes human health.

Following best practice, health impact assessments typically use the World Health Organization's (WHO) definition, which states that health is:

"A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity" (World Health Organization, (1948), Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946).

In this context, the main determinants of human health are made up of:

- Employment and income;
- Community severance or cohesion;
- Social networks and connectivity; and
- Community identity.

The Project will interact with human health in the marine environment in relation to noise, air quality, and socio- economics. Given the Project is small in scale, is far offshore and connected directly to an offshore installation, it is likely no adverse human health effects will occur specifically in relation to exposure to electro-magnetic fields (EMF) or commercial fisheries interests. These impact pathways have therefore been scoped out.

The EIA Regulations also state that any risks to human health, for example, due to accidents or disasters, must be considered. The approach for the consideration of major accidents or disasters is provided in Section 5.6.2.

5.6.2 Consideration of Major Accidents or Disasters

The EIA Regulations require the EIA to consider any "*expected effects arising from the vulnerability of the proposed development to major accidents or disasters that are relevant to that development*".

The Project is designed to operate within its marine environment. Relevant extreme environmental conditions (e.g. storm events) are taken into account when designing the Project. The Project will not include any large inventories of hazardous material that could be released in the event of a natural disaster affecting the Project. In relation to accidental release of pollutants, relevant topic chapters will consider embedded mitigation and any potential impact pathways. A standalone chapter on the topic of major accidents and/or disasters is proposed for the EIAR, in line with the Major Accidents and Disasters in EIA - IEMA Primer (IEMA, 2020).

The only areas of vulnerability for the Project stem from marine operating conditions (but for which it will be designed) due to no onshore operations for the Project.

5.7 References

IEMA (2020). IEMA Major Accidents and Disasters in EIA Guide. https://www.iema.net/resources/blog/2020/09/23/iema-major-accidents-and-disasters-in-eia-primer

Marine Scotland (2018). Marine Scotland Consenting and Licensing Guidance for Offshore Wind, Wave and Tidal Energy Applications. https://www.gov.scot/binaries/content/documents/govscot/publications/consultationpaper/2018/10/marine-scotland-consenting-licensing-manual-offshore-wind-wave-tidal-energyapplications/documents/00542001-pdf/00542001-pdf/govscot%3Adocument

RUK (RenewableUK) (2013). Cumulative Impacts Assessment Guidelines: Guiding Principles for Cumulative Impacts Assessment in Offshore Wind Farms. https://tethys.pnnl.gov/sites/default/files/publications/Cumulative-Impact-Assessment-Guidelines.pdf

6 OFFSHORE PHYSICAL ENVIRONMENT

6.1 Marine Physical Processes

6.1.1 Introduction

This chapter provides an overview of the sensitivities associated with the hydrodynamic, sediment, geological, bathymetry and geomorphological receptors of the Culzean Floating Wind Pilot (the Project). An overview of the potential impacts of the Project on the marine physical environment, including during the construction, operation and maintenance and decommissioning of the Project, are also discussed.

Within this chapter, marine physical processes include the following:

- Tidal regime comprising currents;
- Waves;
- Winds;
- Sediments and geology (including seabed sediment distribution);
- Seabed geomorphology;
- Water column properties, including suspended sediment characteristics and stratification; and
- Sediment transport.

In addition to the above, the chapter also consider Designated Sites and interest features that have the potential to interact with the Project.

In most cases marine physical processes are not in themselves receptors but pathways for impacts to other potential receptors, including physical, ecological and human receptors.

6.1.2 Legislation, Policy and Guidance

In addition to the relevant policy and legislation described in Chapter 2 Legislative Context and Regulatory Requirements, the following guidance will be taken into consideration as part of the scoping of potential impacts on the marine physical processes within the Project.

No specific legislative controls exist in Scotland for the marine physical environment impact assessment. There are however relevant policies that consider properties of the marine physical environment and best practice guidance on completing assessments, which are summarised below.

Policy

- Scotland's National Marine Plan. General Policy 8. The Scottish Government, 2015.

Guidance

- Offshore Wind Energy in Scottish Waters. Regional Locational Guidance. Marine Scotland. October 2020;

- Advice to Inform Development of Guidance on Marine, Coastal and Estuarine Physical Processes Numerical Modelling Assessments. Report No 208. NRW, 2017;
- Guidance Note. Marine Physical Processes Guidance to inform Environmental Impact Assessment (EIA). GN041. NRW, 2020.

6.1.3 Study Area

The Project is entirely offshore, so the marine physical processes study area (hereafter referred to as the 'Study Area') is defined as the Project plus a buffer of 5 km (Figure 6-1). This additional buffer is based on the extent of the tidal ellipses in the vicinity. The buffer has been rounded up to 5 km to account for any potential extreme events, with consideration given to:

- The distance which suspended sediment plumes may be advected (and meaningfully interact with any potentially sensitive receptors); and
- The distance from the Project that tide and wave blockage impacts may potentially be detected, informed by expert judgement and consideration of prevailing direction across the Study Area.

For the purpose of this report, only the potential impacts of the Project on marine physical processes within the immediate vicinity of the Study Area has been discussed, however wider context has been provided where appropriate.

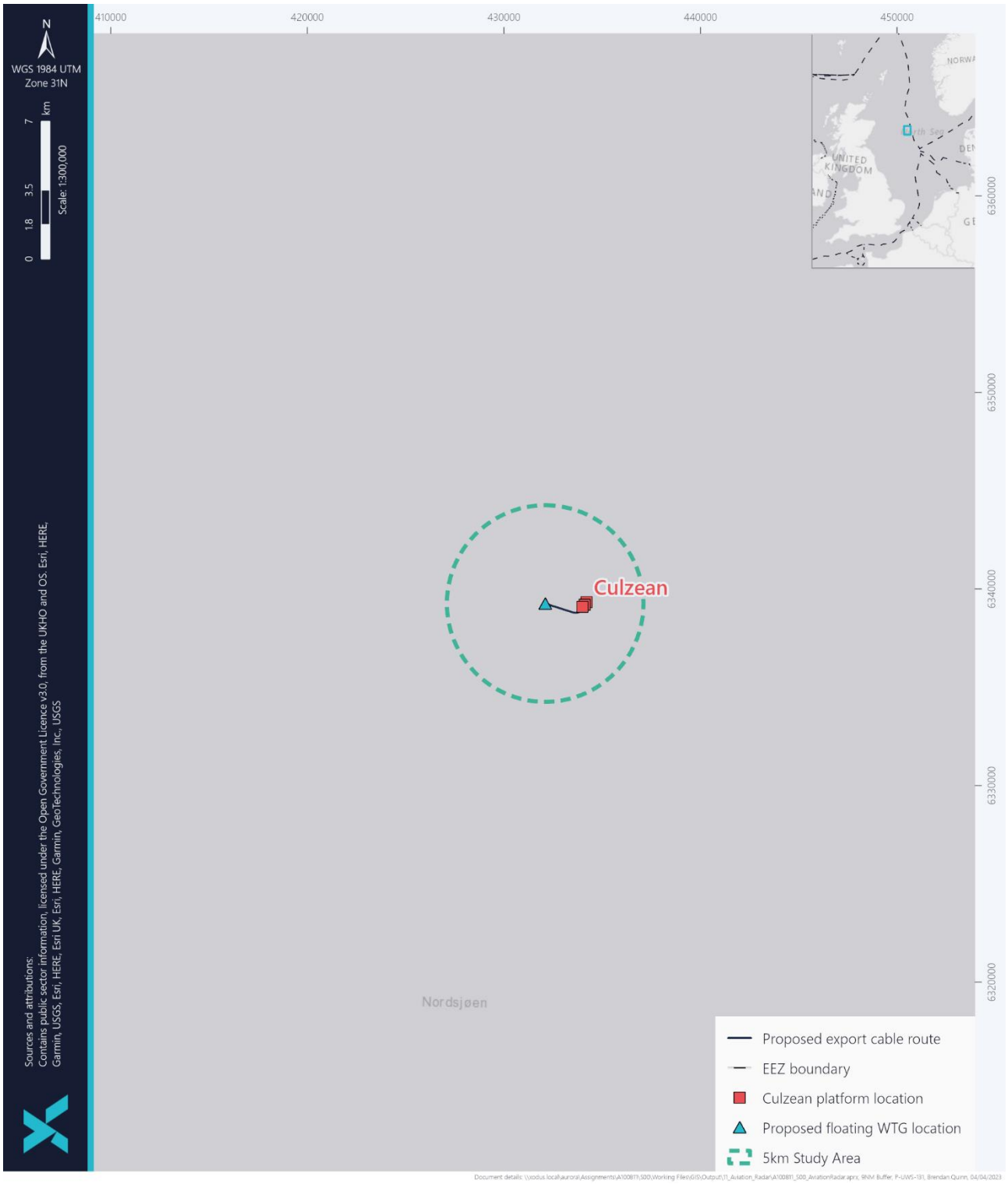

Figure 6-1 Marine Physical Processes Study Area

6.1.4 Data and Information Sources

The baseline environment for this Scoping Report has been established following a desk-based analysis of the data and information sources listed in Table 6-1. Additional geophysical and environmental surveys have been undertaken covering the Project approximately 222 km from shore. A summary of the site-specific data is presented below and will also inform the EIA assessment, together with publicly available data sources summarised in Table 6-1.

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 6-1. Site specific data from the Gardline (2013) United Kingdom Continental Shelf (UKCS) Block 22/25a Culzean Platform Area Site Survey has also been used to inform the baseline characterisation of the offshore seabed sediment.

Table 6-1 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Bathymetry, Geology and Seabed Sediment			
British Geological Survey (BGS) Offshore GeoIndex Map	http://mapapps2.bgs.ac.uk/geoindex_offshore/home.html	2023	BGS
Strategic Environmental Assessment Data Portal	https://webapps.bgs.ac.uk/data/sea/app/search	2021	BGS
Marine Scotland Data Portal	https://marine.gov.scot/data/marine-scotland-data-portal	2023	Marine Scotland
UK Hydrodynamic Office (UKHO) Admiralty Chart data & UKHO INSPIRE bathymetric data	https://datahub.admiralty.co.uk/portal/apps/webappviewer/index.html	2023	UKHO
EMODnet Bathymetry	https://www.emodnet-bathymetry.eu/	2023	EMODnet
Department of Trade and Industry (DTI) Technical Report: Sandbanks, sand transport and offshore wind farms	https://tethys.pnnl.gov/sites/default/files/publications/Keny-et-al-2005.pdf	2015	Kenyon, H, Cooper, B
Metocean Regime (Water Levels, Currents, Waves)			
National Tidal and Sea Level Facility- Observational Water Level Records	https://www.ntslf.org/	2020	NTSLF
UK Offshore Energy Strategic Environmental Assessment 3 (OESEA3). Appendix 1D - Water Environment (Regional Sea 6 &7)	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/504541/OESEA3_A1d_Water_environment.pdf	2016	DECC
UK Offshore Energy Strategic Environmental Assessment 4	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data	2022	BEIS

TITLE	SOURCE	YEAR	AUTHOR
(OESEA4). Appendix 1D - Water Environment	/file/1061672/Appendix_1d_-_Water_environment.pdf		
Admiralty Total Tide (ATT) tidal prediction software	UKHO Admiralty Maritime Data Solutions	2023	UKHO
Atlas of UK Marine Renewable Energy, Interactive Map	https://www.renewables-atlas.info/explore-the-atlas/	2018a	ABPmer
SEASTATES Metocean Data and Statistics Interactive Map	https://www.seastates.net/explore-data/	2018b	ABPmer
Cefas WaveNet	https://wavenet.cefas.co.uk/map	2023	CEFAS
British Oceanographic Data Centre (BODC) data Centre	https://www.bodc.ac.uk/data/	2022	BODC
UK Climate Projections (UKCP) 18	https://www.metoffice.gov.uk/research/approach/collaboration/ukcp	2018	Met Office
National Marine Plan interactive (NMPi)	https://marinescotland.atkinsgeospatial.com/nmpi/	2023	NMPi
Scottish Shelf Waters Reanalysis Service	https://tinyurl.com/SSW-Reanalysis	2020	Marine Scotland
Water Column Properties			
CEFAS Suspended Sediment Climatologies around the UK (Monthly average non-algal Suspended Particulate Matter concentrations on the UK shelf waters)	CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf (publishing.service.gov.uk) http://data.cefas.co.uk/#/View/18133	2016	CEFAS
Climatology of Surface and Near-bed Temperature and Salinity on the North-West European Continental Shelf for 1971–2000 (2009).	https://data.marine.gov.scot/sites/default/files//berx-hughes_2009.pdf	2009	Berx, B., Hughes
British Oceanographic Data Centre (BODC) Observational Conductivity Temperature Depth (CTD) Records	https://www.bodc.ac.uk/	2019	BODC
Anthropogenic Mixing in Seasonally Stratified Shelf Seas by Offshore Wind Farm Infrastructure	https://doi.org/10.3389/fmars.2022.830927	2022	Dorrell *et al.*
Emergence of Large-Scale Hydrodynamic Structures Due to Atmospheric Offshore Wind Farm Wakes	https://doi.org/10.3389/fmars.2022.818501	2022	Christiansen *et al.*

TITLE	SOURCE	YEAR	AUTHOR
Stratified and nonstratified areas in the North Sea: Long-term variability and biological and policy implications	https://doi.org/10.1002/2014JC010485	2015	Van Leeuwen *et al.*
General Information			
Sectoral Marine Plan: Regional Local Guidance	https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/documents/	2020	Scottish Government
Coasts and seas of the United Kingdom, Region 3 North-east Scotland: Cape Wrath to St. Cyrus	https://data.jncc.gov.uk/data/6473ed35-d1cb-428e-ad69-eb81d6c52045/pubs-csuk-region-03.pdf	1996	JNCC
Coastal Cells in Scotland: Cell2 – Fife Ness to Cairnbulg Point	https://www.dynamiccoast.com/files/Ramsay_Brampton_Cell_02.pdf	2000	HR Wallingford
European Union's Earth Observation Programme	https://www.copernicus.eu/en	2022	Capernicus

6.1.5 Baseline Environment

An initial desk-based review of literature and available data sources (Table 6-1) has been undertaken to support this Scoping Report. The findings of this research have been presented below in order to provide an understanding of the Study Area and inform the Scoping process.

The main offshore physical marine processes that should be considered in the baseline characterisation include:

- Geology;
- Bathymetry and morphology;
- Seabed sediment and sediment transport regime;
- Hydrodynamic regime;
- Wave regime;
- Wind regime;
- Fronts and stratification; and
- Designated site.

Due to the entirely offshore location of the Project and 222 km distance from the coast, there is not considered to be any pathway for interaction with coastal morphology, so this Chapter does not consider the coast as a potential physical receptor.

Geology

The Central North Sea (CNS) has a consistent geology >12 NM from the coast. The Project location is consistent with the surrounding area and shows that the bedrock within the area can be categorised as siliciclastic, argillaceous and sandstone of Eocene to Pliocene age (Tertiary) occurring at depths of >50 m. Overlying Quaternary deposits consist

of a mixture of firm to hard interbedded sands, silts and clays, interspersed with undifferentiated mixed sediment of the same lithology.

Seabed sediment and sediment transport regime

DECC (2009; 2016) reports that sand and slightly gravelly sand covers much of the seabed of the CNS region and occurs within a wide range of water depths from the shallow coastal zone to 110 m in the north and to below 120 m in isolated depths. Sediments may have a significant mud content, particularly in basins and in deeper waters to the north (JNCC, 2010; NMPi, 2023). Coastal areas in the region support a more varied range of intertidal and seabed habitats (DTI, 2004).

Across the Project, the seabed is dominated by slightly silty shelly sand, with small outcrops of clay present within the area (Gardline, 2013). All stations sampled in the Gardline (2013) survey were classified as fine or very fine sand under the Wentworth classification and as muddy sand under the folk classification. This is consistent with the sediment that extends throughout the operational area (BGS, 2020; NMPi, 2023). The suspended sediment concentrations throughout the Project are 0 to 1 mg/l throughout the year (Cefas, 2016). Sediment movement throughout the Project are influenced not only by the prevailing hydrodynamic processes, such as swell, waves and winds, tides and currents, but also by the surrounding bathymetry and physical characteristics of the seabed. The sediment transport in the Project area has not been studied in depth, however the HR Wallingford (2000) offshore study found that nearer to shore the predominant sediment movement is from South to North along the Aberdeenshire coast. Sediment movement will be further assessed in more detail within the EIA phase.

Bathymetry and morphology

Water depths in the CNS gradually deepen from south to north from approximately 40 m at the Dogger Bank to approximately 100 m at the Fladen/Witch Ground, (approximately 250 km and 220 km south and north of the Project respectively) (DTI, 2001; DECC, 2016). The main topographic features in the CNS are the Dogger Bank a large sublittoral sandbank submerged through sea-level rise, located in the southwest corner of the region, marking a division between the southern North Sea and CNS, and the Fladen/Witch Ground, a large muddy depression generally considered to define the northern extent of the CNS (DTI, 2001; DECC, 2016).

The water depth at the Culzean platform ranges from 87 m – 91 m (Gardline, 2013). The water depth is relatively consistent across the Project, with the deepest waters at approximately 100 m in depth (NMPi, 2023; Figure 6-6).

Hydrodynamic regime

The anti-clockwise movement of water through the North Sea and around the CNS region originates from the influx of Atlantic water, via the Fair Isle Channel and around the north of Shetland, and the main outflow northwards along the Norwegian coast (DECC, 2016). Against this background of tidal flow, the direction of residual water movement in the CNS is generally to the southeast (DTI, 2001; DECC, 2016). Offshore tidal current velocities in the region are between 0.01-1.0 m/s during mean spring tides (DECC, 2016). The Project has a mean spring tidal range of 1.01 – 2.00 m (Figure 6-7) (ABPmer, 2018a). Across the Project and wider Study Area flood flow is towards the south, associated with the propagation of the tide into and through the North Sea, with the ebb flow being towards the north, as demonstrated through the tidal excursion ellipses across the Study Area.

Mean spring tide peak currents demonstrate variations across the Project. The Project records spring peak flow current speeds of between 0.26-0.5 m/s (Figure 6-7) which is consistent with that of the wider CNS region.

Wave regime

The annual mean wave height in the CNS region follows a gradient decreasing from the northern area of the Fladen/Witch Ground to the southern area of the Dogger Bank. In the north, the mean wave height ranges from 1.51-2.40 m whilst in the south it ranges from 1.51-2.10 m (NMPi, 2023). Wave heights remain low (0.91–1.50 m) along the CNS coastline (NMPi, 2023). McBreen *et al.* (2011) shows that wave energy at the seabed ranges between 'low' (less than 0.21 N/m^2) and 'high' (more than 1.2 N/m^2) in the CNS region. Figure 6-2 shows the significant wave height in the Project, the waves predominantly approach from the north (ABPmer, 2018a). Modelled mean significant wave heights, obtained from the UK Renewables Atlas (ABPmer, 2018a) for the Project, show that the mean significant wave heights typically range between 2.01-2.25 m throughout the year (Figure 6-8). The UK renewables atlas published by ABPmer (2018) shows that there is seasonal variation between the mean significant wave height (Hs) between summer and winter. In summer, the mean significant wave height of the Project ranges from 1.26-1.5 m (Figure 6-2); ABPmer, 2018). In winter, the mean significant wave height varies across the Project, records a mean wave significant height of between 2.76-3 m (ABPmer, 2018).

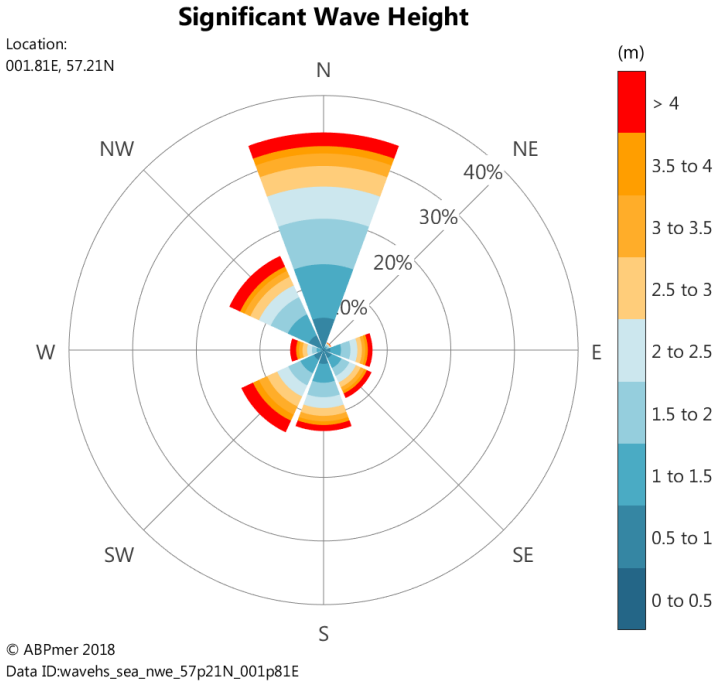

Figure 6-2 Significant Wave Height in the Project Location acquired from the Seastates interactive map (ABPmer, 2018b)

Fronts and Stratification

Across the Project, the mean annual surface temperature is approximately 9.6°C (based on climatology data of the north-west European continental shelf for 1971-2000) (NMPi, 2023). The annual mean near-bed temperatures across the Project are approximately 7°C (NMPi, 2023). There are no known fronts across this region of the CNS. The potential for stratification was assessed on the basis of work completed by Miller and Christodoulou (2014), which provided seasonally averaged front frequency map for summer based on an interpretation of ten years of satellite data (1998 to 2008). Figure 6-3 shows that fronts were most likely in summer, with up to 40% likelihood of time a strong front was observed (Miller & Christodoulou, 2014). Front were below a 20% likelihood in both winter and autumn, however, up to a 20% likelihood in spring.

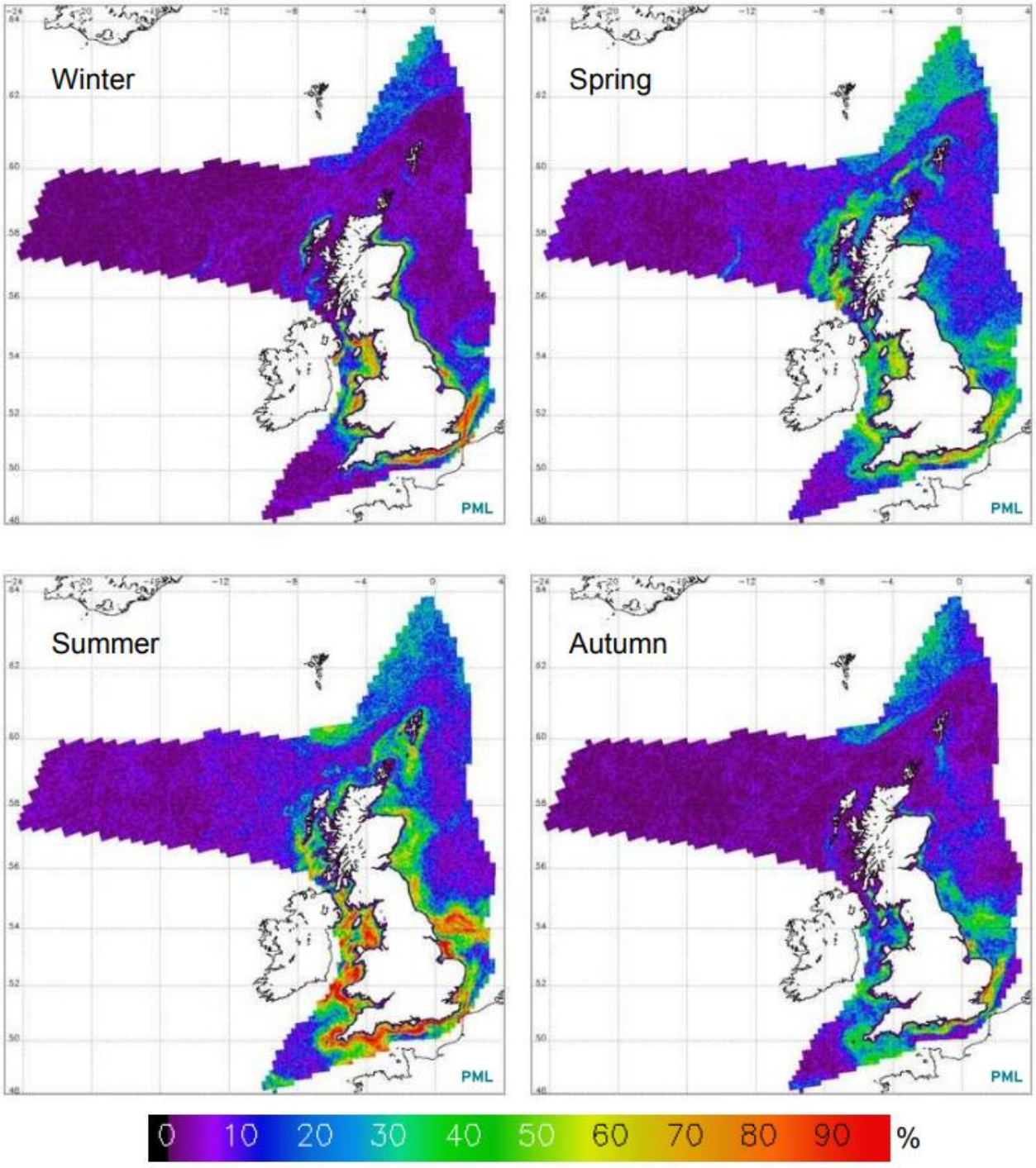

Figure 6-3 Seasonal Frequent Front Maps, Indicating the Percentage of Time a Strong Front Was Observed within the UKCS (1999-2008) (Miller & Christodoulou, 2014)

Wind regime

The prevailing winds in the CNS are from the southwest. Wind strengths in winter are typically in the range of Beaufort scale force 4-6 (6-11 m/s) with higher winds of force 8-12 (17-32 m/s) being much less frequent. Winds of force 5 (8

m/s) and greater are recorded 60-65% of the time in winter and 22-27% of the time during the summer months. In April and July, winds in the open, CNS to northern North Sea (NNS), are highly variable and there is a greater incidence of north-westerly winds (DECC, 2016). The wind speeds within the Project are presented as a 30-year average. Across the Project, the average wind speed is recorded as between 10.1-10.5 m/s, with seasonal variations showing faster wind speeds throughout the autumn, winter, and spring months between September to March (ABPmer, 2018a). Figure 6-4 highlights wind across the Project are largely from the south, west and northerly sectors. The yearly mean average wind dominant direction is from the southwest with mean average wind speeds of 10 – 10.5 m/s (ABPmer, 2018a).

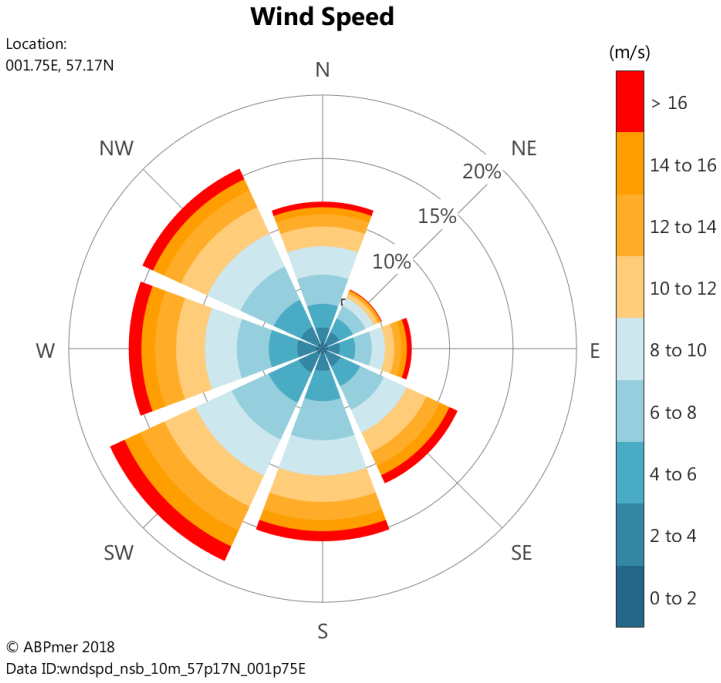

Figure 6-4 Wind Speed in the Project Location

Designated Sites

There are no offshore protected sites that overlap with the Project or the Study Area (Figure 6-9). The closest Special Area of Conservation (SAC) is the Scanner and Braemar Pockmarks SAC located approximately 135 km and 190 km North of the project respectively. The East of Gannet and Montrose Marine Protected Area (MPA) is located approximately 14 km west of the proposed operations. The area was identified for the presence of the long-lived bivalve ocean quahog (*Arctica islandica)* and offshore deep-sea muds (JNCC, 2021). Due to the intervening distance between the proposed operations and the designated interest features within the MPA, as well as the scale of operations, it is considered that there is little to no pathway for interaction or impacts to designated features.

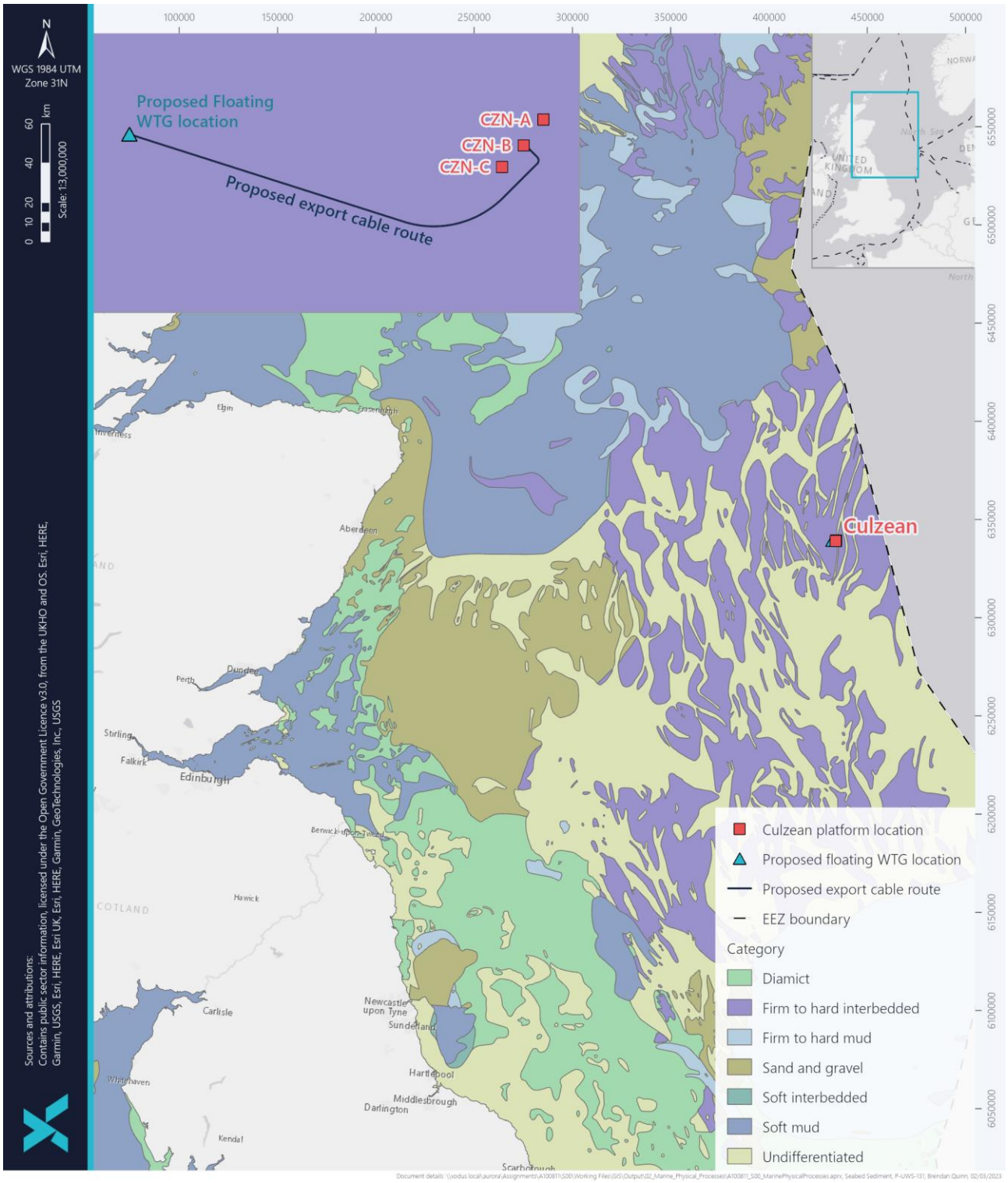

Figure 6-5 Seabed Sediments Across the Project

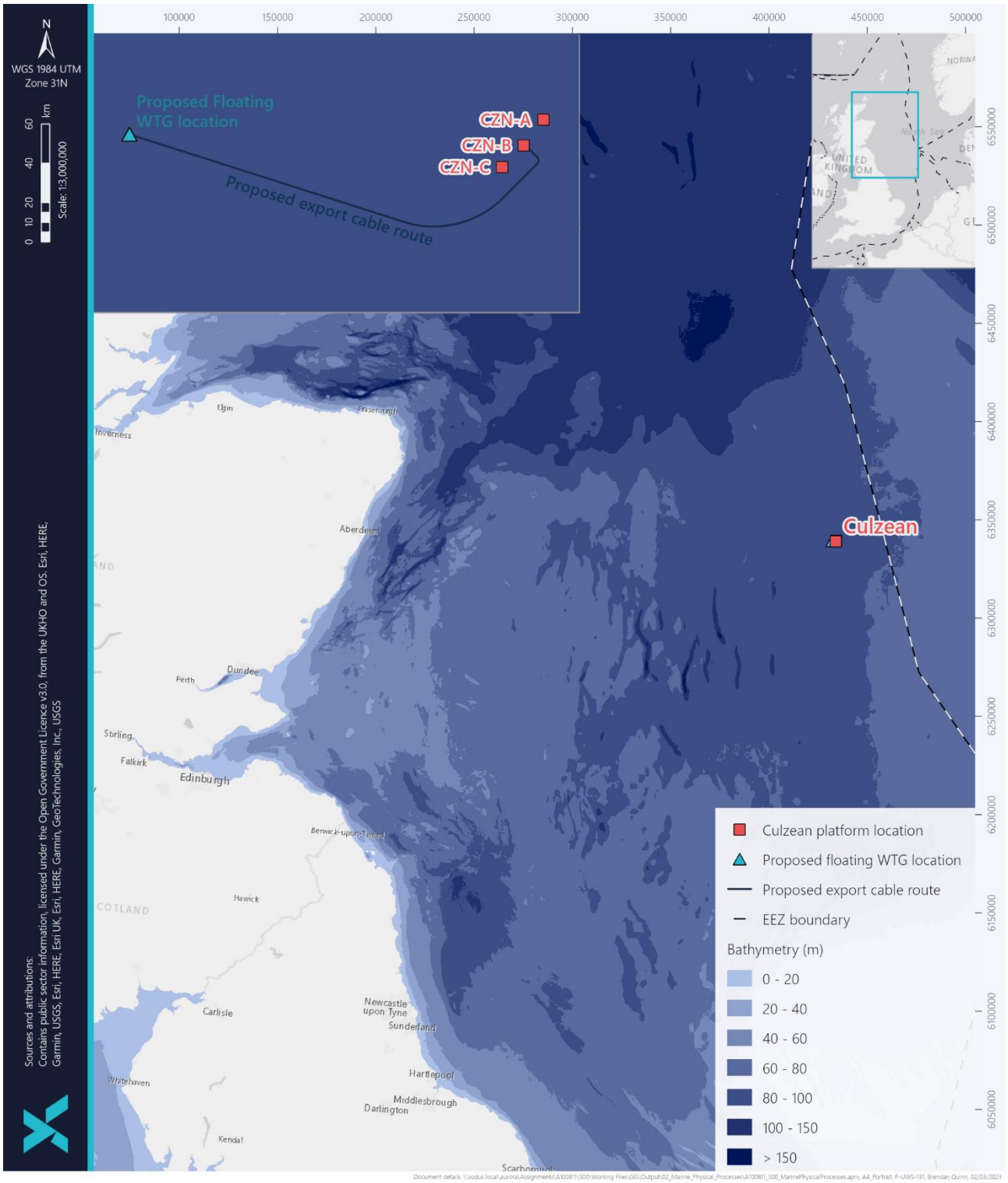

Figure 6-6 Bathymetry of the Project

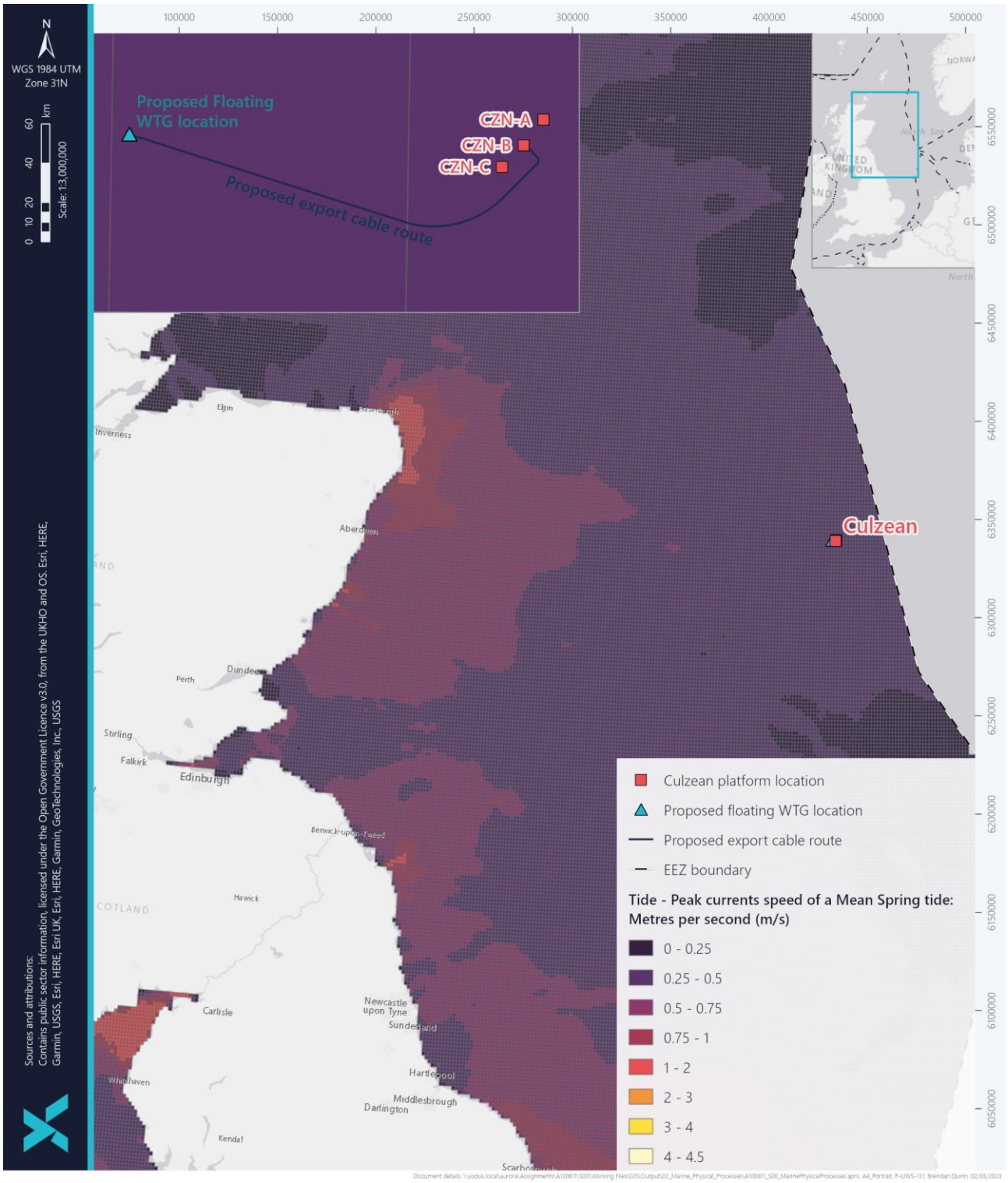

Figure 6-7 Tidal Regime Across the Offshore Area

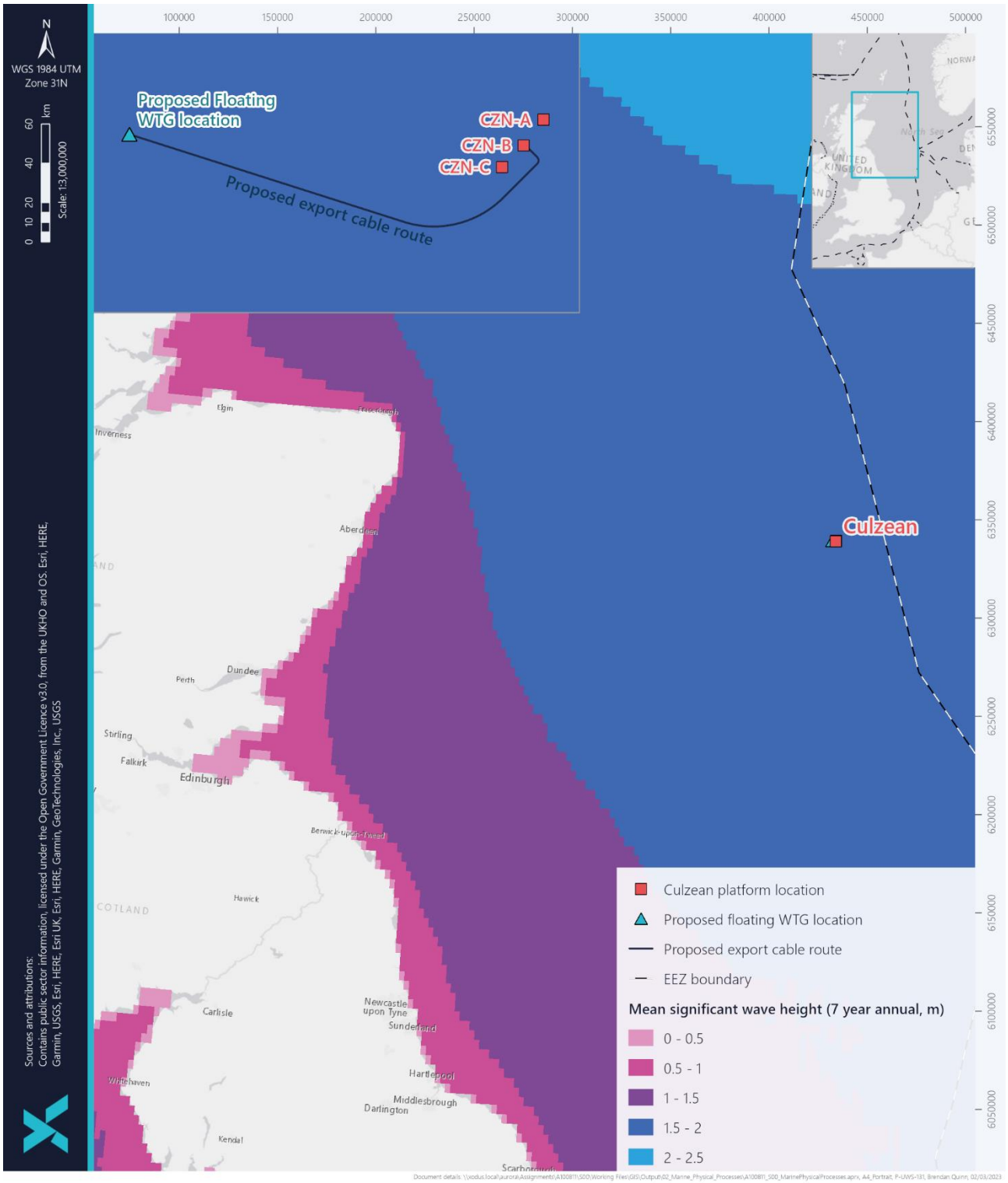

Figure 6-8 Wave Regime Across the Offshore Area

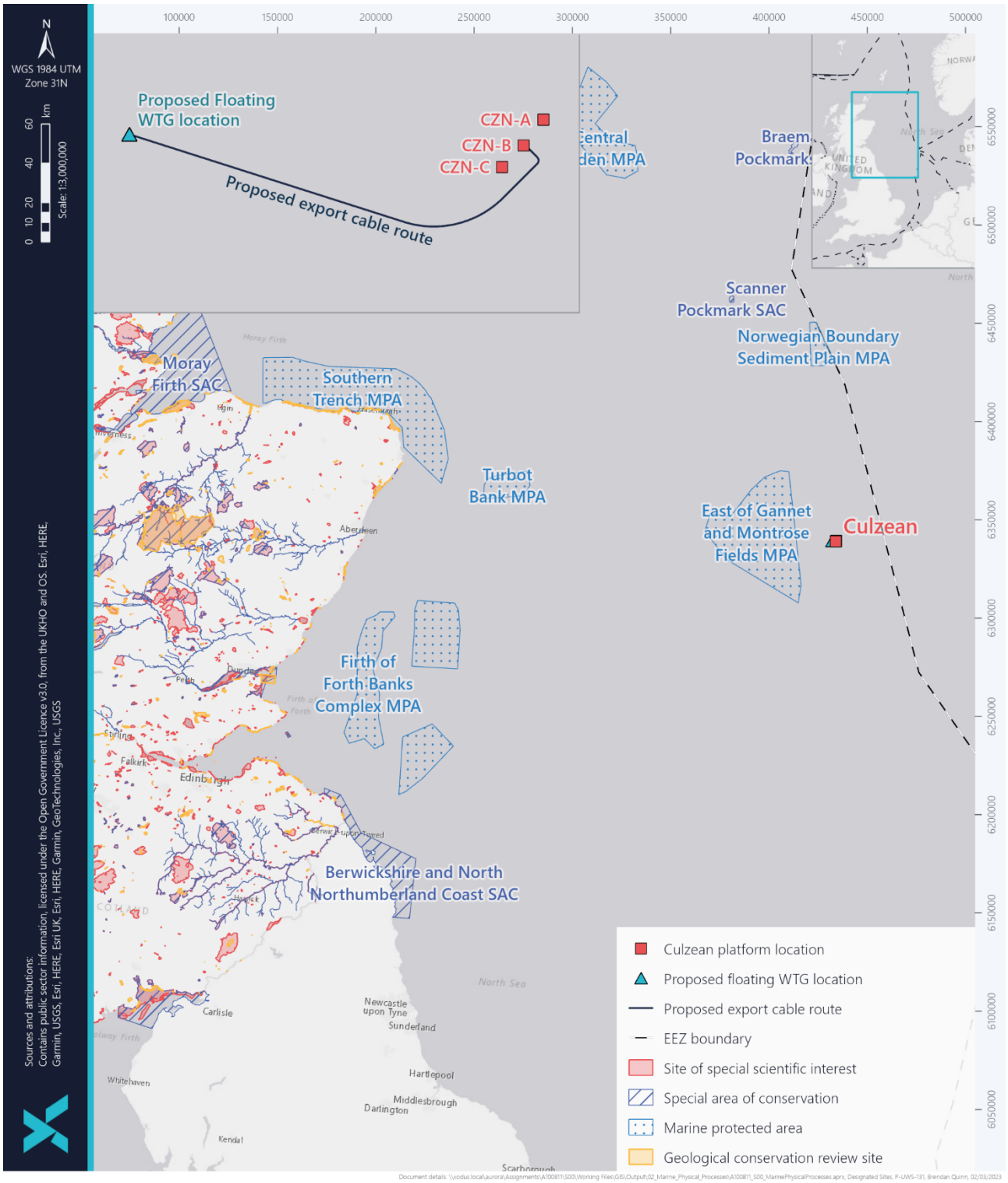

Figure 6-9 Designated Sites of Relevance to Marine Physical Processes

6.1.6 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 6-2.

Table 6-2 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Scour protection[2]	Requirements for scour protection outlined in the Construction Method Statement under Marine Licence consent conditions.
Cable routing and protection measures[3]	Undertake CBRA to determine required cable protection with an aim to minimise volume and spatial extent of protection.
Geophysical cable route survey[4]	Detailed in the Cable Plan which is required under Marine Licence consent conditions.
A Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) will be developed and adhered to.	Secured under Marine Licence consent conditions.

6.1.7 Scoping of Impacts

The potential impacts of the Project on marine physical processes have been summarised in Table 6-3. This table identifies potential impacts during the construction, operation and maintenance and decommissioning phases of the Project, with a scoping justification and scoping decision provided.

Marine physical processes are largely considered to be pathways to other potential receptors, rather than receptors themselves. As pathways, marine physical processes have the potential to lead to changes in associated receptors, including:

- Water and sediment quality (Chapter 6.2);
- Benthic ecology (Chapter 7.1);

[2] *Appropriate scour protection will be put in place where required following the completion of a scour assessment.*
[3] *Cable will be routed to avoid sensitive features wherever practicable and buried as the primary cable protection method. Additional cable protection may be used where adequate burial cannot be achieved and this will be minimised as far as is practicable. This will be informed by a cable burial risk assessment (CBRA), completed to determine the suitable cable protection measures, and implemented through relevant project plans.*
[4] *A pre-construction geophysical cable route survey will be undertaken, the results of which will also be used to identify presence of morphological features of interest that may require mitigation prior to construction works*

- Fish and shellfish ecology (Chapter 7.2);
- Marine mammals (Chapter 7.3);
- Ornithology (Chapter 7.4);
- Commercial fisheries (Chapter 8.1);
- Shipping and navigation (Chapter 8.3);
- Other users of the marine environment (Chapter 8.4); and
- Marine archaeology and cultural heritage (Chapter 8.7).

Due to the entirely offshore location of the Project, there is not considered to be any pathway for impacts on coastal morphology and indirectly seascape, landscape and visual receptors.

Table 6-3 Potential Impacts on Marine Physical Processes During Construction/ Decommissioning, Operations and Maintenance Phases of the Project.

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPING RESULT
Impacts on designated features within designated sites	C, D, O&M	No designated sites are located within 10 km of the proposed operations. Impacts on any designated features are not anticipated by construction, operation or decommissioning activities.	Scoped Out
Loss / alteration of seabed morphology (bathymetry and sediment type)	C	Localised changes to seabed morphology may arise through construction activities. Although impacts are only likely to be minimal due to the small scale of the Project, the potential for the loss / alteration of seabed morphology could occur associated with construction activities, so the impact is retained as a consideration for other topics	Scoped In
Increase in suspended sediments	C, D	Localised alterations to sediment are anticipated as a result of foundation mooring and cable installation and associated infrastructure. These activities may result in increased suspended sediment concentrations. Again, impacts are only likely to be minimal due to the small scale of the Project, there is the potential for localised increases in suspended sediment associated with construction activities, so the impact is retained and considered as a pathway to other topics	Scoped In
Changes to tide and wave regime	O & M	The floating foundations of the offshore turbines and the introduction of cable protection (if required, such as rock placement) does have the potential to introduce blockage to tide and wave patterns, in terms of a localised disruption to the flows and waves. However, due to the scale of the Project (i.e. a single floating foundation, associated with 3 mooring anchors (contingency case is a 5 line configuration) and potential cable protection as detailed in the Project Description, Chapter 3) and the offshore location of the site, any blockage would be highly localised to within the vicinity	Scoped Out

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPING RESULT
		of the infrastructure. The tidal and wave regime are governed by much larger, regional scale oceanographic processes, that would not be disrupted by the presence of the project infrastructure. The tidal excursion identified and used to define the Study Area buffer is at worst 5 km, but in reality, the flows and waves would recover within tens to hundreds of metres downstream of the infrastructure. The spatial footprint and surface area of the installed infrastructure would equate to less than 1% of the overall Project area and even less when considering the surrounding seabed and water column. The offshore location of the site and the intervening distance from the coast is such that any localised blockage to flows and waves in the vicinity of the Project, would not have any impact at the coast. On the basis of the small project footprint and profile within the water column and no obstruction to regional flows and waves, with only minimal blockage effects within tens to hundreds of metres upstream or downstream of the infrastructure, it is proposed that potential impacts to changes in tide and wave regime is scoped out from further assessment within the EIA.	
Impacts on local sediment transport regime and seabed morphology	O & M	As described for the potential changes to flows and waves impacts above, there is again the localised potential for near-bed blockage on flows and consequences to bedload sediment transport, associated with the installed infrastructure and protection. As described for the Project area, sediment transport potential is considered to be small (section 6.1.5). Installed mooring anchors and any protection (if required) would have a maximum height of 27 m above the seabed for anchors and only a few metres for protection. Based on the water depths that occur across the Project of around 91 m and mean spring and neap flow speeds of 0.26 – 0.5 m/s and 0.11 – 0.25 m/s respectively, empirical formulae on determining the depth-averaged flow speed above a submerged near-bed structure from the Construction Industry Research and Information Association (CIRIA) rock manual (CIRIA, 2007), indicated that there would no changes to water levels or flow speeds downstream of the infrastructure. As a direct result, there would be no change to the sediment transport regime beyond the immediate vicinity of the infrastructure. Furthermore, due to the entirely offshore location of the Project, the small scale of the project and the intervening distance to the coast, any potential changes would be highly localised to the infrastructure and indiscernible at the project or even larger regional scales, with no impacts extending to the coast. It is therefore proposed	Scoped Out

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPING RESULT
		that potential operational impacts leading to changes in the sediment transport regime and seabed morphology is scoped out from further assessment within the EIA.	
Introduction of scour	O & M	Evaluates for the potential occurrence of scour around anchors. Prior to installation a scour assessment will be completed to determine the need for protection, and if required, the protection will be installed at construction, thereby negating the potential development of scour. Therefore, due to the mitigation measures, which negates scour developing around anchors and cables, and the limited scope of the proposed Project, the impact is scoped out	Scoped Out
Impacts to stratification	O & M	As it is assessed that the installed infrastructure associated with the Project would not ultimately lead to a change in the wave and tide regime at the project or regional scale, there is not considered to be any onward impact or change to stratification. Section 6.1.5 Fronts and Stratification, did describe the potential for stratification based on the mapping evidence presented in Miller and Christodoulou (2014), with the potential being strongest during summer months. Understanding of stratification elsewhere on the Scottish continental shelf from the Atlantic - European North West Shelf - Ocean Physics Reanalysis model indicates that should stratification be present, it would be only seasonal during the warmer summer months, with the potential for temperature and salinity stratification in offshore locations. Stratification would also most likely occur with respect to surface waters (water and more saline) at water depths of less than 50 m. Should stratification be present within the Project area, the installed infrastructure through the water column, in terms of up to 3 mooring lines (5 for contingency) would not be sufficient to enhance mixing to disrupt stratification. Assessments completed by Carpenter *et al.*, 2016; Cazenave *et al.*, 2016, Dorrel *et al.*, 2022, all identified the potential for increased water column mixing as a result of anthropogenic infrastructure in the marine environment, including in relation to offshore wind developments. However, the proposed scale of the Project, with only one floating foundation, associated with mooring lines is far smaller than the scales being represented in Dorrel *et al.*, 2022. Schultze *et al.*, (2020), based on observations for a fixed offshore wind development identified increased water column mixing associated with fixed foundations in the lee of the structures.	Scoped Out

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPING RESULT
		However, the water column mixing and reduction in stratification was restricted to within hundreds of metres downstream of the structure, with no impact or change to mixing and stratification at larger distances. Furthermore, for locations where the mesoscale processes governing stratification were considered to be dominant or strong, the water column and stratification mixing distance was even less on considering the properties of the entire wind farm. Therefore, in the context of the Project, it is considered that even if water column mixing should occur, leading to reduction in stratification, the effect would be highly localised. The smaller surface area of the mooring lines, albeit there could be up to 5, is far smaller than that of fixed structures, so the blockage or mixing effect from each, would conceptually be smaller. On the basis of the limited spatial extent of increased water column mixing and consequently potential changes to stratification and the small scale of the Project, it is proposed that the impact of potential changes to stratification is scoped out from further assessment in the EIA.	

6.1.8 Potential Cumulative Effects

There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect marine physical processes receptors. Notable projects will be considered as part of the Cumulative Effects Assessment.

Cumulative effects on marine physical processes resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in Section 5, with all relevant effects assessed for the Project in isolation considered on the cumulative level as required. Given the small-scale and localised nature of operations, there are not expected to be any cumulative impacts arising from the Project and other developments in the area.

6.1.9 Potential Transboundary Impacts

The Project does not extend beyond the limits of Scottish or UK territorial waters. There is no potential for transboundary impacts as a result of activities undertaken during the construction, operation and maintenance and decommissioning phases of the Project. Potential transboundary impacts have been scoped out of the EIA and have not been considered further.

6.1.10 Approach to Analysis and Assessment

The assessment of impacts arising from the construction, operation and maintenance, and decommissioning phases of the Project will be completed through a desk-based analysis of publicly available data and information sources (as identified in Section 6.1.4).

The assessment of impacts arising from the Project on marine physical processes will utilise site specific and publicly available data and will be augmented by consultation during the EIA phase. Consultation will be completed with but is not limited to:

- MS-LOT;
- Marine Scotland Science; and
- NatureScot.

Due to the scale and offshore location of the Project, no numerical modelling is proposed or to be completed. Instead the assessment is to be completed using a combination of analytical tools, outputs from existing regional numerical modelling and desk-based reviews will assess the nature and magnitude of potential change on the marine physical processes and the likely significant effect on the marine physical process receptors. The assessment methodology is summarised as follows:

- Loss / alteration of seabed morphology: Will involve the examination of project specific surveys, alongside a desk-based study using publicly available geotechnical, geological and substrate data. Quantitative assessment of any seabed loss due to the installation of subsea Project infrastructure (mainly comprising moorings and protection measures). No drilling is to be completed in installation of the mooring anchors, therefore consideration of the potential for alteration of the sediment type, an assessment will be completed on the nature and properties of the geological substrate up to the target installation depth of anchors, in order to ascertain the potential for any change.
- Increase in suspended sediments: Use of publicly available seabed sediment, suspended sediment concentration and available climatology data on flow properties (available from the Scottish Shelf Model or the Atlantic-European North West Shelf Ocean Physics Reanalysis data). Semi-quantitative analytical tools will be used to take account of tidal flow properties (speed and direction) and seabed sediment properties (size and settling velocities) in order to determine the lateral translation of material disturbed during construction activities.

Where decommissioning activities are scoped into the assessment, it is expected that the activities will result in a reduced level of change than that already considered for the construction phase. The impacts of the Project on marine physical processes will be assessed based on the maximum worst case design scenario of the Project introduced in Chapter 4 and detailed further within the EIAR.

The EIA methodology for marine physical processes will be conducted in line with the processes identified in Section 5.3 and the relevant policy and guidance documents identified in Section 6.1.2.

6.1.11 Scoping Questions

- Do you agree with the Study Area defined for marine physical processes?

- Do you agree with the data and information sources identified to inform the baseline for marine physical processes, or are there any additional data and information sources that should be considered?
- Do you agree with the suggested embedded mitigation measures?
- Do you agree that all potential receptors and impacts have been identified for marine physical processes?
- Do you agree that the impacts proposed can be scoped out of the marine physical processes EIA Chapter?
- Do you agree with the approach for cumulative effects assessment and transboundary impacts?
- Do you agree with the approach to analysis and assessment that will inform the EIA?

6.1.12 References

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6.2 Water and Sediment Quality

6.2.1 Introduction

This chapter presents the water and sediment quality receptors of relevance to the Project, highlighting the potential impacts on water and sediment quality receptors during installation, operation and maintenance and decommissioning phases.

The water and sediment quality receptors considered within this chapter include designated waterbodies, bathing waters, shellfish water protected areas, sensitive areas and sediment quality within the vicinity of the Project. The entirely offshore location of the Project means that terrestrial and inshore waters designated as urban wastewater treatment sensitive areas and Nitrate Vulnerable Zones (NVZs) are not identified as water and sediment quality receptors.

6.2.2 Legislation, Policy and Guidance

In addition to the relevant policy and legislation described in Chapter 2 Legislative Context and Regulatory Requirements, the following section outlines the legislation and guidance considered as part of the assessment of potential impacts on water and sediment quality. Although the Project is located entirely offshore the legislation and policy for coastal locations have been considered due to the identification of coastal water and sediment quality receptors.

Legislation

- Food and Environment Protection Act 1985;
- Water Environment and Water Services (Scotland) Act 2003;
- The Bathing Waters (Scotland) Regulations 2008;
- The Marine Strategy Regulations 2010;
- Marine Policy Statement (2011);
- Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended);
- The Pollution Prevention and Control (Scotland) Regulations 2012;
- The Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013;
- Environmental Authorisations (Scotland) Regulations 2018; and
- Prevention of Pollution from Ships (MARPOL) Convention.

Guidance

- Coastal and marine environmental site guide (Environment Agency, 2003);
- Centre for Environment, Fisheries and Aquaculture Science (Cefas) Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) Requirements: Version 2 (Cefas, 2004); and
- SEPAs Guidance for Pollution Prevention (GPPs) (currently being updated).

6.2.3 Study Area

The Water and Sediment Quality study area is consistent with that of the Marine Physical Processes study area (hereafter referred to as the 'Study Area'), which is defined as the red line boundary for the Project with a 5 km buffer (Figure 6-1)

6.2.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and would inform the baseline characterisation for the EIA as appropriate are outlined in Table 6-4.

Table 6-4 Summary of key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Scotland's Marine Atlas: Overall Assessment	https://marine.gov.scot/information/scotlands-marine-atlas-overall-assessment-2011	2011	Marine Scotland
Waterbody data sheets	https://www2.sepa.org.uk/WaterBodyDataSheets/	2012	Scottish Environment Protection Agency (SEPA)
Environmental Baseline Survey. Maersk Oil North Sea Limited. UKCS Block 22/25a Culzean Platform area site survey.	Gardline Report Ref 9474.6	2013	Gardline Environmental Ltd (GEL)
Environmental Baseline Report. Route 1B Condensate Export Pipeline from Culzean CPF Platform to FSO and FSO Survey Mooring Area	Gardline Report Ref 10042.5	2014a	GEL
Environmental Baseline Report. Route 2A Gas Export Pipeline from Culzean CPF Platform to T2 Junction on the CATS platform	Gardline Report Ref 10043.5	2014b	GEL
Environmental Habitat Assessment. Route 2B Gas Export Pipeline from Culzean CPF Platform to T5 Junction on the CATS platform	Gardline Report Ref 10044.4	2014c	GEL
Monthly average non-algal Suspended Particulate Matter concentrations on the UK shelf waters	https://www.cefas.co.uk/data-and-publications/dois/monthly-average-non-algal-supended-particulate-matter-concentrations/	2016a	Cefas

TITLE	SOURCE	YEAR	AUTHOR
Suspended Sediment Climatologies around the UK	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf	2016b	Cefas
OSPAR Intermediate Assessment 2017 – Contaminant assessments	https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/pressures-human-activities/contaminants	2017	OSPAR
Scotland's water environment 2019: A summary and progress report	https://www.sepa.org.uk/media/490771/191219_scotlands-water-environment-final.pdf	2019	SEPA
Urban Wastewater Treatment Directive Sensitive Areas Map 2019	https://www.gov.scot/binaries/content/documents/govscot/publications/map/2016/01/urban-waste-water-treatment-sensitive-areas-map/documents/urban-waste-water-treatment-sensitive-areas-map-2019/urban-waste-water-treatment-sensitive-areas-map-2019/govscot%3Adocument/UWWTD%2Bdesignations%2B2019.pdf	2020a	SEPA
Coastal Water Body Classifications (as per WFD (2000/60/EC)	https://map.environment.gov.scot/sewebmap/?layers=coastalClass	2020b	SEPA
Clean Seas Environmental Monitoring Programme (CSEMP)	https://www.bodc.ac.uk/projects/data_management/uk/merman/assessments_and_data_access/csemp/	2020	British Oceanographic Data Centre (BODC)
Cefas Sediment Management Framework prototype Action Levels Viewer	https://rconnect.cefas.co.uk/action_levels_tool/	2021	Cefas
Annual updates on the condition of the water environment	https://www.sepa.org.uk/data-visualisation/water-classification-hub	2023a	SEPA
Water Framework Directive (WFD) River Basin Management Plan (RBMP) Waterbody status	https://www.sepa.org.uk/data-visualisation/water-environment-hub/	2023b	SEPA
Scotland's Environment data tool for Bathing Waters	https://www2.sepa.org.uk/bathingwaters/	2023c	SEPA
Marine Protected Area (MPA) mapper	https://jncc.gov.uk/our-work/marine-protected-area-mapper/	2023	Joint Nature Conservation Committee (JNCC)

6.2.5 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 6-4) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

Water Quality

The chemical composition of the water present in the Study Area would be expected to be similar to typical unpolluted offshore Atlantic waters (Northern North Sea). SEPA is responsible for producing and implementing River Basin Management Plans (RBMPs) under the Water Environment and Water Services (Scotland) Act, 2003. River basins comprise all surface waters (including transitional (estuaries) and coastal waters) extending to 5.5 km (3 NM) seaward from the Scottish territorial baseline. Any proposed development within these waters must have regard to the requirements of the Water Framework Directive to ensure that all surface water bodies achieve 'Good Ecological Status' and that there is no deterioration in status. In addition to the above, further consideration is required of designated bathing waters (The Bathing Waters (Scotland) Regulations 2008), designated shellfish waters (The Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013) and nitrate sensitive areas. For the purposes of this Scoping Report, designated waters is the collective term for all the designations under the varying legislative frameworks. The entirely offshore nature of the Project and the Study Area, means there is no pathway for the Offshore Project to interact with designated waters.

As indicated in Chapter 7.1 Marine Physical Processes, the suspended sediment concentrations (SSC) throughout the Project area are 0 to 1 mg/l throughout the year (Cefas, 2016b). The offshore tidal current velocities in the region are between 0.01-1.0 m/s during mean spring tides (DECC, 2016). Any increase in SSC because of the Project would be within the applied study area buffer based on the maximum extent of the mean spring tidal excursion (estimated to be at 5 km). Furthermore, increases in SSC associated with all project phases will be temporary, transient, and localised in nature and would not ultimately result in any change to the water or sediment properties.

Designated Waterbodies

There are no designated waterbodies within the Study Area. The closest waterbodies to the Study Area are located along the Aberdeenshire coastline, located over 222 km away and consists of:

- Don Estuary to Souter Head (Aberdeen), ID:200105;
- Souter head to garron Point, ID 200518; and
- Cruden Bay to the Don Estuary, ID: 200117.

Don Estuary to Souter Head (Aberdeen), Souter Head to Garron Point and Cruden Bay to the Don Estuary are coastal waterbodies, measuring 50.2 km^2, 94.7 km^2 and 149.4 km^2 in area respectively. Only Don Estuary to Souter Head (Aberdeen) is designated as a heavily modified water body on account of physical alterations that cannot be addressed without a significant impact on navigation and from an increased risk of subsidence or flooding. Waterbody status for the three waterbodies are all noted as 'Good' or 'High' for all assessment parameters (SEPA, 2023b). However, as noted above, due to the intervening distance between the Study Area and these designated waterbodies, it is unlikely that any localised impacts on water quality from the Project activities, would negatively impact upon the water quality of these sites.

Designated Bathing Water

There are no designated bathing waters within the Study Area, due to the offshore locality, with the closest being the Peterhead (Lido), ID: UKS7616042; located approximately 220 km away. As for the designated waterbodies, due to the entirely offshore location of the Project and the intervening distance, there is no pathway for interaction and no anticipated impacts to designated bathing waters from the proposed installation, operation and maintenance and decommissioning operations.

Designated Shellfish Water Protected Areas

There are no designated shellfish water protected areas within the Study Area. The nearest designated shellfish water protected areas are within the Durnoch Firth (IDSWPA13) and Cromerty bay (ID:SWPA11). However, both these sites are > 350 km from the Project, so there is no pathway for interaction and therefore no impacts to designated shellfish waters are anticipated.

Sediment Quality

There are no known sediment quality issues within the Study Area based on all publicly available information and environmental sampling associated with the Culzean field. The Marine Scotland assessment of the UK's Clean Seas Environment Monitoring Programme (CSEMP) describes the status and trends of contaminant concentrations and biological effects measurements in biota and sediment at monitoring stations in waters around the UK. The most recent assessment is from April 2020 using data spanning 1999 to 2019 (BODC, 2020). The Project is in the Forties monitoring region for the CSEMP. There are no fixed CSEMP sites or strata recording sediment contaminants for the East Scotland Coast region. The closest monitoring sites are located at the Outer Moray Firth Station, both of which are located >300 km from the Project. These sites are beyond the Study Area and therefore are unable to provide meaningful conclusions on sediment quality based on their available data.

Review of available information on contaminants in Scottish waters from the Cefas Sediment Management Framework prototype Action Level viewer, indicated that there were no samples or contaminant information within the Project or Study Area (Cefas, 2021). The closest occurrence of any contaminants was located within the River Tay, > 280 km from the Project.

Various surveys have been conducted in relation to the Culzean field (Block 22/25a). In 2013 an environmental baseline survey (EBS) was conducted at a site located approximately 13 km North of the Project (GEL, 2013). As part of the EBS a total of 36 grab samples were taken within an area of approximately 4.2 km x 4.5 km, for which metals contaminants and total hydrocarbons (THC) were tested for. A summary of the analyte results from the samples are presented in Table 6-5, with the results compared against existing international threshold standards for evaluating contamination. Including Cefas Action Levels and Canadian sediment quality guidelines, both presented in Table 6-6. Cefas Action Levels are typically used as part of a 'weight of evidence' approach to demonstrate to decision-makers the suitability of dredged material for disposal at sea but are not themselves statutory standards. These levels are used in this assessment to inform the potential risk to the environment from contaminants. Contaminants below Action Level 1 (AL1) are generally not considered to be of concern and are approved for disposal at sea. Contaminant levels above Action Level 2 (AL2) are not considered suitable for disposal at sea without further consideration. The Canadian Sediment quality guidelines were developed by the Canadian Council of Ministers of the Environment as broadly protective tools to support the functioning of healthy aquatic ecosystems. They are based on field research programmes that have demonstrated associations between chemicals and biological effects by establishing cause

and effect relationships in particular organisms. Therefore, a comparison of measured concentrations of various contaminants within the sediments with these guideline values will, therefore, provide a basic indication on the degree of contamination and likely impact on ecology. The guidelines consist of threshold effect levels (TELs) and probable effect levels (PELs). The TELs and PELs are used to identify the following three ranges of chemical concentrations with regards to biological effects. It is likely that the TELs will be adopted as the interim sediment quality guidelines (ISQGs):

- Below the TEL: the minimal effect range within which adverse effects rarely occur.
- Between the TEL and PEL: the possible effect range within which adverse effects occasionally occur.
- Above the PEL: the probable effect range within which adverse effects frequently occur.

For the 36 sampled locations across the Culzean field reported in GEL (2013), THC values were generally low across the survey area recording typically <11 µg/g at the majority of stations; compared to 'background' data recorded in sandy sediments of the central sector of the North Sea, where a mean THC value of 11.3 µg/g (UKOOA, 2001). All but three samples were below this 'background' concentration. It was concluded that the three sites with elevated concentrations were due to the dispersal of drill cuttings from the Culzean well. As illustrated in Table 6-5 details of measured metals contaminant concentrations obtained during various surveys within Block 23/21, indicates that the recorded contaminant levels are significantly lower than both the AL1 and TEL threshold values.

In 2014, another EBS was conducted along the proposed c.3.7 km Route 1B Condensate Export Pipeline corridor from the Culzean central processing facility (CPF) platform to a proposed floating storage and offloading (FSO) vessel location (GEL, 2014a). The survey site was located approximately 16 km from the Offshore Development. During the survey a total of ten samples were acquired from eight stations. THC, metals and Polycyclic Aromatic Hydrocarbons (PAH) were analysed as part of this sampling survey, with results for metals summarised in Table 6-7. Again measured metals contaminants were all well below sediment quality thresholds, including Cefas AL1 and Canadian TEL thresholds. It was found that the THC concentrations ranged from 4.7 µg/g to 19.0 µg/g, with the higher concentrations indicating low level contamination from drilling fluids derived from the well 22/25a-10. The THC concentrations at all stations were considered to be within background threshold values in the Central North Sea defined by UKOOA, 2001 (GEL, 2014a).

On the basis of the available information around the Project, there is not considered to be an issue with sediment quality as all measured contaminants were well below sediment quality threshold standards.

Table 6-5 Details of sediment metal concentrations obtained during surveys within UKCS 23/21. (GEL, 2013)

Contaminant	Culzean Surveyed Sediment Metal Concentrations (mg/kg)				
	Culzean Platform Area site survey [1]	Culzean Alpha [2]	Culzean Beta [2]	UKCS 23/21 [2]	UKCS 23/21 [2]
Arsenic	5.7	0.8	0.9	7.2	3.9
Mercury	0.04	<0.1	<0.1	0.01	0.03
Cadmium	0.2	0.8	1	0.1	NR
Chromium	19.2	14.6	12.9	21.9	23
Copper	9.8	3.8	4.1	8.5	8.9
Nickel	6.9	17.7	18.2	7.2	9.7
Lead	17	12.5	13.9	17.4	15.2
Zinc	34.5	3.9	4.7	18	NR [3]

[1]: Of the 36 samples analysed, these were summarised with the maximum presented for each analyte across all the samples. This was completed in order to enable comparison with previous studies presented in GEL (2013).
[2]: Reported in GEL (2013) based on previous sampling and analyses completed in 2010, 2011 and 2012.
[3]: Measure not reported

Table 6-6 Sediment quality thresholds including Cefas Action Levels and Canadian sediment quality guidelines

Contaminant	Cefas Action Levels		Canadian sediment quality guidelines	
	Cefas AL 1 mg/kg	Cefas AL2 mg/kg	ISQG/TEL mg/kg	PEL mg/kg
Arsenic	20	100	7.24	41.6
Mercury	0.3	3	0.13	0.7
Cadmium	0.4	5	0.7	4.2
Chromium	40	400	52.3	160
Copper	40	400	18.7	108
Nickel	20	200	-	-
Lead	50	500	30.2	112
Zinc	130	800	124	271

Table 6-7 Details of sediment metal concentrations obtained during surveys associated with the Route 1B Condensate Export Pipeline corridor (GEL, 2014a)

Contaminant	Culzean Surveyed Sediment Metal Concentrations (mg/kg)							
	EBS-001	EBS-002	EBS-003	EBS-004	EBS-005	EBS-006	EBS-007	EBS-008
Arsenic	2.7	2.7	3	2.9	2.1	2.7	2.2	2.6
Cadmium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	8.4	13.8	13.6	10.8	10.4	10.3	9	10.1
Copper	5.1	4	3.9	3.4	3.1	4	3.4	3.4
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	4.9	6.2	6.9	5.9	6.7	5.5	4.5	4.7
Lead	15.8	10	9.4	7	8.6	6.4	6.2	6.5
Tin	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	19	15	15.8	13.2	14.1	11.2	12.1	12.4

6.2.6 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 6-8.

Table 6-8 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Environmental Management Plan, covering pollution prevention, biosecurity assessment and waste management	Secured under the Marine Licence consent conditions
Marine pollution prevention under the MARPOL convention requirements	Secured through the production of a Marine Pollution Prevention Plan, a condition of the Marine Licence.

6.2.7 Scoping of Impacts

A number of potential impacts on water and sediment quality receptors have been identified, which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. The potential impacts have been summarised in Table 6-9.

Table 6-9 Scoping Assessment for water and Sediment Quality

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPING RESULT
Impacts on water quality status of designated waters	C, D, O&M	Recorded contaminant levels within Block 23/21 are significantly below the threshold levels for Cefas AL1 and the Canadian sediment quality guidelines TEL. Increases in SSC or disturbance effects associated with all stages of the Project would be temporary and localised, being limited by the tidal excursion (estimated to be 5 km), and returning to background levels after a short period on cessation of the operation. There is no potential for the Project to result in impacts on the water quality status of designated waters during all stages of operations on the Project. Although there may be a temporary, highly localised increase in SCC during operations, the nearest designated waters have been shown to be over 200 km from the Project.	Scoped Out
Changes in water and sediment quality due to accidental discharges from vessels	C, D, O&M	Installation, operation and decommissioning activities may potentially result in reduced water and sediment quality in the vicinity due to accidental discharges from vessels. The risk will be adequately managed through the embedded mitigation measures, which will reduce the risk of accidental discharges. In addition, implicit vessel and environmental protocols in line with international standards will inherently limit the risk from vessel discharges and any onward impacts to wate rand sediment quality. Therefore, the impacts are likely to be short lived and very localised. There are no designated water bodies within or in the vicinity of the Project or Study Area; with the nearest site being located more than 200 km away. Therefore, any accidental discharges during the undertaking of installation, operation or decommissioning activities will not affect the status of these sites.	Scoped Out

It is proposed that the Water and Sediment Quality topic be scoped out of the EIA due to the offshore location of the Project and the intervening distance to designated waters, the designed in mitigation measures and the limited disturbance potential form the small scale project.

6.2.8 Potential Cumulative Effects

Given the small-scale and localised nature of operations, there are not expected to be any cumulative impacts arising from the Project and other developments in the area. Cumulative effects have therefore been scoped out.

6.2.9 Potential Transboundary Impacts

The localised and transient nature of sediment disturbances during the development, operational and decommissioning activities there is considered to be no potential for transboundary impacts on water and sediment quality and therefore these have been scoped out.

6.2.10 Approach to Analysis and Assessment

Any potential impacts would be localised, transient and temporary to the Project, with mitigation in place to limit these occurring in the first place. Based on the results of the scoping of impacts outline in the Section 6.2.7 above, an EIA for water and sediment quality is not required as all potential impacts of the Project on water and sediment quality have been scoped out.

6.2.11 Scoping Questions

- Do you agree with the Study Area defined and applied for the water and sediment quality topic?
- Do you agree with the data sources used to complete the scoping assessment for water and sediment quality receptors?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified for water and sediment quality?
- Do you agree with completed scoping assessment and that the water and sediment quality topic can be scoped out from further assessment within the EIA?
- Do you agree with scoping out cumulative and transboundary impacts?

6.2.12 References

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Gardline Environmental Ltd (2014b). Survey Report for Maersk Oil North Sea Limited. Culzean Export Pipeline Route Surveys. Route 2A. Gas Export Pipeline from Culzean CPF Platform to T2 Junction on the CATS Pipeline. Environmental Baseline Report. Survey Date: April – July 2014. Report Reference 10043.5

Gardline Environmental Ltd (2014c). Survey Report for Maersk Oil North Sea Limited. Culzean Export Pipeline Route Surveys. Route 2B. Gas Export Pipeline from Culzean CPF Platform to T5 Junction on the CATS Pipeline. Environmental Habitat assessment. Survey Date: April – August 2014. Report Reference 10044.4

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7 OFFSHORE BIOLOGICAL ENVIRONMENT

7.1 Benthic Ecology

7.1.1 Introduction

This chapter will provide an overview of the sensitivities associated with offshore and intertidal benthic receptors of the Project. An overview of the potential impacts of the Project on benthic ecology, including during the construction, operation and maintenance and decommissioning of the Project, are also discussed.

7.1.2 Legislation, Policy and Guidance

In addition to the relevant policy and legislation described in Chapter 2 Legislative Context and Regulatory Requirements, the following section outlines the legislation, policy and guidance that will be taken into consideration on the potential impacts on Benthic Ecology within the Study Area.

Legislation

- Nature Conservation (Scotland) Act 2004.

Policy

- Scotland's Biodiversity: a route map to 2020 (Scottish Government, 2015).

Guidance

- Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2019);
- Assessment of the Environmental Impact of Offshore Wind-Farms (OSPAR, 2008);
- OSPAR Assessment of the Environmental Impacts of Cables (OSPAR, 2009);
- Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive (Irving, 2009);
- SNH (now NatureScot) guidance: Guidance on Survey and Monitoring in Relation to Marine Renewable Developments in Scotland – Volume 5: Benthic Habitats (SNH, 2011);
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Judd, 2012);
- Refining the criteria for defining areas with a 'low resemblance' to Annex I stony reef (Golding *et al.* 2020); and
- Priority Marine Features (PMFs), as described in NatureScot Commissioned Report 388; Strategy (NatureScot, 2020).

7.1.3 Study Area

The benthic ecology study area is defined as the Project plus a buffer of 5 km (Figure 7-1) (hereafter referred to as the 'Study Area'). The Study Area is defined as the area that will be directly impacted by the offshore infrastructure and the adjacent areas that may be affected by indirect impacts, such as sediment suspension and resettlement, which will not extend beyond the buffer zone, in line with the study areas for marine physical processes and water and sediment quality (see Chapter 6.2).

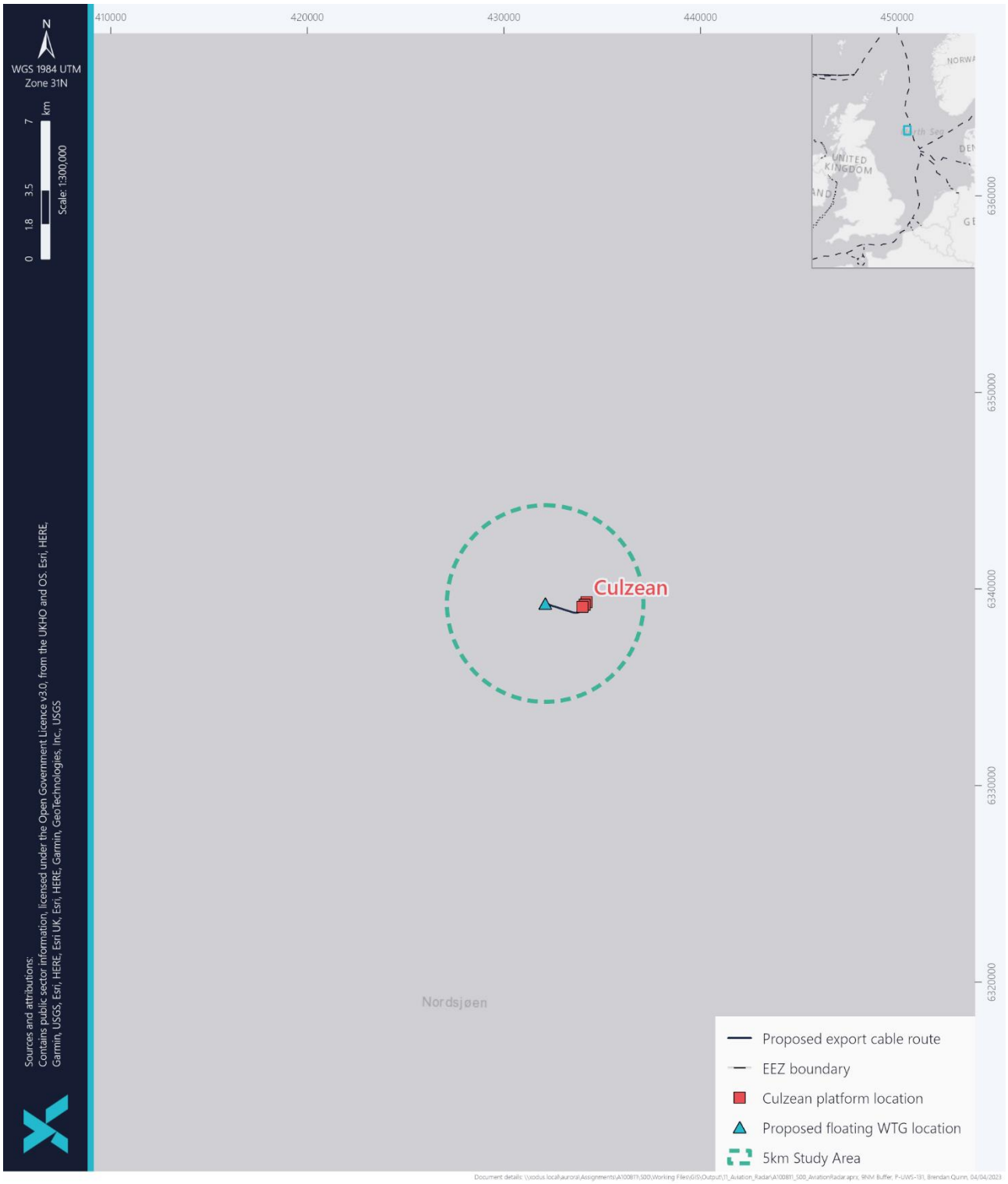

Figure 7-1 Study Area

7.1.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 7-1.

Table 7-1 Summary of Key Datasets and Reports

TITLE	SOURCE	AUTHOR	DATE
List of threatened and/or declining species and habitats	https://www.ospar.org/work-areas/bdc/species-habitats/list-of-threatened-declining-species-habitats	OSPAR	2008
Scottish PMF	https://marine.gov.scot/sma/content/descriptions-scottish-priority-marine-features-pmfs	Tyler-Walters *et al.*	2016
Species distribution modelling of marine benthos. A North Sea case study	https://www.researchgate.net/publication/236647105-Species_distribution_modelling_of_marine_benthos_A_North_Sea_case_study	Reiss *et al.*	2011
Spatial data relating to benthic ecology on National Marine Plan Interactive	https://marinescotland.atkinsgeospatial.com/nmpi/	NMPi	2023
Annex I Submarine structures made by leaking gas	https://hub.jncc.gov.uk/assets/b47ebc16-7b74-4a69-bd4b-7e29c0584d59	JNCC	2018
Annex I Reefs in UK offshore waters (public)	https://hub.jncc.gov.uk/assets/992dfef7-3267-43db-b351-5927bf0621d4	JNCC	2022
SAC Scotland ESRI	https://www.nature.scot/professional-advice/protected-areas-and-species/protected-areas/international-designations/european-sites/special-areas-conservation-sacs	NatureScot	2020
SPA Scotland ESRI	https://data.gov.uk/dataset/549cfe11-819d-4b0c-9479-9c70135fe9cf/special-protection-area-scotland	NatureScot	2020
MPA Scotland ESRI	https://marine.gov.scot/maps/844	NatureScot	2020
Feature Activity Sensitivity Tool	http://www.marine.scotland.gov.uk/FEAST/	Marine Scotland	2013

Project Site-Specific Surveys

A number of environmental surveys have been undertaken across the Culzean Field Development area between 2009 and 2014. These surveys are referenced below and have been used to inform on local benthic characteristics in the vicinity of the Project.

- Gardline Limited (2009). UKCS Block 22/25a Culzean Alpha Site and Environmental Survey. November – December 2009. Project number 8232.5
- UKCS Block 22/25a Culzean Platform Area Site Survey. Surveyed April to May 2013, Gardline Report Reference 9474.5
- Gardline Limited (2014). Culzean Export Pipeline Route Surveys. April – July 2014. Project Number: 10042.4.

It should be noted that these surveys are all at least nine years old and were targeting different areas of the Culzean field. Therefore they can only be considered indicative, as opposed to providing site-specific information on the Project. Future survey work as part of the Project will elucidate on this.

7.1.5 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 7-1) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment and inform the Scoping process.

The key features of benthic ecology which are likely to require consideration within the EIA are:

- Broad sediment/habitat type;
- Annex I habitats;
- PMFs; and
- Protected species.

Protected areas will be taken into consideration to assess impact on benthic receptors.

Sediment & Habitat Type

The benthic habitat type that underlies the Study Area is classified under the European Nature Information System (EUNIS) as 'Deep Circalittoral Sand' (EUNIS habitat code A5.27 (MD5) (Figure 7-2). These results are supported by the Gardline (2009) survey which found that sediment characteristics around the Culzean platform varied from muddy sand to slightly gravelly mud under the Modified Folk Classification. Little data is available on circalittoral sand habitats, however they are typically more stable than their shallower counterparts (European Environment Agency, 2022). They are characterised by a diverse range of polychaetes, amphipods, bivalves and echinoderms. Total Organic Matter (TOM) was found to be low in the sediments surrounding Culzean, with a mean of 1.3% reported in Gardline (2014). These habitats typically support a high number of bivalves such as *Thyasira* spp., echinoderms and foraminifera. Multiple historic wells have been drilled in the region surrounding the Project and sediment contaminants such as metals and hydrocarbons are therefore likely to be present in the area.

Visible fauna were limited at the majority of sampling stations during the Gardline survey (2013) around the Culzean platform. Areas with higher reflectivity were interpreted as deposits of shell, cobble and boulder exhibiting higher densities of visible fauna (Gardline, 2013). Commonly identified fauna are listed in Table 7-2. The species recorded are typical of EUNIS 'deep circalittoral sand' habitats.

Table 7-2 Benthic Fauna Identified During the Gardline (2013) Survey

PHYLUM	KEY SPECIES
Annelida	Polychaetes including *Ophiodromus flexuosus Ditrupa* sp.
Arthropoda	Crabs *(Lithodes maja, Cancer pagarus, Corystes cassivelaunus Liocarcinus* sp),shrimps *(Cardea)*, hermit crab *(Pagurus* sp.), squat lobster (*Munida* sp.)
Cnidaria	Seapens *(Pennatula phosphorea, Virgularia mirabilis)*, Soft coral *(Alcyconium* sp.), anemones (*Bolocera* sp., *Urticina* sp., *Hormathia digitata)*
Echinodermata	Starfish *(Asterias rubens, Astropecten irregularis)*, Sea urchin *(Echinus esculentus), brittlestars (Ophiuroidea* sp., *Ophiopholis aculeata)*
Mollusca	Horse mussel *(Modiolus modiolus), scallops (Pectinidae), Scaphopoda* sp., *Gastropods (Neptunea* sp and*Buccinum undatum)*

The sampling station ENV 35 was located to the west of the Culzean platform and likely represents the area closest to the proposed WTG and export cable (Figure 7-4). The site reported sand with a veneer of fines and shell fragments, organic flocculations in the water column and faunal tracks and burrows. The following species were also identified at the site *Bulossidium luteum, P. phosphorea, H. digita, Ditrupa sp., V. mirabilis*. Similar communities were identified at sampling points ENV32 and ENV33 which are similarly located to the west of the Culzean platform.

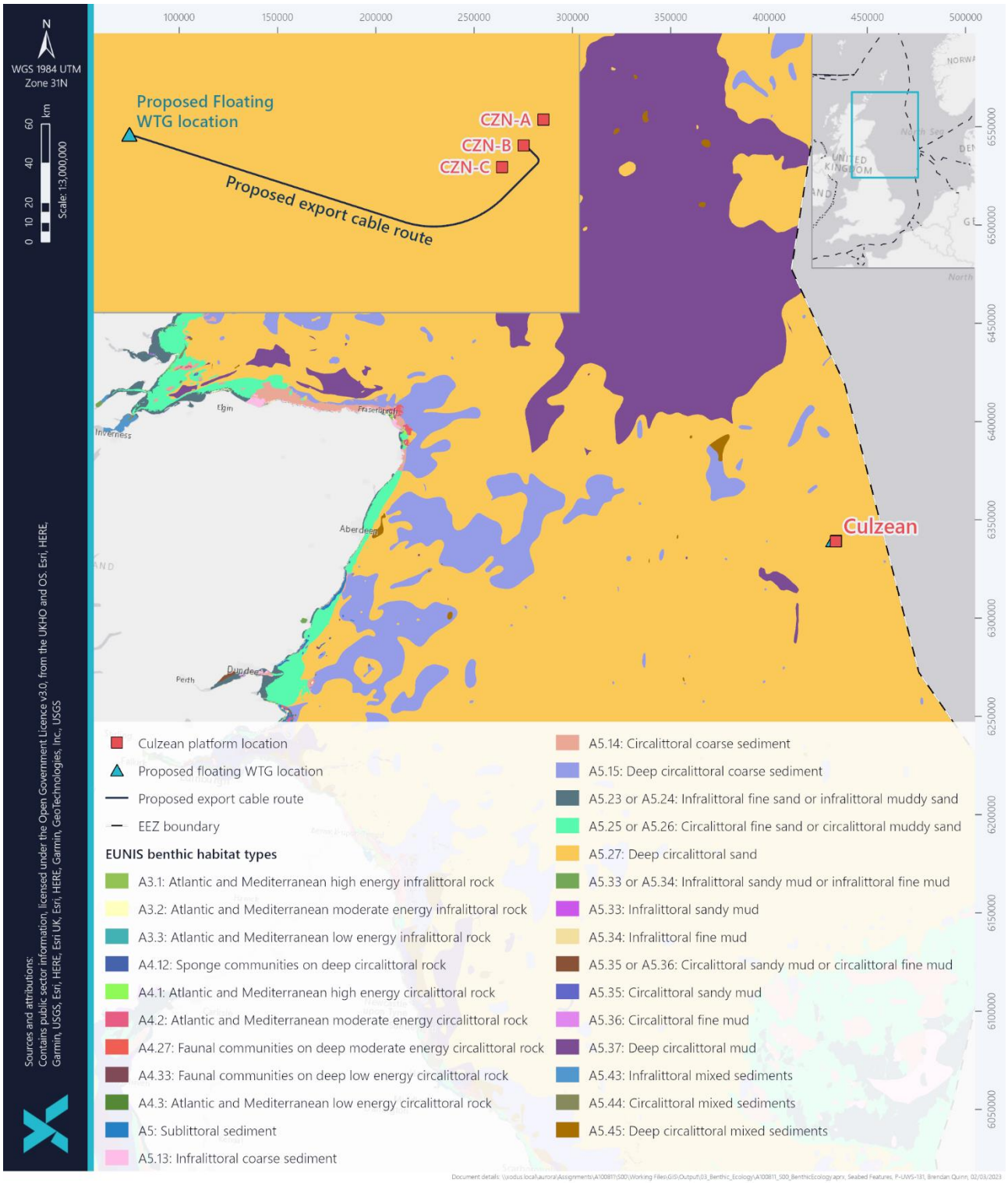

Figure 7-2 EUNIS Benthic Habitat Types

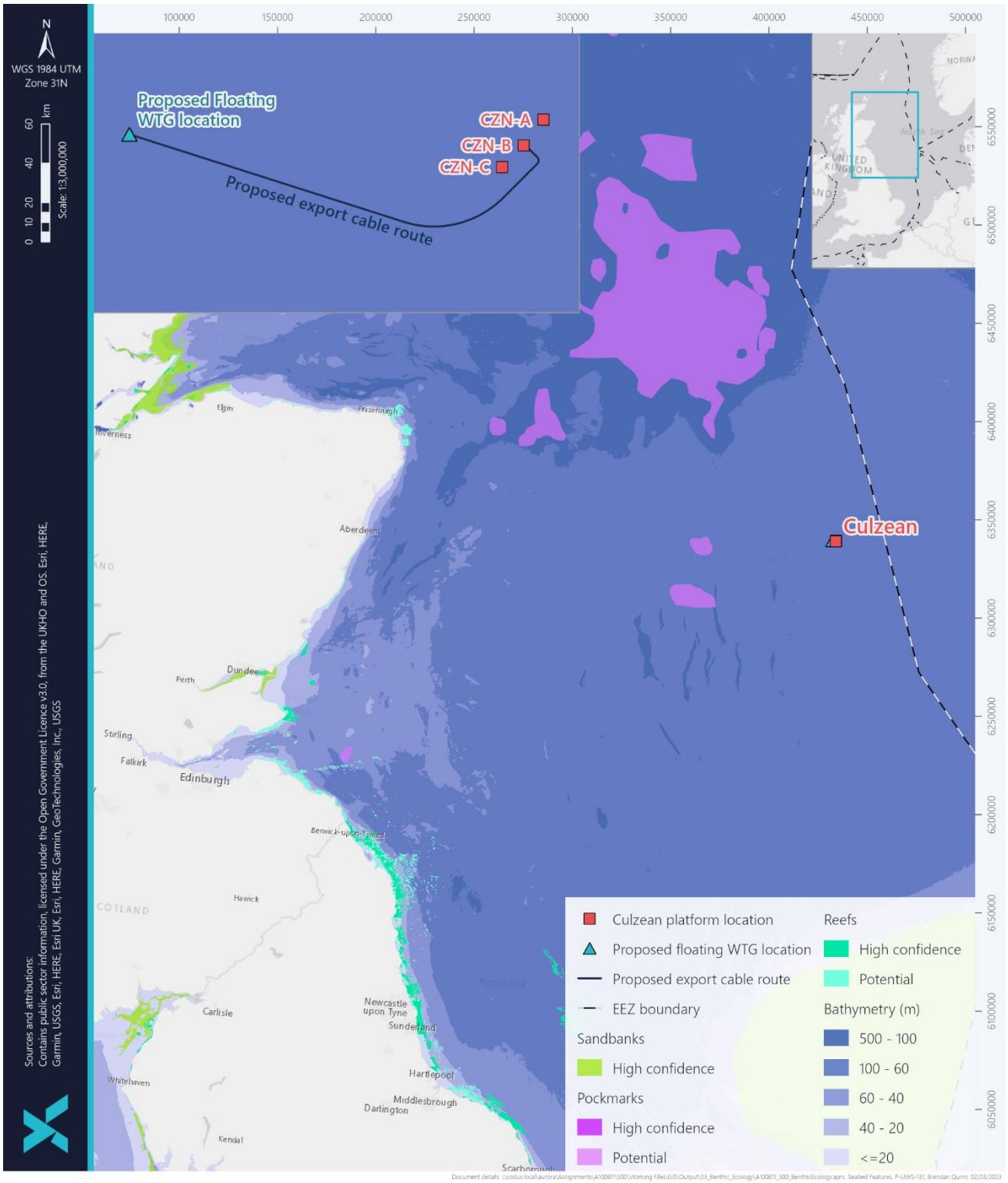

Figure 7-3 Seabed Habitats

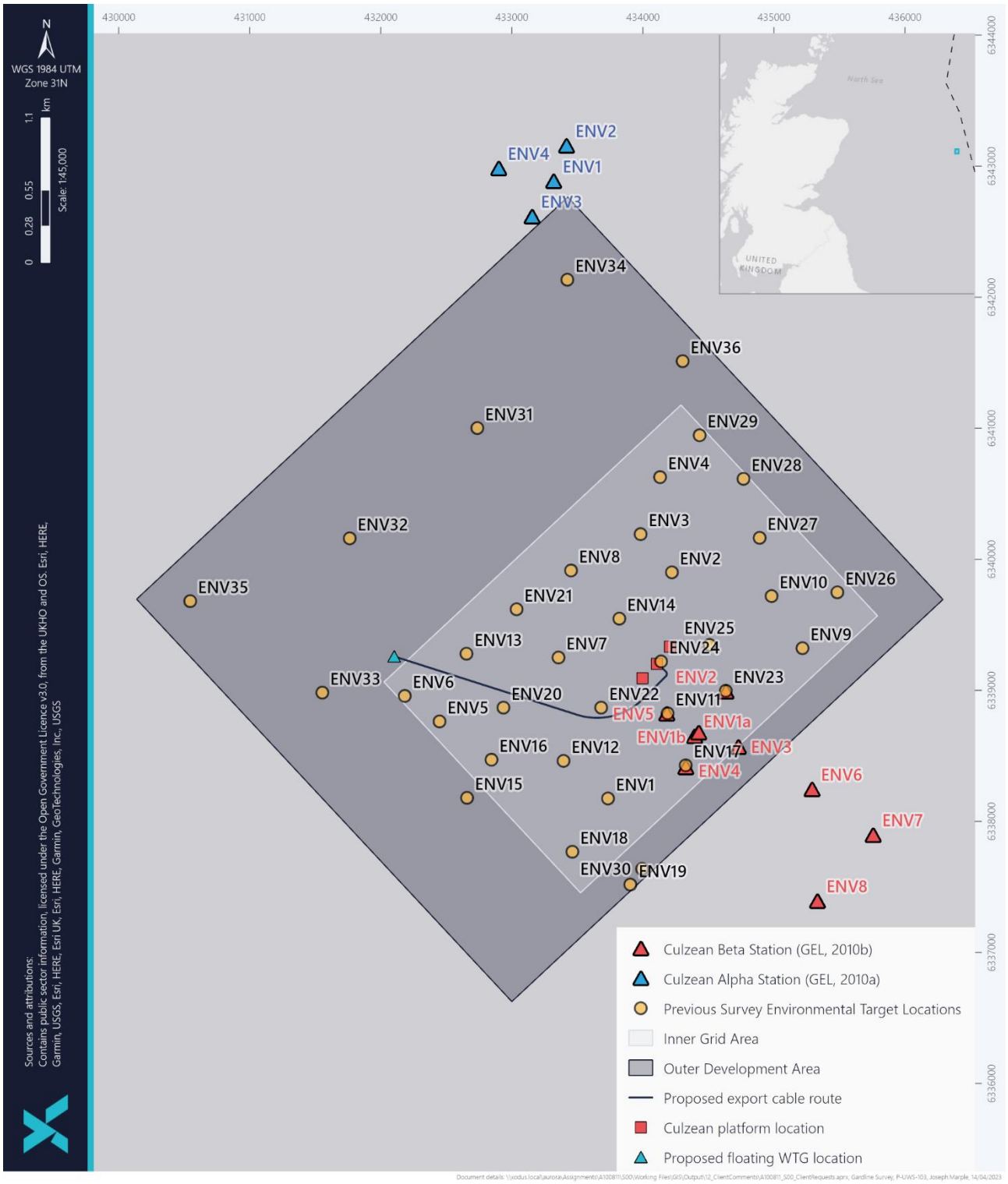

Figure 7-4 Survey sample points

Annex I habitats

Throughout the North Sea, three Annex I marine habitats occur regularly. These are:

- Reefs (defined as hard substrata (biogenic and rocky (or geogenic)) on the sea floor which can be formed in several different ways (EU Commission, 2013));
- Sandbanks (which are slightly covered by seawater all the time); and
- Submarine structures made by leaking gases (e.g. Pockmarks) (EU Commission, 2013).

Whilst a broad scale analysis suggests that none of these habitats are likely to be present in the Study Area (Figure 7-3), potential features of reefs and 'submarine structures made by leaking gases' were identified during surveys in the region which are discussed below. No sandbanks are present near the Study Area.

Cobbles and boulders were present in the vicinity of the Project (Gardline, 2013). These substrata can form the basis of the Annex I 'stony reef' habitat. Rocky reefs are extremely variable, both in structure and in the communities they support. A wide range of topographical reef forms meet the EU definition of this habitat type. These range from vertical rock walls to horizontal ledges, sloping or flat bed rock, broken rock, boulder fields, and aggregations of cobbles (JNCC, 2022). Reefs are characterised by communities of attached algae and invertebrates, usually associated with a range of mobile animals, including invertebrates and fish. The specific communities that occur vary according to a number of factors (JNCC, 2022). However, the densities of cobbles and boulders identified during the export pipeline survey were not indicative of the habitat (Gardline, 2013). Despite this, the Gardline (2013) survey did not assess the proposed WTG area or cable route and the possible presence of this habitat in the Study Area cannot be ruled out.

The original gas export pipeline route survey identified evidence of active methane derived authigenic carbonate (MDAC) structures, formed by leaking gases (pockmarks) (an important component of the Annex I habitat 'submarine structures made by leaking gases') (Gardline, 2014). MDAC structures were identified at multiple stations, including the CULGT5-E-EBS001 sampling station from the Gardline (2014) report, located approximately 4 km west of the Culzean platform. This area represents a similar area to the Project and could suggest the presence of the Annex I habitat 'submarine structures made by leaking gases'. Methane, which seeps from the sediments below, acts as a food source for bacterial mats forming the beginning of the chemotrophic food chain. The fauna of pockmarks can be especially abundant in bivalves, shrimps, bryozoans, starfish, hydroids, sea anemones and sea pens. Fish may also accumulate in these areas and be attracted by the abundance of food and shelter (JNCC, 2018). Despite the evidence for MDAC structures in this survey, no evidence of the Annex I habitat 'submarine structures made by leaking gases' was identified in the vicinity of the Culzean platform (Gardline, 2013). However, given the MDAC structures identified during the Gardline (2014) survey, the presence of 'submarine structures made by leaking gases' in the vicinity of the Project may potentially occur. These surveys are only indicative of the wider region and the area surrounding the WTG and export cable will require further site-specific survey work to confirm the presence of Annex I habitats.

Priority Marine Features

PMFs represent a list of habitats and species that are a priority for conservation in Scottish waters (Tyler-Walters *et al*. 2016). The benthic PMF 'subtidal sands and gravels' covers much of the North Sea and is known to occur in the vicinity of the Project (NMPi, 2023). Within this PMF, offshore fine and muddy sands often comprise communities of tube building polychaetes, burrowing brittlestars, polychaetes and bivalves, other communities in medium sands are dominated by pea urchins, while communities in fine sands are dominated by amphipods and hooded shrimp (Marine

Scotland, 2016). Despite being a PMF, this habitat is abundant throughout much of the North Sea and is not specific to the area surrounding the Project (NMPi, 2023).

The sea pens *V. mirabilis* and *P. phosphorea* were identified during the Gardline (2014) survey. Seapens form part of the OSPAR (2008) threatened and/or declining benthic habitat 'seapens and burrowing megafauna', which is a component biotype of the PMF 'burrowed mud' habitat. However, the seapens recorded during the Gardline (2014) survey were too sparsely distributed to indicate the presence of the 'seapen and burrowing megafauna' habitat. Moreover, the closest known PMF 'burrowed mud' habitat is located approximately 94 km north of the Culzean field (NMPi, 2023). Despite this, the Gardline (2014) survey is only indicative of the wider area and not-site specific for the Project. Moreover, both species of seapen were identified at sampling points EBS002 and EBS003 (Figure 7-5). These sites were the closest sampling points to the Project from the Gardline (2014) survey. Similarly, *V. mirabilis* and *P. phosphorea* were identified along with faunal burrows at the sampling point closest to the Project (ENV35) during the Gardline (2013) survey. The presence of the PMF habitat 'seapens and burrowing megafauna' is therefore possible at the Project and further survey work will be required to assess this.

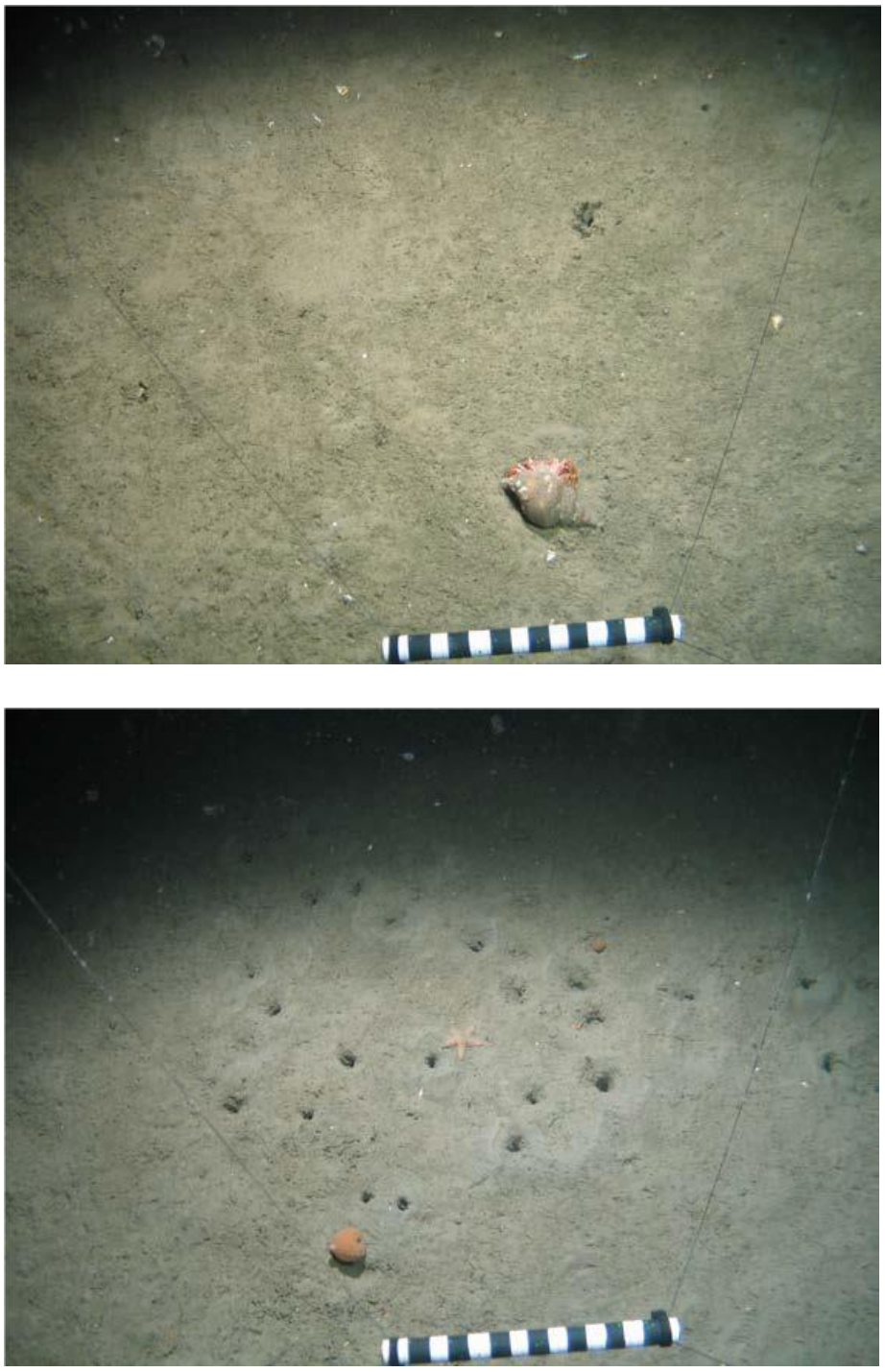

Figure 7-5 Seabed Imagery showing Evidence of PMF Habitat 'Seapens and Burrowing Meagafauna' at EBS002 (Above) and EBS003 (Below) (Gardline, 2014)

The ocean quahog (*Arctica islandica)* is a species of bivalve mollusc that can live for up to 400 years. During the Gardline site survey (2013), lone individuals of ocean quahog were identified. This mollusc is a PMF due its limited mobility and ecologically important role as a filter feeder (JNCC, 2021). Ocean quahog are also listed as an OSPAR threatened and/or declining species (OSPAR, 2008). Ocean quahog typically inhabits areas dominated by sands and

gravels. Given the presence of the PMF habitat 'subtidal sands and gravels' in the Study Area, it is likely that ocean quahog are distributed throughout the vicinity. This is supported by surveys at the Culzean platform, where a total of 190 *Arctica islandica* juveniles were identified across the survey area, with a maximum of seventeen individuals recorded at any one station (Gardline, 2013). Despite the species conservation importance, ocean quahog are widely distributed throughout the North Sea and are not unique to the Study Area. Furthermore, five different species distribution models for ocean quahog reported that the species is likely to occur in the vicinity of the Project (Reiss *et al.* 2011). Ocean quahog and 'subtidal sands and gravels' are the only PMFs known to occur in the vicinity of the Project. However, further PMFs may be present in the area surrounding the WTG and export cable. Further site-specific surveys will be required to confirm what PMFs are present in the region.

Protected Areas

The nearest protected site is the East of Garnet and Montrose Fields MPA, located approximately 18 km to the west of the Culzean platform (Figure 7-6). The area is designated for the presence of the PMF habitat 'offshore deepsea muds' and ocean quahog aggregations (JNCC, 2021). The closest SAC is the Scanner Pockmark SAC, located approximately 132 km north of the Project, whilst the closest Marine Conservation Zone (MCZ) is the Fulmar MCZ, located approximately 65 km south of the Culzean Development (NatureScot, 2020). There are no Nature Conservation Marine Protected Areas (NCMPAs) in the vicinity of the Project, the nearest being the Turbot Bank NCMPA, approximately 220 km west of the Project (Figure 7-6). Given their respective distance from the Project, no protected sites are expected to be impacted by the operations.

There are no further records of vulnerable or protected benthic features or benthic species within the vicinity of the Project that are likely to be adversely impacted by the activities of the Project.

None of the habitats present in the Study Area are associated with blue carbon storage. These habitats (e.g. seagrass meadows and kelp forests) are typically associated with nearshore areas and are therefore not expected to be impacted by the Project.

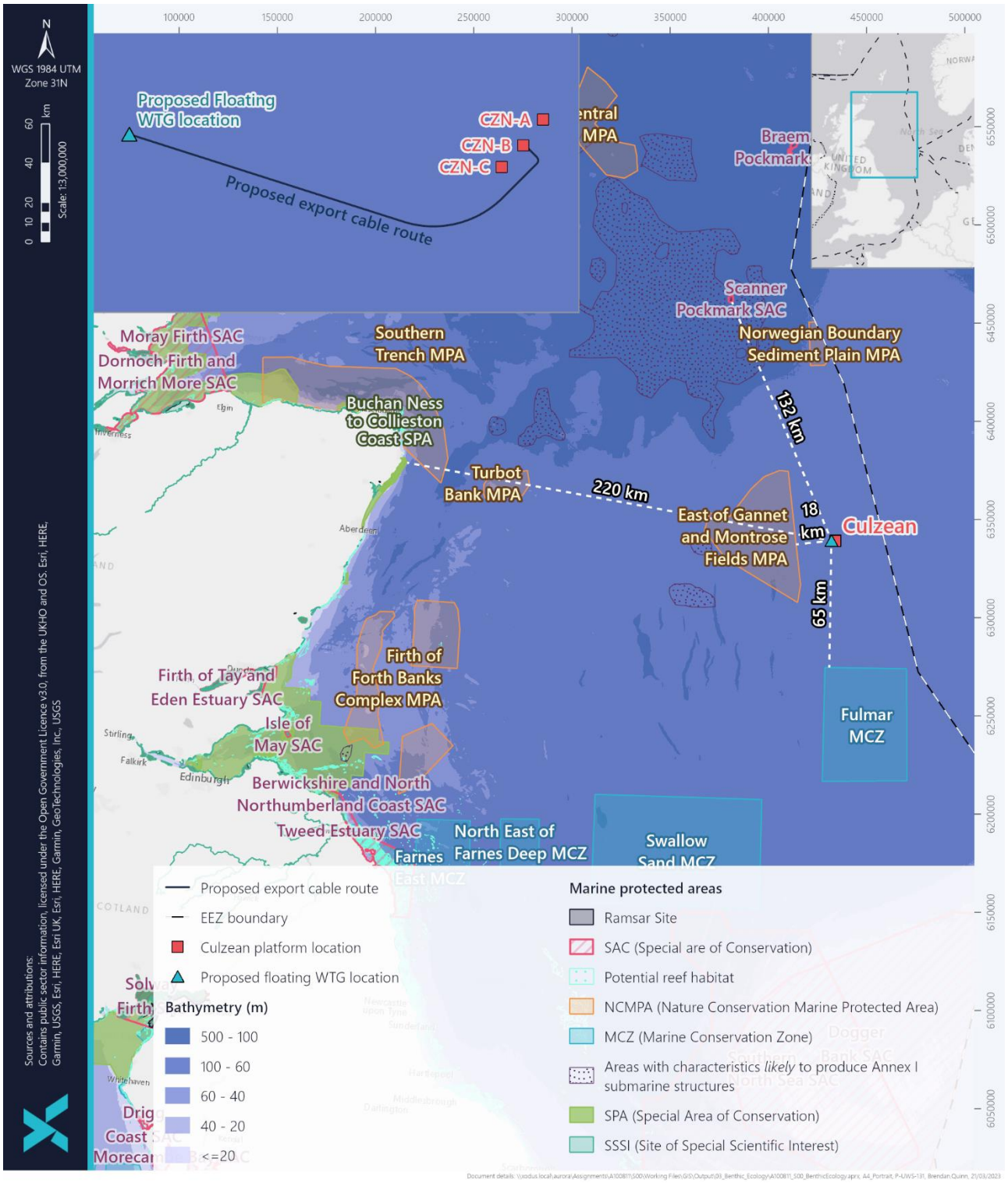

Figure 7-6 Protected Sites

7.1.6 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 7-3.

Table 7-3 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
An appropriate Code of Construction Practice (CoCP) will be developed and adhered to.	Secured under Marine Licence consent conditions.
A Construction Environmental Management Plan (CEMP), including a Marine Pollution Contingency Plan (MPCP) and Invasive Non-Native Species (INNS) Management Plan will be developed and adhered to.	Secured under Marine Licence consent conditions.
A Decommissioning Programme will be developed and adhered to.	Secured under the Energy Act 2004
Micrositing of wind turbine and the associated offshore infrastructure (including cable).	The final Project layout will be presented within the Cable Plan and Design Specification and Layout. This will only be possible following site specific surveys of the WTG and export cable area. Secured under Marine Licence consent conditions.
The cable will be routed to avoid sensitive features wherever practicable and buried as the primary cable protection method. Additional cable protection may be used where adequate burial cannot be achieved and this will be minimised as far as is practicable. This will be informed by a cable burial risk assessment (CBRA), completed to determine the suitable cable protection measures, and implemented through relevant project plans.	Undertake CBRA to determine required cable protection with an aim to minimise volume and spatial extent of protection. This cannot be actioned without site-specific data. Surveys of the proposed export cable route and WTG area will be necessary to inform this measure.

The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on benthic ecology receptors and will be consulted upon with consultees throughout the EIA process.

7.1.7 Scoping of Impacts

A number of potential impacts on benthic ecology receptors have been identified, which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. The potential impacts have been summarised in Table 7-4.

Table 7-4 Potential Impacts on benthic ecology During Construction (C)/ Decommissioning (D), and Operations and Maintenance (O&M) Phases of the Project

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Long-term loss to benthic habitats and species.	C, D,	There is the potential for the long-term loss to benthic habitats or species as a result of activities relating to the construction or decommissioning of the Project (e.g., seabed preparation).	Scoped in
Temporary habitat loss or disturbance.	C, D	There is the potential for the temporary loss or damage to habitats or species as a result of activities relating to the construction, operation and maintenance or decommissioning of the Project (e.g., seabed preparation, and cable laying and maintenance activities).	Scoped in
Increased suspended sediment concentrations and associated deposition	C, D	Sediment disturbance resulting from construction or decommissioning activities (in particular the laying and removal of the 2 km export cable) may result in increased suspended sediment concentrations and may result in indirect impacts on benthic communities resulting from the associated impacts of sediment deposition.	Scoped In
Increased risk of introduction and spread of INNS	C, O&M, D	Vessel movements during construction, decommissioning, operations and management can result in the spread of invasive and non-native species. The Environmental Management Plan will include a specific INNS plan, which will demonstrate and ensure that all required measures are implemented so that the potential for introduction of INNS are minimised (e.g. adherence to relevant legislation and guidance). Through these measures the discharges of ballast waters and the biofouling of project vessels will be strictly controlled. There will be a minimal increase in vessel activity to the area due to the small scale of the development. For these reasons, this impact has been scoped out.	Scoped out
Impact to habitats or species as a result of pollution or accidental discharge	C, O&M, D	Accidental release of pollutants contained within the WTG and oil and fluid emissions from Project vessels. The potential for full inventory release for any individual turbine is considered extremely rare. The potential slow release of fluids is considered the only avenue through which pollution or discharge would enter the water column and sediment from WTG. Further, the magnitude of an accidental spill incident from Project vessels is limited by the size of chemical or oil inventory	Scoped out

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
		on such vessels. Embedded mitigation measures will be adopted to ensure that the potential for accidental release of pollutants is limited, including strict controls on vessel activities and procedures. For these reasons, the impacts of pollution or accidental discharge to the benthic ecology has been scoped out.	
Disturbance of contaminated sediments	C, D	The Project is located in an area where multiple historic wells have been drilled in the region surrounding the Project and sediment contaminants such as metals and hydrocarbons are therefore likely to be present in the area is not. In order to minimise risk, the potential for disturbance of contaminated sediment will be controlled by implementation of an appropriate project CEMP, Marine Pollution Contingency Plan and Decommissioning Programme.	Scoped in
Removal of artificial hard substrate during decommissioning	D	The removal of anchors, scour protection, the export cable and cable protection during the decommissioning phase of the Project has the potential to result in species and/or habitat loss.	Scoped in
Hydrodynamic changes leading to scour around subsea infrastructure	C, O&M	Localised movement of seabed as a result of infrastructure placements relating to the Project is unlikely due to the low energy environment in the Culzean Project Area (see Section 6.1). For these reasons, this impact has been scoped out.	Scoped out
Colonisation of hard structures	O&M	Artificial structures placed on the seabed (i.e., export cable and/or cable protection, and anchors) may result in colonisation by marine organisms, resulting in localised changes to biodiversity.	Scoped in
Impact of cable thermal load or EMF on benthic ecology	O&M	This potential impact is not well understood. Levels of EMF exposure will be dependent on cable burial and protection methods. Effect on the burrowing activity of *H.diversicolor* (polychaete) was enhanced when treated with EMF up to 1 mT. No avoidance or attraction behaviour to EMF was however shown. (Jakubowska 2019). Enhanced sediment reworking activity observed in response to exposure to EMF might be profitable for the ecosystem in terms of sediment oxygenation and stimulation of cycling of nutrients. On the other hand, more intense bioturbation may also lead to release of contaminants and their transport to the water column (Gilbert *et al.*, 1994; Hedman *et al.*, 2011). The authors tell that one	Scoped out

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
		solution is to bury the cables in the sediment to reduce the potential exposure to magnetic fields which is done in most projects. Where possible the cable will be buried, or mechanical protection will be placed over the cable to reduce EMF emissions. The impacts of thermal load or EMF will be assessed throughout the operation and maintenance phases of the Project. Given the short length of the export cable (2,200 m in contact with the seabed), there is not expected to be significant levels of EMF emissions associated with it. For these reasons, this impact has been scoped out.	

C = Construction, O&M = Operations & Management, D = Decommissioning

7.1.8 Potential Cumulative Effects

There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect benthic ecology receptors. Notable projects will be considered as part of the Cumulative Effects Assessment.

Cumulative effects on benthic ecology resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in Section 5, with all relevant effects assessed for the Project in isolation considered on the cumulative level as required. Given the small-scale and localised nature of operations, there are not expected to be any cumulative impacts arising from the Project and other developments in the area.

7.1.9 Potential Transboundary Impacts

There is no potential for transboundary impacts on offshore benthic ecology as a result of the construction, operation and maintenance or decommissioning of the Project. Any impacts are predicted to be localised within the boundary of the Study Area.

7.1.10 Approach to Analysis and Assessment

The assessment of impacts arising from the construction, operational and maintenance and decommissioning phases of the Project on benthic ecology will utilise Project-specific and publicly available data and will be augmented by consultation during the EIA phase. Consultation will be undertaken during the process with key stakeholders relevant to benthic ecology, including:

- Marine Scotland;
- NatureScot; and
- JNCC.

Early consultation with NatureScot has already taken place with some input on benthic surveys. Further consultation will take place with relevant stakeholders throughout the EIA process. The data gathered during the seabed surveys will allow for a detailed description of the biotope classification within the Project area and the likely presence or absence of benthic habitats or species of conservation importance. The conservation status of the habitats and species will be specified, including whether these are Annex I or II species of the EC Habitats Directive, PMFs, OSPAR threatened/declining species, or UK Biodiversity Action Plan (UKBAP) priority habitat and species.

The assessment criteria will be consistent with the approach recommended by CIEEM (2019). Both direct and indirect impacts will be assessed. Direct impacts include those generated by direct interaction of the project activities with the seabed environment, such as physical disturbance of the seabed within the project footprint. Indirect impacts are those produced as a result of an impact pathway, for example the resettlement of disturbed sediments outside the footprint of the project. The seabed area affected by both direct and indirect impacts will be quantified, informed by the maximum design scenario for the Project. The magnitude of the impact will be derived from the maximum design scenarios for the Project in the context of the wider environment. The sensitivity, vulnerability and recoverability of benthic habitats and species of conservation importance identified in the Project area will be assessed in relation to the type, extent and duration of disturbance using the Scottish Government's Feature Activity Sensitivity Tool (FEAST) and the Marine Life Information Network (MarLIN, 2022).

The presence of Annex I habitats and PMFs will be identified in the baseline characterisation and the significance of the potential impacts on these features of conservation importance will be assessed based on a range of criteria.

EIA Methodology

EIA methodology for benthic ecology will be conducted in line with the processes identified in Section 5.3 and the relevant legislation identified in Section 7.1.2.

7.1.11 Scoping Questions

- Do you agree that all relevant legislation, policy and guidance documents have been identified for the benthic ecology assessment, or are there any additional legislation, policy and guidance documents that should be considered?
- Do you agree with the Study Area defined for benthic ecology?
- Do you agree with the data and information sources identified to inform the baseline for benthic ecology, or are there any additional data and information sources that should be considered?
- Do you agree with the suggested embedded mitigation measures?
- Do you agree that all potential receptors and impacts have been identified for benthic ecology?
- Do you agree that the impacts proposed can be scoped out of the benthic ecology EIA Chapter?
- Do you agree with the approach for cumulative effects assessment and transboundary impacts?
- Do you agree with the approach to analysis and assessment that will inform the EIA?

7.1.12 References

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7.2 Fish and Shellfish Ecology

7.2.1 Introduction

This chapter will provide an overview of the sensitivities associated with offshore fish and shellfish ecology receptors of the Project. An overview of the potential impacts of the Project on fish and shellfish ecology, including during the construction, operation and maintenance and decommissioning of the Project, are also discussed.

7.2.2 Legislation, Policy and Guidance

In addition to the relevant policy and legislation described in Chapter 2 Legislative Context and Regulatory Requirements, the following section outlines the legislation and guidance that will be taken into consideration on the potential impacts on fish and shellfish ecology within the Study Area.

Legislation

- Nature Conservation (Scotland) Act 2004;
- Wildlife and Natural Environment (Scotland) Act 2011; and
- The Conservation of Offshore Marine Habitats and Species Regulations 2017 (known as "the Offshore Marine Regulations").

Policy

- Scotland's Biodiversity: a route map to 2020 (Scottish Government, 2015); and
- Priority Marine Features list (NatureScot, 2020).

Guidance

- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008);
- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019); and
- Offshore Wind Farms. Guidance note for EIA in respect of FEPA and CPA requirements (Cefas *et al.*, 2004).

7.2.3 Study Area

The fish and shellfish ecology Study Area is defined as the International Council for Exploration of the Sea (ICES) rectangle within which the Project is located (hereafter referred to as the 'Study Area'). The Study Area (including the floating wind turbine and the export cable to the Culzean platform) is located within a single ICES rectangle, 43F1 (Figure 7-7).

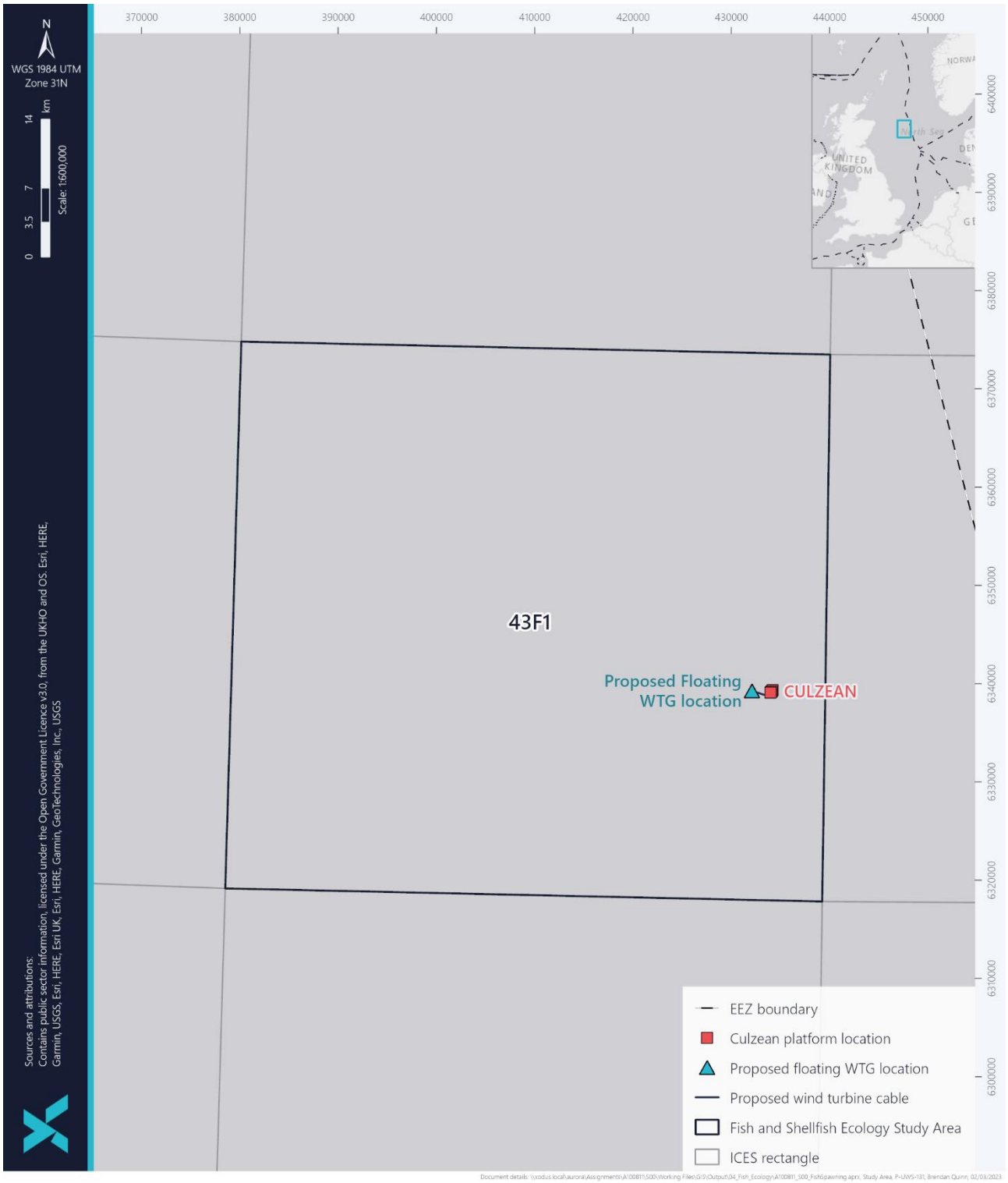

Figure 7-7 Study Area

7.2.4 Data and Information Sources

The following existing data sets and literature with relevant coverage to the Project have been used to inform this Scoping Report. These data sources will inform the baseline characterisation in the EIA are outlined in Table 7-5.

Table 7-5 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Fisheries statistics	https://data.marine.gov.scot/dataset/2021-scottish-sea-fisheries-statistics-fishing-effort-and-quantity-and-value-landings-ices	2021	Marine Scotland
Updated fisheries sensitivity maps in British waters	https://data.marine.gov.scot/dataset/updating-fisheries-sensitivity-maps-british-waters	2014	Aires *et al*
Landings data (value and weight) by species	https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2021	2021	Marine Management Organisation (MMO)
Survey data / reports available through ICES, including International Herring Larvae Survey (IHLS) and the International Bottom Trawl Survey (IBTS) (North Sea)	https://www.ices.dk/data/data-portals/Pages/default.aspx	various	ICES
Fisheries sensitivity maps in British waters	https://www.cefas.co.uk/media/o0fgfobd/sensi_maps.pdf	1998	Coull *et al.*
Spawning and nursery grounds of selected fish species in UK waters (Ellis - key species only)	http://randd.defra.gov.uk/Document.aspx?Document=mb5301_8991_TPS.pdf	2012	Ellis *et al.*
List of threatened and/or declining species and habitats	https://www.ospar.org/work-areas/bdc/species-habitats/list-of-threatened-declining-species-habitats	2008	OSPAR
Scottish Priority Marine Features	https://marine.gov.scot/sma/content/descriptions-scottish-priority-marine-features-pmfs	2016	Tyler-Walters *et al.*
Special Areas of Conservation in Scotland	https://www.nature.scot/professional-advice/protected-areas-and-species/protected-areas/international-designations/european-sites/special-areas-conservation-sacs	2020	NatureScot

TITLE	SOURCE	YEAR	AUTHOR
Marine Protected Areas in Scotland	https://marine.gov.scot/maps/844	2020	NatureScot
Spawning grounds of Atlantic cod, haddock and whiting	https://marine.gov.scot/maps/1912 https://marine.gov.scot/maps/1913 https://marine.gov.scot/maps/1914	2016 2017 2016	Gonzalez-Irusta and Wright
Verified distribution model for lesser sandeel	https://marine.gov.scot/information/lesser-sandeel-habitat	2021	Langton, Boulcott & Wright
The Marine Life Information Network (MarLIN)	https://www.marlin.ac.uk	2023	MarLIN

7.2.5 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 7-5) has been undertaken to support this Scoping Report. The findings of this research are presented below, to provide an understanding of the marine environment surrounding the Project and to inform the Scoping process.

The key fish and shellfish receptors which are likely to require consideration within the EIA are:

- Protected species (i.e. species listed as Priority Marine Features);
- Key prey species (i.e. species considered to be key prey within marine food webs); and
- Commercially important species (i.e. those that are commercially exploited through targeted fisheries).

Fish and shellfish assemblage

Fish receptors relevant to the Project within the Study Area include marine fish (pelagic and demersal), elasmobranchs, and shellfish such as the Norway lobster *Nephrops norvegicus*. There is little evidence to suggest that diadromous fish (such as Atlantic salmon) will occur within the Study Area, however these species are also considered here. In the absence of site-specific survey data, sea fisheries landing statistics have been used to describe the fish and shellfish assemblage. However, it is acknowledged that commercial landings do not provide an accurate representation of species composition, as landings will be influenced by the fishing methods used, seasonality, quotas and Total Allowable Catch (TAC) limits, and could be influenced by discarding practices. To account for these limitations, ICES trawl survey data will also be reviewed for the EIA, as required.

Elasmobranchs

The spiny dogfish, or spurdog *Squalus acanthias* can be found in the Study Area, determined by catch records. They are widely distributed through British and Irish waters and are classified as a Priority Marine Feature in Scotland (Marine Scotland 2023).

Other elasmobranchs in the commercial landings data from ICES rectangle 43F1 include cuckoo ray *Leucoraja naevus*, spotted ray *Raja montagui* and "unidentified dogfish".

Spawning grounds

Identified fish and shellfish spawning grounds within the Study Area are shown in Figure 7-8 and Figure 7-9. The Project overlaps with spawning grounds for several species, including sand eels (low intensity), which spawn in the area across a four month period; mackerel, which spawn during a four month period (including three months of peak spawning activity), and cod which spawn across a four month period (including two months of peak spawning activity; Ellis *et al.*, 2012). The project is in a region of high spawning intensity for Norway pout (Coull *et al.*, 1998), and while the spawning intensities of Norway lobster and lemon sole are undetermined (Coull *et al.*, 1998), Norway lobster spawn in the area throughout the year and lemon sole also demonstrates an extended (six month) spawning period (see Table 7-6)

Nursery grounds

Identified fish and shellfish nursery grounds within the Study Area are shown in Figure 7-10 and Figure 7-11. The Study Area also overlaps with nursery grounds for a number of ecologically important and commercially valuable species. The Study Area overlaps with a high intensity nursery ground for cod. Low intensity nursery ground species include anglerfish, blue whiting, ling, herring, mackerel, plaice, sand eel and spur dog (Ellis *et al.* 2012). Norway lobster, haddock and Norway pout nursery grounds are also present within the Study Area, but the intensities are undetermined (Coull *et al.* 1998) (Table 7-6).

Anglerfish, haddock, hake and Norway pout are the species with the highest probability of juvenile (<1 year old fish) aggregation within the waters of the Study Area. Herring, cod and whiting were modelled at a moderate probability of juvenile aggregation (Aires *et al.*, 2014; Figure 7-12).

Table 7-6 Commercially Valuable Species Spawning and Nursery Intensities for ICES 43F1

	JAN	FEB	MAR	APR	MAY	JUN	JUL	SEP	OCT	NOV	DEC
Anglerfish	N	N	N	N	N	N	N	N	N	N	N
Blue Whiting	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
European hake	N	N	N	N	N	N	N	N	N	N	N
Haddock	N	N	N	N	N	N	N	N	N	N	N
Herring	N	N	N	N	N	N	N	N	N	N	N
Lemon sole				S	S	S	S	S			
Ling	N	N	N	N	N	N	N	N	N	N	N
Mackerel	N	N	N	N	S*N	S*N	S*N	N	N	N	N
Nephrops	SN	SN	SN	S*N	S*N	S*N	SN	SN	SN	SN	SN
Norway pout	SN	S*N	S*N	SN	N	N	N	N	N	N	N
Plaice	N	N	N	N	N	N	N	N	N	N	N
Sandeels	SN	SN	N	N	N	N	N	N	N	SN	SN
Spurdog	N	N	N	N	N	N	N	N	N	N	N
Whiting	N	N	N	N	N	N	N	N	N	N	N

S=spawning, S*=peak spawning, N= nursery, Species= high nursery intensity as per Ellis *et al* (2012), Species= high concentration spawning as per Coul *et al* (1998)

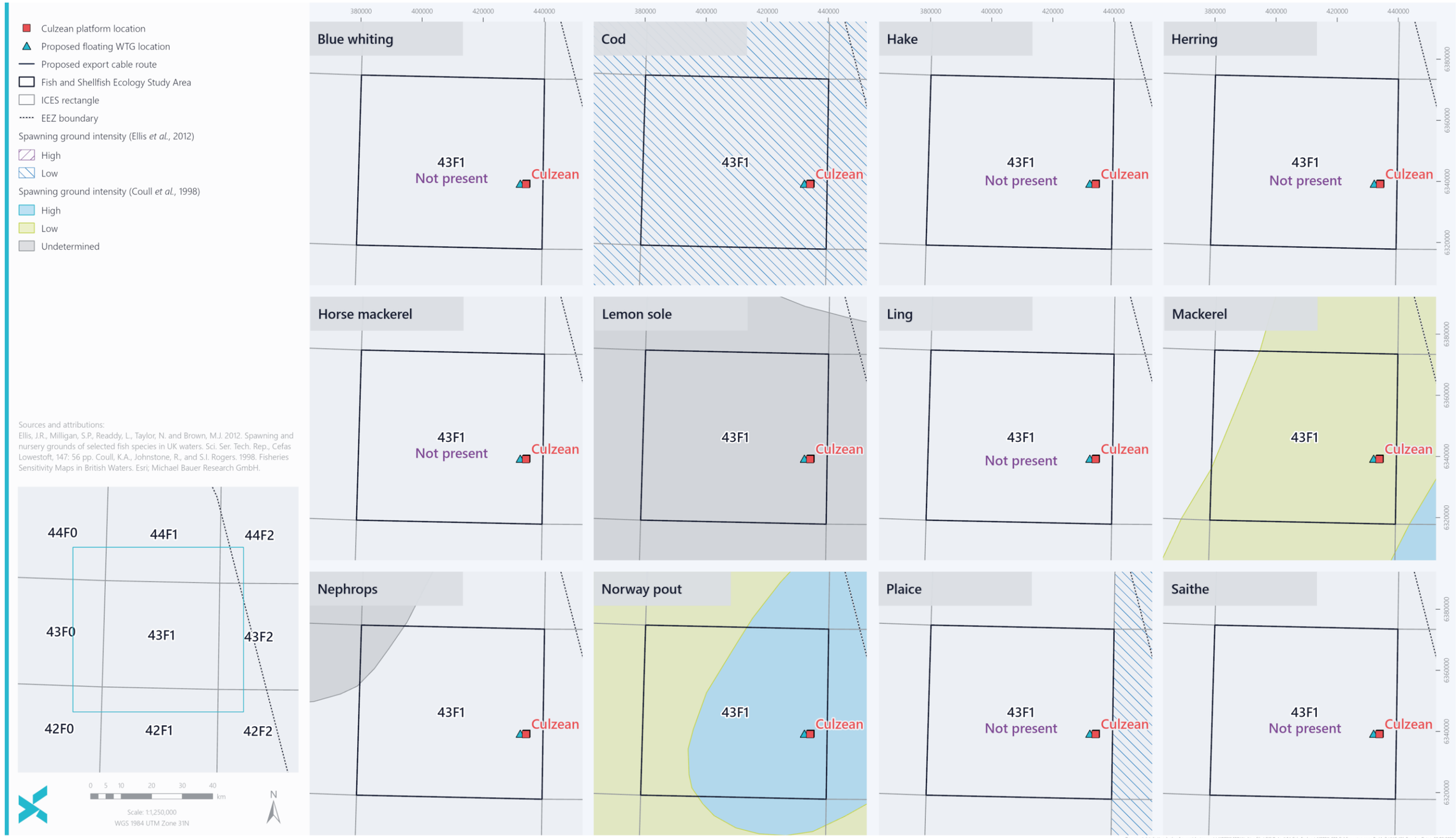

Figure 7-8 Spawning Grounds – Part 1

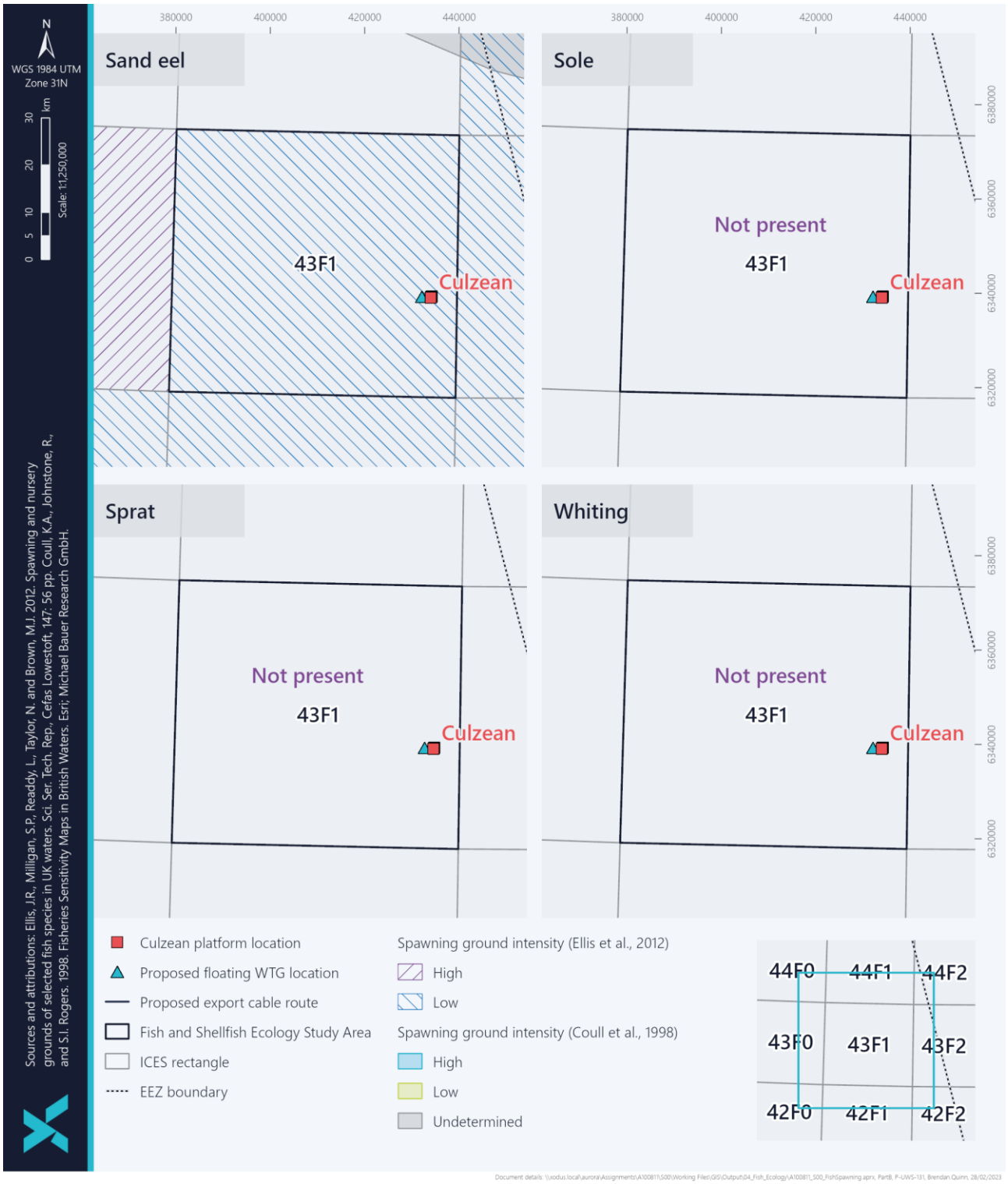

Figure 7-9 Spawning Grounds - Part 2

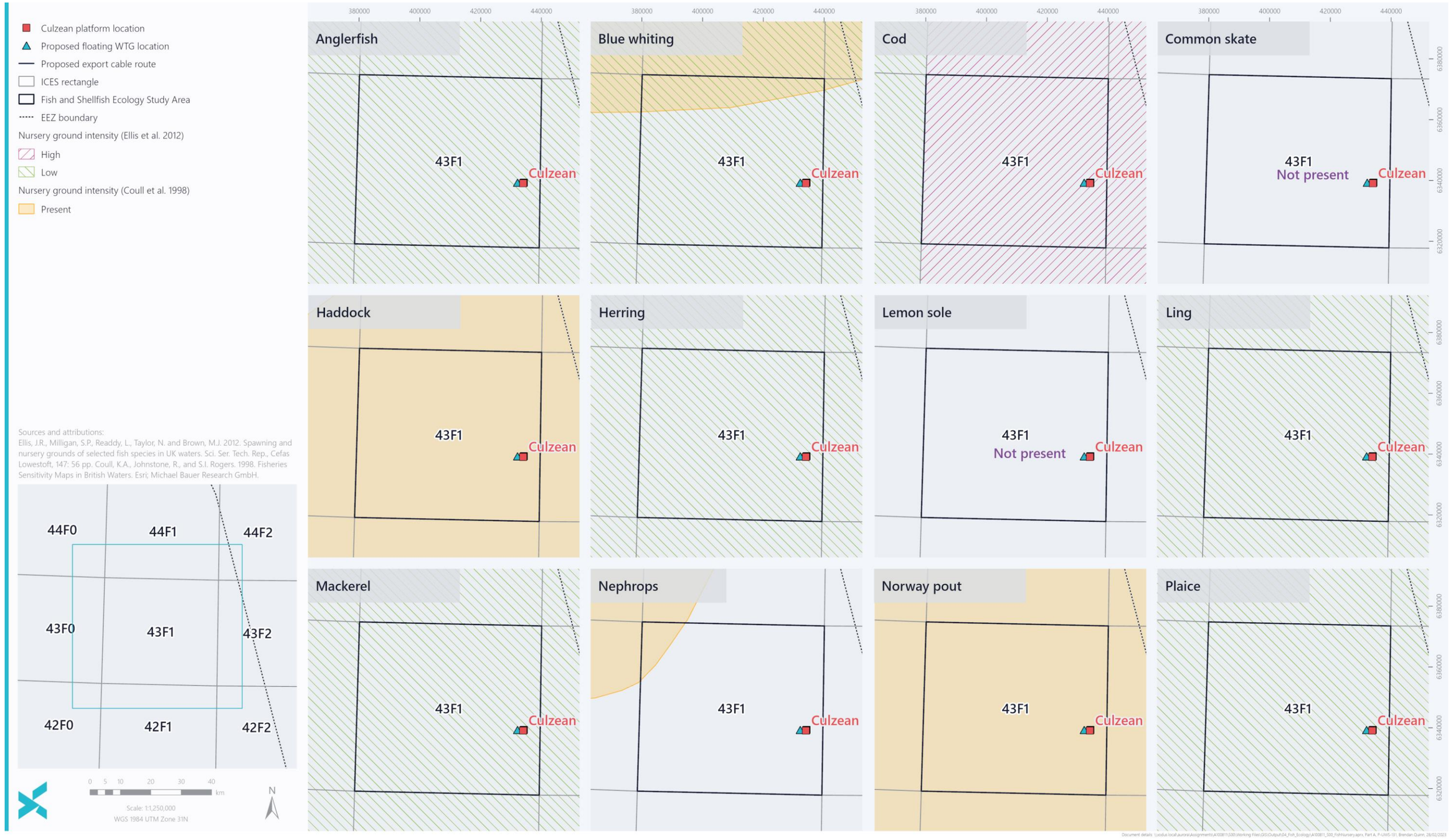

Figure 7-10 Nursery grounds – part 1

Figure 7-11 Nursery grounds -part 2

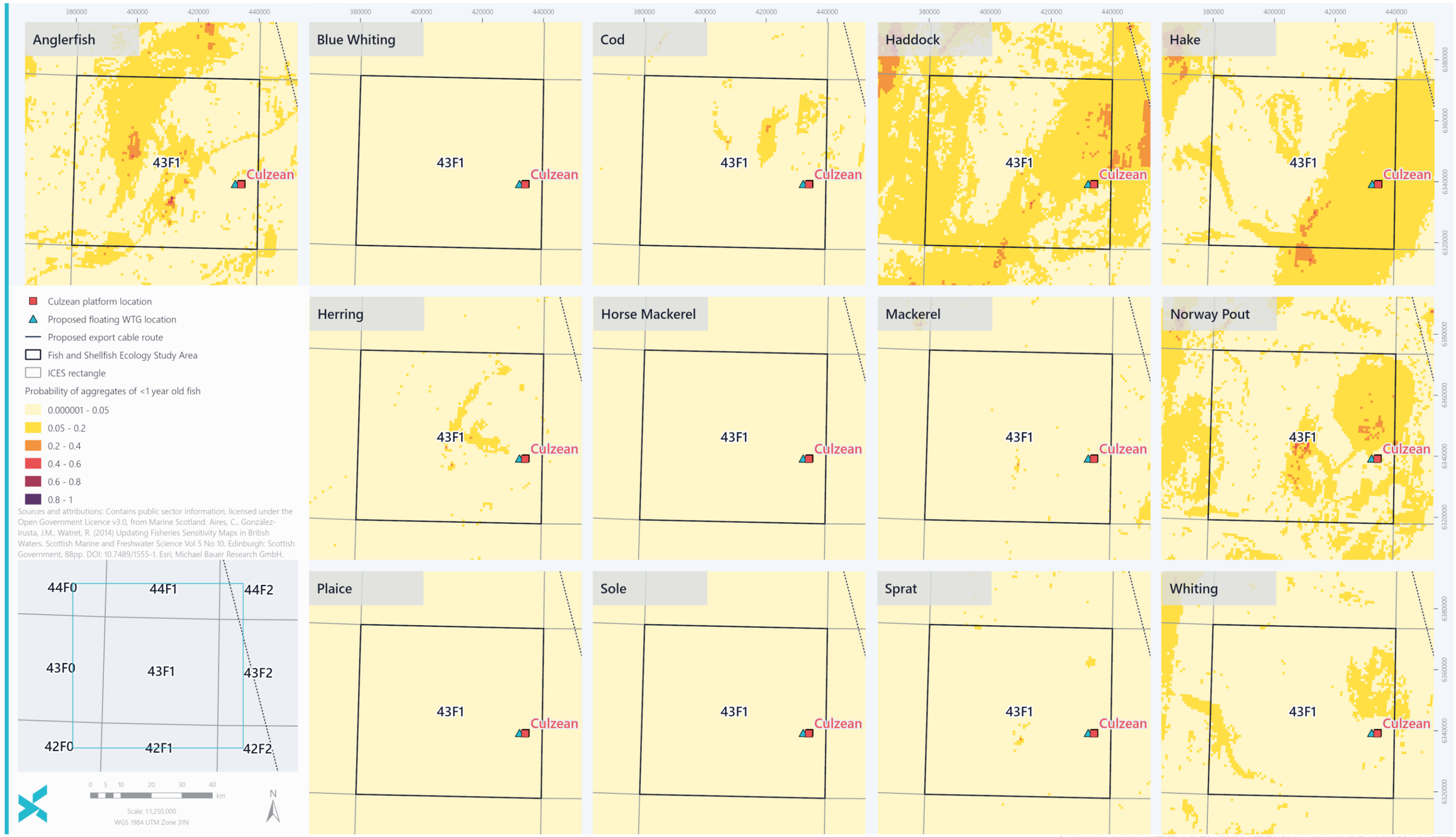

Figure 7-12 Probability of Aggregations of <1 Year Old Fish

8.2.5.5 Designated Species

Of the species identified within the waters of the Study Area, two are listed on the OSPAR (2008) List of Threatened and/or Declining Species and Habitats: cod and spurdog. Ten species are listed as Scottish Primary Marine Features (PMFs): these are sandeel, cod, whiting, herring, Norway pout, blue whiting, ling, anglerfish, mackerel and spurdog (Tyler-Walters *et al.*, 2016).

7.2.6 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 7-7.

Table 7-7 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Develop and implement an Environmental Management Plan (EMP), and Invasive Non-Native Species Management Plan, a Code of Construction Practice (CoCP) and a Marine Pollution Contingency Plan (MPCP).	Secured under Marine Licence conditions
Cable routing and protection measures[5]	Undertake CBRA to determine required cable protection with an aim to minimise volume and spatial extent of protection. Secured under Marine Licence conditions
The development of, and adherence to, a Decommissioning Programme.	Marine Licence conditions

7.2.7 Scoping of Impacts

Several potential impact pathways have been identified which may impact on fish and shellfish during the construction, operation and maintenance, and decommissioning phases of the Project. These impacts are outlined, together with a justification for scoping them in or out of the EIA (Table 7-8).

[5] *Cable will be routed to avoid sensitive features wherever practicable and buried as the primary cable protection method. Additional cable protection may be used where adequate burial cannot be achieved and this will be minimised as far as is practicable. This will be informed by a cable burial risk assessment (CBRA), completed to determine the suitable cable protection measures, and implemented through relevant project plans.*

Table 7-8 Potential Impacts on fish and shellfish ecology during Construction (C)/ Decommissioning (D), and Operations and Maintenance (O&M) phases of the Project

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Electromagnetic fields (EMF)	O&M	EMFs consist of both electrical (E) and magnetic (B) fields. When electrons, in the form of electrical current, pass through a cable, a B-field is produced. The presence of the B-field can produce a second induced component, a weak electrical field, referred to as induced electrical (iE) field. The strength of E, B and iE fields depends on the magnitude and type of current flowing through the cable and the construction of the cable. Some organisms can detect E- or B-fields (i.e., electro- or magneto-sensitive species) and are presumed to do so by either iE-field detection or magnetite-based detection. Little evidence exists as to the impacts of B- and iE-fields from *in situ* cables on marine species, but where evidence exists, no study has indicated that EMF levels generated from the infrastructure associated with this Project would be likely to have major or wide-ranging behavioural or physiological impacts upon fish or shellfish receptors. Several studies have shown minor, localised behavioural and physiological impacts on fish and shellfish species known to occur in the Study Area. For example, the swimming speed and acceleration of haddock larvae were reduced (Cresci *et al*. 2022) and in the European lobster, EMFs can cause alteration in egg and larval parameters (i.e. carapace height, length, eye diameter; Harsanyi *et al*. 2022). However, the studies which obtained these findings used simulated levels of EMF (150µT and 2800 µT) in a laboratory setting. These EMF levels would be far greater than any EMF associated with the wind turbine and cable comprising this Project. Other studies have shown no effect on young European flounder (Bochert & Zettler 2006), lesser sandeel (Cresci 2022) or herring larvae (Cresci 2020), suggesting that EMFs from a single AC cable such as the cable in this Project would be unlikely to have effects on teleost fish. No impacts were also found on juvenile Norway lobsters in a tank experiment (Taormina *et al*. 2020), nor on the American lobster (Hutchison *et al*. 2018).	Scoped out

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
		Finally, the spurdog is an elasmobranch, many of which are known to possess electroreceptive systems. Elasmobranchs can therefore detect EMF and could be attracted to or avoid them depending on the field strength, the species, and the individual. However, Tricas & Gill (2011) presented a review of elasmobranch species for which information on sensitivity to electric or magnetic fields has been reported, and found no sensitivity of the spiny dogfish, (albeit with inconclusive results when exposed to EMFs from a 36 kV AC cable). Furthermore, as the scope of this Project is small (i.e., one turbine with a single transmission cable), the spatial extent of EMFs associated with this infrastructure will be limited to the immediate vicinity of the turbine and cable. For this reason, it is considered that EMFs will be of negligible magnitude beyond a few metres from the infrastructure, isolated spatially from any other sources of EMF, and so any impacts on fish and shellfish will be highly localised and of insignificant magnitude. EMF has therefore been scoped out of further assessment.	
Disturbance or damage to sensitive species due to underwater sound generated from construction and decommissioning activities	C, D	A number of species within the vicinity of Study Area, namely cod and herring, are sensitive to the impacts of underwater noise from activities in relation to offshore construction. Sound pressures and particle motion can have pronounced impacts on the swim bladder of these species which is closely connected to the ear, and these "hearing specialists" show a more extended hearing range of up to 500 Hz (Popper and Hawkins, 2019). During construction, vessel activity will introduce continuous sound into the surrounding environment. However, fish are not considered to be sensitive to vessel noise. Pin piling may be required for construction if an alternative anchor solution is required. Therefore, if piling is required there may be a potential impact on fish are expected due to the introduction of sound to the marine environment.	Scoped in
Disturbance or damage to sensitive species due to underwater sound generated during the operation and maintenance phase	O&M	Operational marine renewable energy development devices may generate sound within what can be an already noisy environment. The effects of operational noise of one turbine are not likely to generate significant levels of noise. The Project is also of sufficient size where it is predicted that underwater noise associated with operation and maintenance is not expected to cause significant disturbance to sensitive fish species. Based on the location of the project and the ambient noise generated from the Culzean platform, local fishing and shipping activities, the operation and maintenance of this Project is not likely to form a major contribution to the soundscape, and	Scoped out

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
		owing to the low sensitivity of fish and shellfish to the type of low-frequency continuous noise associated with operational floating offshore wind turbines, no impacts on fish are expected due to the introduction of operational sound to the marine environment.	
Temporary habitats loss or disturbance during the installation of the cable and the anchors	C, D	The project overlaps with the spawning and/or nursery grounds for commercially valuable or sensitive species. The extent of habitat loss will depend on the equipment used. Disturbance is likely to be temporary and localised and may occur during the installation of the cable and placement of anchors on seabed during construction and/or decommissioning. While the spatial and temporal extent of any habitat loss or disturbance will be limited, this pathway has been scoped in for further assessment.	Scoped in
Temporary habitat loss or disturbance due to the presence of the cable and the anchors	O&M	Disturbance may occur during the installation of the anchors and cable, however once installed, the extent of habitat disturbance will be highly limited. Given that the Project requires only one cable, it is unlikely that ongoing surveys and maintenance during the operational phase could generate a significant level of disturbance to fish and shellfish receptors.	Scoped out
Temporary increases in suspended sediment concentrations and potential sedimentation / smothering on fish and shellfish during construction and decommissioning activities	C,D	Increased sedimentation associated with installation and decommissioning work may lead in localised changes in sediment type which may potentially impact seabed dependant species (e.g., sandeel and herring). However due to the small, localised area, the increased sedimentation is likely to be minimal. It is worth considering that commercial fishing takes place in this region, and has impacts across a much greater spatial scale than the construction, installation and decommissioning of a single turbine and cable.	Scoped out
	O&M	The nature of works associated with operation and maintenance activities and the discrete area within which these activities will be undertaken, will result in significantly lower suspended sediment concentrations than those associated with construction activities. For this reason, this impact has been scoped out for further assessment within the EIAR.	Scoped out

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Long term habitat loss due to presence of WTG anchors and the cable on the seabed and associated scour protection	O&M	The footprint of anchor impacts will be relatively small, due to the small number of anchors needed for a single offshore wind turbine. The extent of this habitat loss will not have a significant impact on fish or shellfish habitat when considered at the scale of fish spawning and nursery grounds.	Scoped out
Impact to habitats or species as a result of pollution or accidental discharge	C,O&M,D	Accidental release of pollutants contained within the WTGs and oil and fluid emissions from Project vessels. The potential for full inventory release for an individual turbine is considered extremely rare. The potential slow release of fluids is considered the only avenue through which pollution or discharge would enter the water column and sediment from WTGs. Further, the magnitude of an accidental spill incident from Project vessels is limited by the size of chemical or oil inventory on such vessels. Embedded mitigation measures will be adopted to ensure that the potential for accidental release of pollutants is limited, including strict controls on vessel activities and procedures. For these reasons, the impacts of pollution or accidental discharge to fish and shellfish ecology has not been considered further.	Scoped out
Fish aggregation around the floating structure and associated infrastructure	O&M	Offshore infrastructure may act as a fish aggregation device (FAD), offering a refuge area for some fish and shellfish species. Although relatively little is known about this impact, it is unlikely that this aggregation of fish around novel structures will represent a significant change to the environment within the Study Area due to the relatively small scale of the Project.	Scoped out

7.2.8 Potential Cumulative Effects

There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect fish and shellfish ecology receptors. Notable projects will be considered as part of the Cumulative Effects Assessment.

Cumulative effects on fish and shellfish ecology resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in Section 5, with all relevant effects assessed for the Project in isolation considered on the cumulative level as required. Given the small-scale and localised nature of operations, there are not expected to be any cumulative impacts arising from the Project and other developments in the area.

7.2.9 Potential Transboundary Impacts

In the context of the small size of the Study Area and its location, there will be no potential for transboundary impacts.

7.2.10 Approach to Analysis and Assessment

The EIA will consider and present relevant information from across the ICES rectangle where this Project is located (43F1). This ICES rectangle will form the basis of the fish and shellfish ecology Study Area.

A desk-based study of the publicly available data, existing ICES trawl survey data and reports identified in Section 7.2.4 will be conducted (as required) to characterise the fish and shellfish ecology baseline for the Study Area. The review will identify key receptor groups with consideration given to fish and shellfish species of commercial value, known sensitive / abundant species, spawning and nursery grounds and the occurrence of Priority Marine Features. Specific consideration will be given to the spawning grounds of both herring and sand eel within the EIAR due to the sensitivity of these species, and the ecological importance of these species in marine food webs.

The Biodiversity Action Plan list will be used to determine those fish and shellfish considered to be of commercial importance.

A desk-based review of geophysical survey data will be conducted to identify the broad-scale habitats present across the Study Area and identify any potential fish and shellfish spawning and nursery habitats.

ICES catch data will be assessed at this stage to further qualify local fish and shellfish populations across the Study Area.

EIA Methodology

EIA methodology for fish and shellfish ecology will be conducted in line with the processes identified in Section 5.3 and the relevant legislation identified in Section 7.2.2. The approach to EIA assessment for fish and shellfish ecology will be agreed with key stakeholder groups (as outlined in Section 4).

7.2.11 Scoping Questions

- Do you agree with the Study Area defined for fish and shellfish ecology?
- Do you agree with the data sources which are suggested for the assessment of fish and shellfish ecology?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified for fish and shellfish ecology?
- Do you agree with scoping out transboundary impacts?
- Do you agree that the project site-specific studies are sufficient to inform the proposed assessment approach?
- Do you agree with the proposed assessment approach?

7.2.12 References

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Harsanyi P, Scott K, Easton B A A, de la Cruz Ortiz G, Chapman E C N, Piper A J R, Rochas C M V and Lyndon A R 2022 The Effects of Anthropogenic Electromagnetic Fields (EMF) on the Early Development of Two Commercially Important Crustaceans, European Lobster, Homarus gammarus (L.) and Edible Crab, Cancer pagurus (L.) Journal of Marine Science and Engineering 10 564 Online: http://dx.doi.org/10.3390/jmse10050564

Hutchison, Z. L., P. Sigray, H. He, A. B. Gill, J. King, and C. Gibson, 2018. Electromagnetic Field (EMF) Impacts on Elasmobranch (shark, rays, and skates) and American Lobster Movement and Migration from Direct Current Cables. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2018-003.

NatureScot, 2020. Priority Marine Features list. Available here: https://www.nature.scot/doc/priority-marine-features-scotlands-seas-habitats (accessed 17 March 2023)

Taormina, B., Di Poi, C., Agnalt, A.-L., Carlier, A., Desroy, N., Escobar-Lux, R.H., D'eu, J.-F., Freytet, F. and Durif, C.M.F. (2020). Impact of magnetic fields generated by AC/DC submarine power cables on the behavior of juvenile European lobster (Homarus gammarus). Aquatic Toxicology, 220, p.105401. doi:https://doi.org/10.1016/j.aquatox.2019.105401.

Tricas, T. and Gill, A.B. (2011). Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species. [online] dspace.lib.cranfield.ac.uk. Available at: https://dspace.lib.cranfield.ac.uk/handle/1826/7785 [Accessed 22 Feb. 2023].

7.3 Marine Mammals

7.3.1 Introduction

This chapter will provide an overview of the sensitivities associated with marine mammal receptors of the Project. An overview of the potential impacts of the Project on marine mammals, including during the construction, operation and maintenance, and decommissioning of the Project, are also discussed.

For the purpose of this report, marine mammals are defined as large, highly mobile and potentially migratory species (cetaceans and pinnipeds) which have been identified within the waters of the Project.

7.3.2 Legislation, Policy and Guidance

In addition to the relevant policy and legislation described in Chapter 2 Legislative Context and Regulatory Requirements, the following Section outlines the legislation and guidance that will be taken into consideration on the potential impacts on marine mammals within the Project.

Legislation

- Wildlife and Countryside Act 1981 (WCA);
- Nature Conservation (Scotland) Act 2004; and
- The Conservation of Offshore Marine Habitats and Species Regulations 2017.

Guidance

- PMFs (NatureScot, 2020);
- The UK Post-2010 Biodiversity Framework and the Scottish Biodiversity Strategy: Revised Implementation Plan (2018-2020) (JNCC, 2018);
- Marine environment: unexploded ordnance clearance joint interim position statement (jointly published by regulators and Statutory Nature Conservation Bodies (SNCBs), 2022);
- Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects (Southall *et al.*, 2019);
- Environmental Impact Assessment Handbook (SNH, 2018);
- Scottish Marine Wildlife Watching Code (SNH, 2017);
- The protection of Marine European Protected Species from injury and disturbance: Guidance for Inshore Waters (July 2020 Version) (Marine Scotland, 2020a);
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (seismic survey guidelines) (JNCC, 2017);
- JNCC guidelines for minimising the risk of disturbance and injury to marine mammals whilst using explosives (JNCC, 2021a);
- Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010); and
- The Basking Shark Code of Conduct (Shark Trust, 2020).

7.3.3 Study Area

The marine mammal study area (hereafter referred to as the 'Study Area') will vary depending on the species, considering individual species ecology and behaviour. For all species, the Study Area covers the Project Area and is extended over an appropriate area considering the scale of effect, movement, and population structure for each species. For each species, the area considered in the assessment is largely defined by the appropriate species Management Unit (MU).

The Study Area for marine mammals has been defined at two spatial scales: the MU scale for species-specific population units, and the marine mammal site-specific survey area for an indication of the local densities of each species (Figure 7-13). The MU's for relevant cetacean species are:

- Celtic and Greater North Seas (CGNS): MU for white-sided dolphin, white-beaked dolphin and minke whale;
- North Sea (NS): MU for harbour porpoise; and
- Greater North Sea (GNS): MU for bottlenose dolphin.

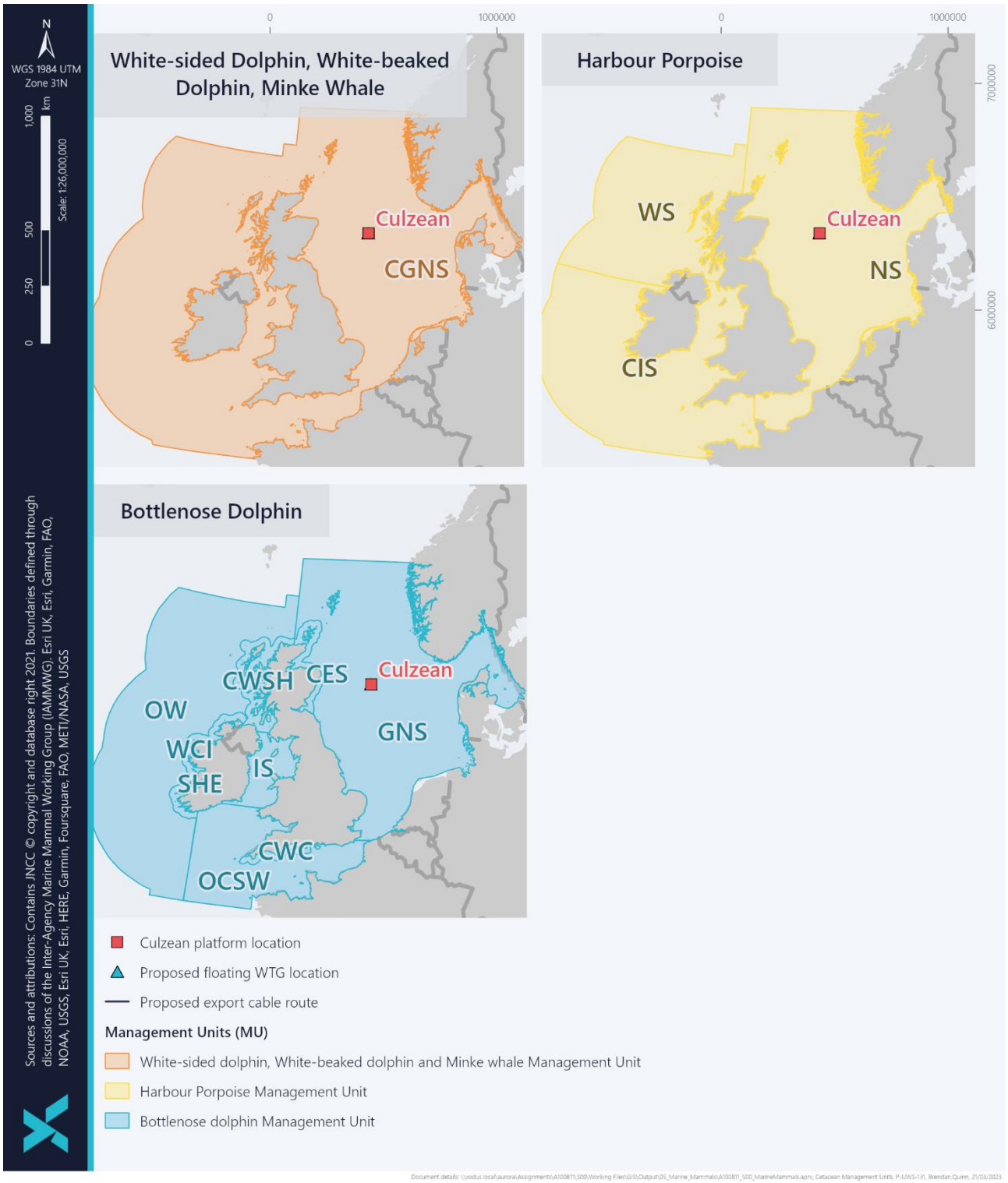

Figure 7-13 Study Area

7.3.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the Environmental Impact Assessment (EIA) are outlined in Table 7-9.

It is noted that the Small Cetaceans in the European Atlantic and North Sea (SCANS)-IV survey was completed in summer 2022, and that results are anticipated to be released in 2023. Where available, these will also be used to inform the baseline characterisation and impact assessment.

Table 7-9 Summary of Key Datasets and Reports

NAME OF SOURCE	DESCRIPTION/LINK	AUTHOR	DATE
A Framework for Studying the Effects of Offshore Wind Development on Marine Mammals and Turtles	https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/A-Framework-for-Studying-the-Effects.pdf	Kraus *et al.*	2019
Regional Baselines for Marine Mammal Knowledge Across the North Sea and Atlantic Areas of Scottish Waters	https://data.marine.gov.scot/sites/default/files//Scottish%20Marine%20and%20Freshwater%20Science%20%28SMFS%29%20Vol%2011%20No%2012_%20Regional%20baselines%20for%20marine%20mammal%20knowledge%20across%20the%20North%20Sea%20and%20Atlantic%20areas%20of%20Scottish%20waters%20-%20Appendix%201%20Data%20Sources.pdf	Hague *et al.*	2020
Bottlenose dolphin estimate	https://www.nature.scot/doc/east-coast-scotland-bottlenose-dolphins-estimate-population-size-2015-2019	Arso Civil *et al.*	2021
Improving understanding of bottlenose dolphin movements along the east coast of Scotland. Final report.	https://tethys.pnnl.gov/publications/improving-understanding-bottlenose-dolphin-movements-along-east-coast-scotland-interim	Arso Civil *et al.*	2019
Small Cetaceans in the European Atlantic and North Sea (SCANS-III)	https://scans3.wp.st-andrews.ac.uk/files/2022/08/SCANS-III_density_surface_modelling_report_final_20220815.pdf	Hammond *et al.*	2021
Modelled density surfaces of cetaceans in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys	https://scans3.wp.st-andrews.ac.uk/files/2022/08/SCANS-III_density_surface_modelling_report_final_20220815.pdf	Lacey *et al.*	2022
Scientific Advice on Matters Related to the Management of Seal Populations	http://www.smru.st-andrews.ac.uk/files/2022/08/SCOS-2021.pdf	SCOS	2021
Updated abundance estimates for cetacean Management Units in UK waters (Inter-	https://hub.jncc.gov.uk/assets/3a401204-aa46-43c8-85b8-5ae42cdd7ff3	IAMMWG	2022

NAME OF SOURCE	DESCRIPTION/LINK	AUTHOR	DATE
Agency Marine Mammal Working Group (IAMMWG)			
SAC Scotland ESRI	https://www.nature.scot/professional-advice/protected-areas-and-species/protected-areas/international-designations/european-sites/special-areas-conservation-sacs	NatureScot	2020
MPA Scotland ESRI	https://marine.gov.scot/maps/844	NatureScot	2020
Atlas of Cetacean Distribution	https://hub.jncc.gov.uk/assets/a5a51895-50a1-4cd8-8f9d-8e2512345adf	JNCC	2003
Revised Phase III Data Analysis of Joint Cetacean Protocol (JCP) Data Resources	https://hub.jncc.gov.uk/assets/01adfabd-e75f-48ba-9643-2d594983201e	Paxton *et al.*	2016
Distribution Maps of Cetacean and Seabird Populations in the North-East Atlantic	https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.13525	Waggitt *et al.*	2019
The Identification of Discrete and Persistent Areas of Relatively High Harbour Porpoise Density in the Wider UK Marine Area	https://data.jncc.gov.uk/data/f7450390-9a89-4986-8389-9bff5ea1978a/JNCC-Report-544-FINAL-WEB.pdf	Heinänen and Skov	2015
Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/959723/SMRU_2020_Habitat-based_predictions_of_at-sea_distribution_for_grey_and_harbour_seals_in_the_British_Isles.pdf	Carter *et al.*	2020
Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management	https://www.frontiersin.org/articles/10.3389/fmars.2022.875869/full	Carter *et al.*	2022
Seal telemetry data (1988 – 2018)	https://risweb.st-andrews.ac.uk/portal/en/researchoutput/smru-seal-telemetry-data-holdings(758f5208-c2d5-4cae-8508-892204cadc0c).html	SMRU, University of St Andrews	2018
East Coast Scotland Marine Mammal Acoustic Array (ECOMMAS)	https://marine.gov.scot/information/east-coast-marine-mammal-acoustic-study-ecommas	Marine Scotland	2020

7.3.5 Baseline Environment

Cetaceans

Several cetacean species are known to occur within the North Sea, and four species in particular are likely to occur in the vicinity of the Project. White-beaked dolphins *Lagenorhynchus albirostris* and harbour porpoise *Phocoena phocoena* are the most common cetacean species within the North Sea, found within the waters off the coast of Scotland throughout the year, with the highest densities recorded in the summer months (Reid *et al.*, 2003; Hague *et al.*, 2020). Minke whales *Balaenoptera acutorostrata* generally occur in greater numbers in the North Sea during

the summer months (May – September) but have been observed in these waters until November (DECC, 2016; Risch *et al.*, 2019). Populations of bottlenose dolphins *Tursiops truncatus* are regularly sighted in the waters off the east coast of Scotland, with fewer sightings offshore in the vicinity of the Project, although offshore surveys have observed this species in the central North Sea (Hammond *et al.*, 2021). Other species, including killer whales *Orcinus orca*, Atlantic white-sided dolphin *Lagenorhynchus acutus*, Risso's dolphin *Grampus griseus* and long-finned pilot whale *Globicephala melas* are also being occasionally sighted in the waters off the east coast of Scotland (DECC, 2016). The Project is located in SCANS-III Block R. Block-specific density estimates are presented in Table 7-10 (Hammond *et al.*, 2021).

*Table 7-10 Density Estimates for the Key Cetacean Species within the Project (Hammond et al., 2021; IAMMWG,2022)[6]**

SPECIES	ANIMALS/ KM^2	MU
	BLOCK R	
Harbour porpoise	0.599	NS: 346,601 (UK portion: 159,632)
White-beaked dolphin	0.243	CGNS: 43,951 (UK portion: 34,025)
Minke whale	0.0387	CGNS: 20,118 (UK portion: 10,288)
Bottlenose dolphin	0.0298	GNS: 2,022 (UK portion: 1,885)

** Density estimates are taken from SCANS-III survey Block R*

All cetaceans are listed as European Protected Species (EPS) under Annex IV of the EU Habitats Directive, with harbour porpoise and bottlenose dolphin additionally listed under Annex II of the EU Habitats Directive, requiring the designation of Special Areas of Conservation for these species. Atlantic white-sided dolphin, bottlenose dolphin, harbour porpoise, minke whale and white-beaked dolphin are additionally listed as Scottish PMF's (NatureScot, 2020).

The closest protected site which is designated for marine mammals as a conservation feature is the Southern Trench Nature Conservation Marine Protected Area (NCMPA). This site is located 192 km to the northwest of the Project. The NCMPA is designated for the protection of minke whales which are frequently sighted in the summer months in the outer Moray Firth. In addition, the Moray Firth Special Area of Conservation (SAC), located >300 km northwest of the Project supports the only known resident bottlenose dolphin population in the North Sea, estimated at approximately 224 individuals (Arso-Civil *et al.*, 2021; IAMMWG, 2022). Individuals associated with this protected site are primarily observed within shallow, nearshore waters of eastern Scotland, in particular the inner and southern coast of the

[6] *It should be noted that Lacey et al. (2022) recently released modelled density surfaces and SCANS IV is expected to be released in 2023. The EIA will explore these data sources and select the most appropriate available to use in quantitative assessments.*

Moray Firth, Aberdeenshire coast and Tay Estuary (Quick *et al.*, 2014). Sightings of bottlenose dolphins offshore in the North Sea, including in the region of the Project, are far less common and are attributed to the Greater North Sea MU (Cheney *et al.*, 2013; IAMMWG 2022).

The Southern North Sea SAC is also located >200 km from the proposed operations and is designated for harbour porpoise. This site includes key winter and summer habitat for this species and is the largest SAC in UK and European waters at the point of designation in 2019. Located to the east of England, this site stretches from the Central North Sea (CNS) (north of Dogger Bank) to the Straits of Dover in the south, covering an area of 36,951 km^2 (JNCC, 2021b).

Given the anticipated occurrence and presence of cetacean species across the Project, and the presence of relevant protected areas, the following key cetacean species are scoped in for further quantitative impact assessment:

- Harbour porpoise;
- White-beaked dolphin;
- Bottlenose dolphin; and
- Minke whale.

It is noted that density estimates for Atlantic white-sided dolphin, while available from SCANS-III for Block R, are subject to high uncertainty and correspond to single sightings in the Block (Hammond *et al.*, 2021). The evidence for their occurrence across the Project will be comprehensively assessed in the baseline technical report for the EIA. This assessment will give consideration to site-specific survey results however, it is not anticipated that they will be subject to quantitative assessment.

Pinnipeds

Two species of seal regularly occur in UK waters and breed onshore: the grey seal *Halichoerus grypus* and the harbour seal *Phoca vitulina* (DECC, 2016). Both species are listed under Annex II of the EU Habitats Directive and are recognised as Scottish PMFs.

Both seal species feed in inshore and offshore waters to suit prey availability and seasonality, with numbers of harbour seal particularly high in inshore waters during the pupping and moulting seasons. Seal tracking studies indicate that harbour seal typically forage within coastal regions, although longer travel distances do occur (e.g., Carter *et al.*, 2022 gives a maximum recorded distance from a haul-out as 273 km). Grey seals have been observed travelling larger distances than harbour seals, with some grey seal individuals travelling hundreds of kilometres from haul-out sites (Carter *et al.*, 2022 gives a maximum recorded distance from a haul-out as 448 km).

The Project is located within the East Scotland Seal Management Area.

The modelled habitat preference data from Carter *et al.* (2022) estimates densities of grey and harbour seals in the waters of the Project, with estimated population densities of grey and harbour seals as being < 1 per 25 km^2 in the Project (Cater *et al.*, 2022). When compared to other regions of the UKCS, these densities are considered to be low (Marine Scotland, 2017) (Figure 7-14). Both grey and harbour seals have been scoped in for the quantitative impact assessment.

The closest SAC designated for seals is the Berwickshire and North Northumberland Coast SAC which is designated for grey seals. This site is located approximately 260 km from the Project. The nearest designated seal haul out, protected under The Protection of Seals (Designated Sea Haul-out Sites) (Scotland) Order 2014, is Fast Castle, located approximately 278 km from the Project. Therefore, seal haul-out sites are considered too distant to be impacted by any proposed operations. As such, seal haul-out are not discussed further.

Considering the distance between the Project and these protected sites, it is considered that the Project will result in a low potential for impacts to the sites from the Project and its associated activities.

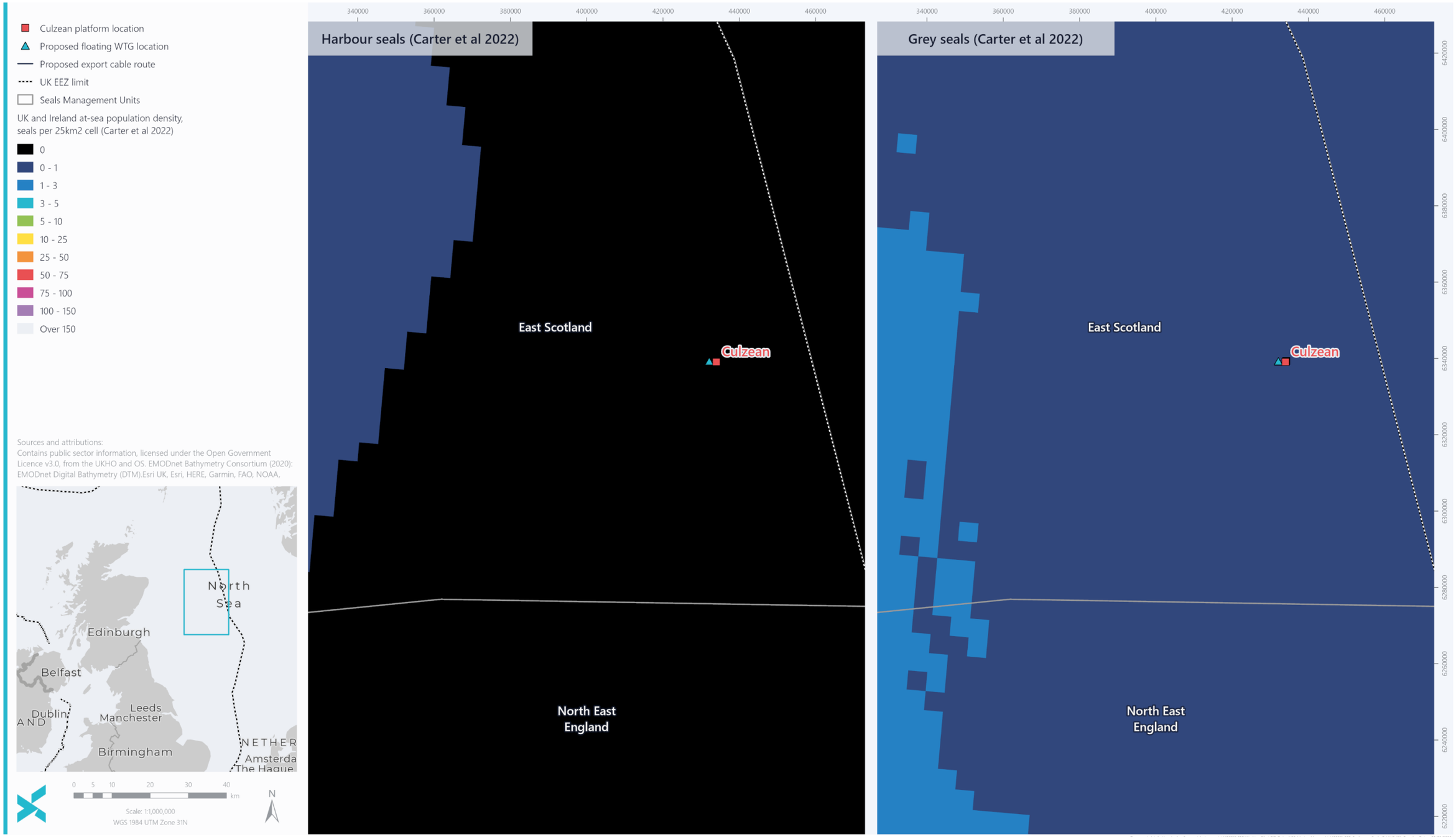

Figure 7-14 Seal Distribution within the Vicinity of the Development Area (Carter et al., 2022)

The assessment of marine mammals with potential connectivity to the Project should include other marine megafauna species which have been sighted in UK waters (namely turtles and basking sharks). The subsections below consider these species and their distribution throughout the North Sea in relation to the Project.

Turtles

Sightings of marine turtles within United Kingdom (UK) waters are rare, with leatherback turtles *Dermochelys coriacea* the most commonly sighted species within the UK (NBN Atlas, 2020). In Scotland, marine turtle sightings are primarily focused in the seas off the west of Scotland. Sightings have also occurred in and around the Firth of Forth area on the east coast of Scotland and in small numbers in the Orkney and Shetland Islands. Following a review of the National Biodiversity Network (NBN) data there were no confirmed sightings of marine turtles within the waters of the Project, therefore this taxon has not been considered further within this report.

Basking Sharks

The basking shark *Cetorhinus maximus* is listed on both the OSPAR (2008) List of Threatened and/or Declining Species and Habitats, the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (categorised as Endangered) and is a Scottish PMF. Additionally, the basking shark is protected in UK waters under the Wildlife and Countryside Act 1981. The species has experienced declines following periods of over-exploitation throughout the northeast Atlantic (Tyler-Walters *et al.*, 2016).

Basking sharks are present throughout the year along the west coast of the UK, from the coastal waters of Cornwall to the Celtic and Hebridean Seas, although sightings are most common during the summer months. The waters surrounding the Project offer habitat suitable for basking shark populations, concluded through habitat modelling of the waters surrounding the Project where thermal fronts and a favourable seabed slope were identified (Austin *et al.*, 2019). However, the Project is not considered an important site for basking shark, with very few sightings recorded in the waters of the North Sea (Witt *et al.*, 2012; Doherty *et al.*, 2017).

Given data on the distribution of this species and the low recorded sightings of basking shark populations, there is unlikely to be any connectivity between the Project and its associated activities and this species. Therefore, this taxon has not been considered further within this report.

7.3.6 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 7-11.

Table 7-11 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Develop and implement an Environmental Management Plan (EMP), a Code of Construction Practice (CoCP) and a Marine Pollution Contingency Plan (MPCP).	Marine Licence consent conditions
Cable routing and protection measures[7]	Undertake CBRA to determine required cable protection with an aim to minimise volume and spatial extent of protection. Marine Licence consent conditions
The development and implementation of a Vessel Management Plan (VMP).	Marine Licence consent conditions
Development and adherence to a Piling Strategy (if required) which delineates the noise mitigation measures to be implemented during any piling activities (e.g., soft-start and ramp-up procedures) to reduce the risk of injury to negligible levels. **Marine Mammal Mitigation Protocols (MMMP) for pile driving, geophysical surveys and Unexploded Ordnance (UXO) clearance (if needed) will be implemented. The mitigation measures will be informed by:** **JNCC (2010): JNCC guidelines for minimising the risk of injury and disturbance to marine mammals from seismic surveys.** **JNCC (2010): JNCC guidelines for minimising the risk of injury to marine mammals from using explosives.** **JNCC (2017): JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys.**	Established within the design principles of the Project and secured under Marine Licence consent conditions

The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on marine mammal receptors and will be consulted upon with consultees throughout the EIA process.

7.3.7 Scoping Impacts

The potential impacts of the Project on marine mammals have been summarised in Table 7-12. The table identifies potential impacts during the construction, operation and maintenance, and decommissioning phases of the Project, with a scoping justification and scoping decision provided. While UXO clearance will be subject to a separate Marine Licence application, an indicative assessment of the potential for noise impacts to marine mammals from UXO clearance during the construction phase will be included within the impact assessment. However, if the Project surveys do not indicate the presence of UXO this will not be required.

[7] *Cable will be routed to avoid sensitive features wherever practicable and buried as the primary cable protection method. Additional cable protection may be used where adequate burial cannot be achieved and this will be minimised as far as is practicable. This will be informed by a cable burial risk assessment (CBRA), completed to determine the suitable cable protection measures, and implemented through relevant project plans.*

Table 7-12 Potential Impacts on Marine Mammals during Construction (C)/ Decommissioning (D), and Operations and Maintenance (O&M) phases of the Project

POTENTIAL IMPACT	PROJECT PHASE*	SCOPING JUSTIFICATION	SCOPED IN/OUT
Noise-related impacts to marine mammals associated with construction/ operational/ decommissioning noise, including the risk of injury and disturbance/displacement	C, D	Underwater noise associated with pre-construction geophysical surveys and UXO clearance will be considered in the relevant licence applications. If UXO are identified during the survey, impacts associated with the clearance will be assessed in the EIA. The only noise will be from construction (such as cable laying) and potentially pin piling if an alternative anchor solution is required. As the construction noise from cable laying will be of short duration and transient, it is expected that the impact on marine mammal activity, habitat use and distribution will be very limited. Evidence also suggests that potential impacts include short term or temporary displacement of mammals. The impacts of underwater noise to protected species marine mammals will require further for consideration if pin piling is required	Scoped in
	O&M	The effects of operational noise of floating Wind Turbine Generators (WTGs) are not likely to generate significant levels of noise that would result in disturbance fish species (as prey species of marine mammals). Based on the location of the Project and the ambient noise generated from local fishing and shipping activities, the operation and maintenance of the Project is not likely to surpass existing ambient noise. Due to the early stage of floating offshore wind technology and limited existing monitoring data of noise from operational floating wind farms, available literature is limited. That said, some early measurements have concluded that underwater noise from operating wind turbines is limited to low frequencies (below 1 kHz) and of low intensity, considerably lower than ship noise (Tougaard, 2020). JASCO (2022) undertook noise monitoring of floating turbines. It identified that the noise footprint is relatively benign and, in the quite noisy North Sea, does not present any threat of auditory injury to marine species. Therefore, the added noise from the WTG is not expected to be significantly higher than that which is already observed in the area such as from oil and gas activities to offshore fishing. As such this has been scoped out.	Scoped Out
Indirect impacts of construction noise on the prey species of marine mammals	C, D	Underwater noise disturbance to fish populations (as prey species of marine mammals) generated during construction (i.e., cable laying) may indirectly impact marine mammal species. However, the scale of these impacts is expected to be minimal for cable laying activities and potentially pin piling with impacts likely to be localised. The impacts of underwater noise to prey species of marine mammals are therefore not required further for consideration.	Scoped Out
	O&M	The effects of operational noise of floating WTGs are not likely to generate significant levels of noise that would result in disturbance fish species (as prey species of marine mammals). Based on the location of the Project and the ambient noise generated from local fishing and shipping activities, the operation and maintenance of the Project is not likely to surpass existing ambient noise. Due to the early stage of floating offshore wind technology and limited existing monitoring data of noise from operational floating wind farms, available literature is limited. That said, some early	Scoped Out

POTENTIAL IMPACT	PROJECT PHASE*	SCOPING JUSTIFICATION	SCOPED IN/OUT
		measurements have concluded that underwater noise from operating wind turbines is limited to low frequencies (below 1 kHz) and of low intensity, considerably lower than ship noise (Tougaard, 2020). Therefore, the added noise from the WTG is not expected to be significantly higher than that which is already observed in the area such as from oil and gas activities to offshore fishing. As such this has been scoped out.	
Vessel disturbance	C, D	Relatively high levels of vessel traffic (passenger, cargo and other vessel activities) within the area form part of the existing baseline. Increased vessel traffic during construction and decommissioning may increase the risk of disturbance to marine mammals, however the operations during these stages will be temporary and limited to a specific area. In addition, the increase in vessel noise during construction and decommissioning is not expected to be significant as it will be for one offshore floating wind turbine and one cable route. As such, this has been scoped out.	Scoped Out
	O&M	The small number of vessels required for operation and maintenance activities is unlikely to generate an increase in disturbance against the existing baseline of shipping activity. As such this has been scoped out.	Scoped Out
Risk of injury resulting from collision of marine mammals with installation vessels	C, D	It is not expected that increased localised vessel traffic associated with the Project will increase the risk of collision to marine mammals within the area. Vessel movements will be managed through the implementation of a VMP in a way that will mitigate the negative impacts to marine mammals, including: • Vessel activities will fall under standard transits speeds • Vessels will follow prescribed routes (non-random movement) • Vessel sizes will remain small relative to large cargo vessels Following relevant (activity-specific) such as JNCC guidance to minimise the risks of injury to marine mammals during the construction, operation and maintenance and decommissioning phases of the Project.	Scoped Out
Impacts associated with effects upon marine water quality, particularly due to any disturbed sediments affecting turbidity	C, D	Activities relating to the construction and decommissioning of the Project may influence water quality as a result of sediment disturbance. These impacts are localised and short-lived. Marine mammals often migrate through waters where conditions are turbid for extended periods without significant impacts to species biology or behaviour. For this reason, localised, temporary changes to water quality will not have a significant impact on marine mammals.	Scoped Out
Risk of injury resulting from entanglement of marine mammals with mooring lines or cable, including secondary interactions with derelict fishing gears, or entrapment with mooring systems	O&M	The effects of marine renewable energy mooring devices on marine mammals are not well understood. It is predicted that the introduction of dynamic lines or cables introduces a potential entanglement risk. The mooring system used for the Project will be a 3-anchor mooring spread which will be encompassed by a mooring radius of approximately 600 m around the floater centre. This area is small when compared to the wider available marine environment. It is expected that the potential risk for entanglement will be limited and therefore this has been scoped out.	Scoped Out
Risk of injury resulting from collision of marine mammals with WTG substructures	O&M	Designs with the greatest total submerged volumes (such as semi-submersible or SPAR designs) are more likely to generate a collision risk with marine mammals. The mooring system used for the Project will be a 3-anchor mooring spread which will be encompassed by a mooring radius of approximately 600 m around the floater centre. This area is small	Scoped Out

POTENTIAL IMPACT	PROJECT PHASE*	SCOPING JUSTIFICATION	SCOPED IN/OUT
		when compared to the wider available marine environment. It is expected that the potential risk for entanglement will be limited and therefore this has been scoped out.	
Displacement or barrier effects resulting from the physical presence of devices and infrastructure	O&M	The introduction of new infrastructure into the marine environment can potentially result in displacement or exclusion from habitats. However, as the Project will be part of the wider Culzean asset which already exists in the area, the added presence of the floating WTG is not likely to increase physical presence disturbance to what is already established in the area. As such this has been scoped out.	Scoped Out
Risk of injury resulting from collision of marine mammals with operations and maintenance vessels	O&M	The small number of vessels required for operation and maintenance activities will be subject to a VMP, resulting in Project vessels unlikely to generate an increase in collision risk against the existing baseline of shipping activity.	Scoped Out
Risk associated with Electromagnetic Fields (EMFs) associated with subsea cabling	O&M	EMFs are emitted along the lengths of subsea cables and can have behavioural and psychological effects on sensitive marine mammals and megafauna species. Existing evidence suggests that the levels of EMFs emitted by offshore renewable energy export cables are at a level low enough that there is no potential for direct significant impacts on marine mammals. For this reason, it is considered that there will be no significant impacts of EMFs associated with subsea cabling on marine mammals.	Scoped Out
Impacts associated with effects upon marine water quality due to any accidental release of pollutants.	O&M	The accidental release of pollutants is limited to oils and fluids contained within the WTGs and vessels. The potential for full inventory release from a turbine is considered extremely remote and would occur as a slow release, which would be almost undetectable and immediately dispersed, limiting the potential interactions between pollutants and marine mammals. For this reason, it has not been considered further.	Scoped Out
Long term habitat change, including the potential for change in foraging opportunities	O&M	Changes in prey abundance and distribution resulting from operation and maintenance activities, and potential EMF impacts on prey species may impact foraging success for marine mammals. However, as the Project will be part of the wider Culzean asset which already exists in the area, the added presence of the floating WTG is not likely to increase long term habitat change and foraging changes for species. As such this has been scoped out.	Scoped Out

7.3.8 Potential Cumulative Effects

The cumulative effects assessment will assess the potential for impacts of the Project during the construction, operation and maintenance, and decommissioning phases to interact with the activities of other projects in adjacent waters, resulting in cumulative effects on marine mammals. The most significant cumulative impact on marine mammal species is likely to be underwater noise associated with construction activities. For marine mammals the approach to cumulative impact assessment will be holistic and combine all other potential sources of underwater noise including UXO clearance and pile driving at other OWFs together with disturbance from seismic surveys and any other offshore construction developments that are planned within the relevant MUs for each species. A staged process will be adopted of developing a 'long list' of projects to consider for cumulative effects across multiple

receptors, which will then be refined into a 'short list' for marine mammals giving particular consideration to potential effects pathways.

For each relevant project, an assessment will be made of the number of animals which may be impacted on any one day, based on reported levels of impacts in published EIAs where available and, where not, on various assumptions relating to impact footprints and animal densities. For each year, the maximum number animals impacted on any one day (assuming concurrent activity) will be presented as a proportion of the relevant MU.

There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect marine mammal receptors. Notable projects will be considered as part of the Cumulative Effects Assessment.

Cumulative effects on marine mammal resulting from the effects of the Project and other developments will also be assessed in accordance with the guidance and methodologies set out in Section 5, with all relevant effects assessed for the Project in isolation considered on the cumulative level as required.

The cumulative effects assessment will be undertaken with reference to, and use of, the Cumulative Effects Framework which is currently being developed by Marine Scotland – Licensing Operations Team (MS-LOT) (expected to be ready for use in Spring 2023) for the EIAR.

7.3.9 Potential Transboundary Impacts

There are significant levels of marine development being undertaken by neighbouring European Union (EU) Member States, including Germany, Denmark, and the Netherlands within the North Sea. Marine mammal species are highly mobile and will cross state boundaries during their yearly seasonal migrations. Therefore, there is the potential for transboundary impacts relating to the Project, particularly when we consider the impacts of underwater noise.

Potential transboundary impacts will be assessed considering the populations and species that are likely to be impacted and their potential linkage to designated sites and protected areas.

7.3.10 Approach to Analysis and Assessment

The data sources identified in Section 7.3.4 will be used to characterise the existing environment and species baselines for marine mammals within the Project. The potential impacts identified in Section 7.3.7, in conjunction with expert judgement and consultation will be used to inform the Environmental Impact Assessment Report (EIAR). Consultation will be undertaken with key stakeholders including Marine Scotland, NatureScot, JNCC and the Whale and Dolphin Society.

The EIAR chapter, which will include:

- A description of relevant protected sites;
- A comprehensive review of key relevant existing data sources to summarise the reported distribution and abundance of marine mammals in the Study Area, including descriptions of survey methods and limitations of each dataset;

- The latest available results from the site-specific digital aerial surveys, supplied by the aerial digital survey provider, including: summary information on effort and environmental conditions encountered during the surveys; monthly sighting rates and (where possible) and design-based abundance and density estimates of marine mammals. Where appropriate, abundance and density estimates will be apportioned to account for any species identified to group level, and, where possible, corrected to account for availability bias;
- An assessment of the most appropriate density estimates to be carried forward to quantitative impact assessment; and
- An evaluation of the nature conservation status of the marine mammal species found to be present within the Study Area.

The direct and indirect impacts of the Project will also be assessed based on a realistic worst-case design scenario.

The assessment of potential impacts will be qualitative and based on the best available evidence of these impact pathways considered alongside the Project's design envelope, location and species scoped in. In the event that pin piling is required, underwater noise modelling will be undertaken to inform the assessment.

European sites designated for the conservation of marine mammal features (SACs) will be considered within the Report to Inform the Appropriate Assessment (RIAA) which will be completed alongside the EIAR. The EIAR chapter will also provide discuss the potential impacts of the Project on the protected sites. Due to the distance of the Project to protected sites designated for marine mammals this is expected to be minimal.

EIA Methodology

EIA methodology for marine mammals will be conducted in line with the processes identified in Section 5.3 and the relevant legislation identified in Section 7.3.2.

7.3.11 Scoping Questions

- Do you agree that all relevant legislation, policy and guidance documents have been identified for the marine mammals assessment? Are there any additional legislation, policy and guidance documents that should be considered?
- Do you agree with the Study Areas defined for marine mammals?
- Do you agree with the data and information sources identified to inform the baseline for marine mammals? Are there any additional data and information sources that should be considered?
- Do you agree with the suggested embedded mitigation measures?
- Do you agree that all potential receptors and impacts have been identified for marine mammals?
- Do you agree that the impacts proposed can be scoped out of the marine mammals EIA Chapter?
- Do you agree with the approach for cumulative effects assessment?
- Do you agree with the approach to analysis and assessment that will inform the EIA?

7.3.12 References

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7.4 Ornithology

7.4.1 Introduction

This chapter considers the potential impacts to species of birds from the construction, operation and maintenance and decommissioning of the Project. The chapter concentrates on species that are known to or are likely to occur within the Study Area.

The assessment of potential impacts upon ornithology which will be presented in the EIA will be partly informed using the detail presented in the following relevant technical chapters: Project Description (Chapter 3), Marine Physical Processes (Chapter 6.1), Benthic Ecology (Chapter 7.1) and Fish and Shellfish Ecology (Chapter 7.2). It should be noted that an HRA will be undertaken alongside the EIA for the proposed Project.

The extent of the study area for birds will take into account the known distribution and breeding season foraging ranges (Woodward *et al.* 2019) of the seabird species potentially affected. The final study area will be agreed following consultation process, with the designated sites to be considered agreed through the HRA screening process.

Where necessary mitigation and/or monitoring measures will be identified as required during the formal EIA process, to be informed through the assessment process itself in consultation with stakeholders.

7.4.2 Legislation, Policy and Guidance

In addition to those described in Chapter 2: Legislative Context and Regulatory Requirements, the following guidance and legislation will be taken into consideration as part of the assessment of potential impacts on ornithology:

Legislation

- Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention').

Guidance

- NatureScot (2018). Environmental Impact Assessment Handbook. V5. Available online at https://www.nature.scot/handbook-environmental-impact-assessment-guidance-competent-authorities-consultees-and-others;
- NatureScot guidance notes on ornithology to support offshore wind energy applications; (NatureScot website, https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/marine-renewables/advice-marine-renewables-development).
- CIEEM (2018). Guidelines for Ecological Impact Assessment in Britain and Ireland: Marine and Coastal. Winchester, Institute of Ecology and Environmental Management. Available at: https://cieem.net/wp-content/uploads/2019/02/Combined-EclA-guidelines-2018-compressed.pdf; and
- Walls, R., Pendlebury, C. Budgey, R. Brookes, K. and Thompson, P. (2009). Revised best practice guidance for the use of remote techniques for ornithological monitoring at offshore wind farms. COWRIE REMTECH-08-08.

7.4.3 Study Area

The area of relevance to EIA for ornithology is considered at two spatial scales. At the smaller scale is the location of the proposed WTG and its nearby surrounds. For the purposes the Scoping Report and area referred to as the Study Area is defined as the Marine Licence area with a surrounding buffer of 2 km. This area is relevant to EIA both for characterising baseline ornithological conditions at the Project site and for considering the area over which seabirds may be directly affected by the Project.

The various seabirds species that occur in the Study Area are all highly mobile species. It is therefore also relevant for EIA to consider where the birds that use the Study Area are likely to come from, in particular where there breeding sites are located. During the breeding season the birds that use the Study Area are likely to be from breeding sites in the eastern half of the UK (this is considered in more detail in Section 7.4.7 Designated Sites). Outside the breeding season, when seabirds are no longer spatially constrained by the need to attend their breeding colony, the seabirds that occur in the Study Area may originate from breeding colonies in north and east of Britain, Scandinavia, Iceland and Russia, depending on the species.

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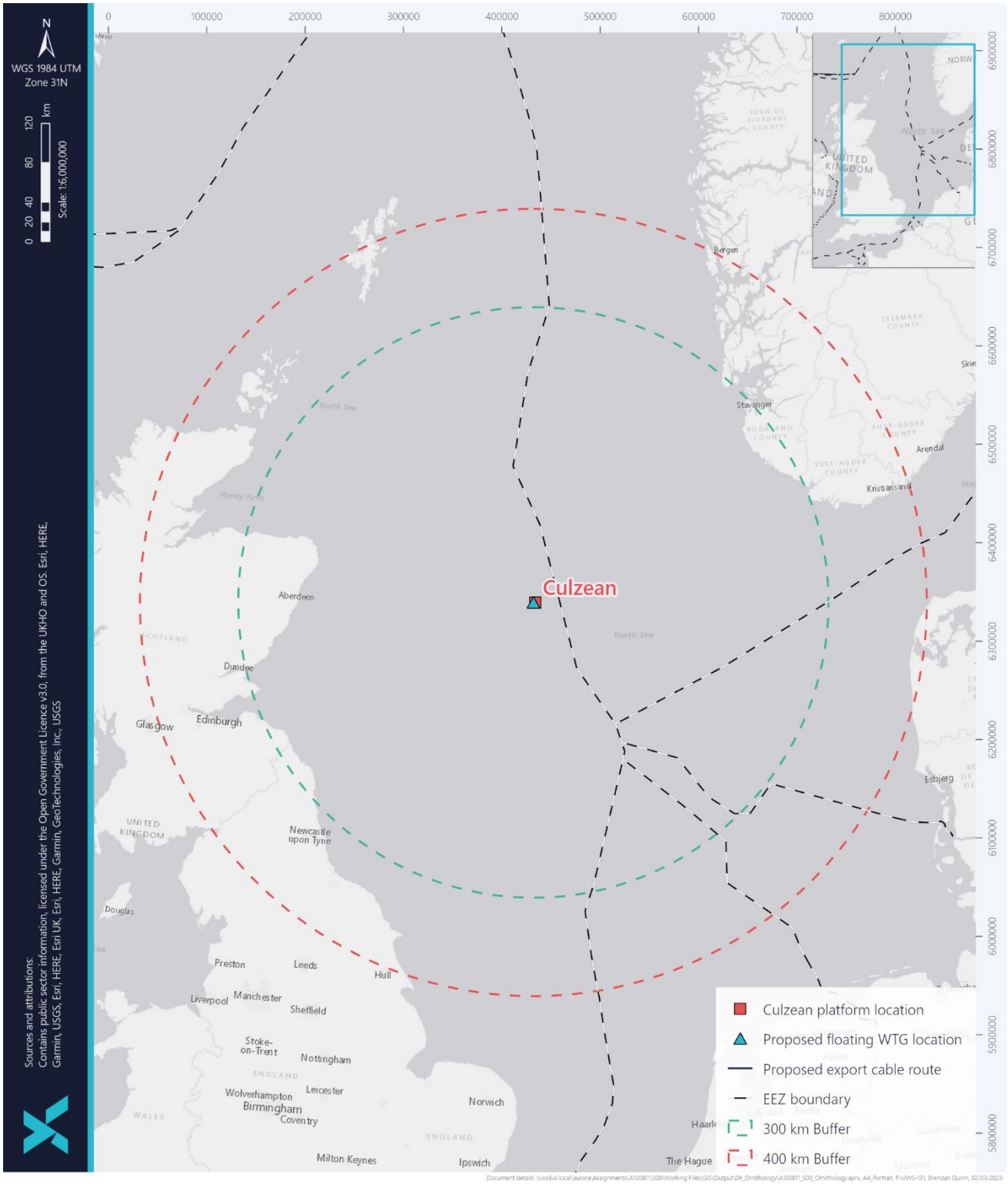

Figure 7-15 Study Area and breeding season colonies

7.4.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 7-13.

Table 7-13 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs.	JNCC Report No. 431;	2010	Kober *et al.*
Distribution maps of cetacean and seabird populations in the North-East Atlantic.	Journal of Applied Ecology 57: 253-269	2020	Waggitt *et al.*
Seabird Monitoring Database	Online. Managed by BTO on behalf of JNCC	2023	Managed by BTO on behalf of JNCC
Seabirds Count - A census of breeding seabirds in Britain and Ireland (2015–2021)	Lynx Publications	Due 2023	Burnell *et al.*
The use of bird data in marine planning and licensing. Available online at https://www.rspb.org.uk/globalassets/downloads/documents/positions/marine/rspb-guidance-on-the-use-of-bird-data-in-marine-planning.pdf	RSPB	2019	Anon.
Breeding density, fine-scale tracking, and large-scale modelling reveal the regional distribution of four seabird species	Ecological Applications journal	2017	Wakefield *et al.*
Desk-based revision of seabird foraging ranges used for HRA screening.	BTO Research Report No. 724	2019	Woodward *et al.*
(Draft) Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 4. Birds.	NatureScot	2011	Jackson and Whitfield,
Important Bird Areas for seabirds in the North Sea. Sandy, UK: RSPB.	BirdLife International	1995	Skov *et al.*
Assessing vulnerability of marine bird populations to offshore wind farms.	Journal of Environmental Management 119 (2013) 56-66.	2013	Furness, Wade and Masden.
Review of seabird demographic rates and density dependence	JNCC Report No. 552	2015	Horswill, C. & Robinson R. A.

TITLE	SOURCE	YEAR	AUTHOR
Joint Response from the Statutory Nature Conservation Bodies to the Marine Scotland Science Avoidance Rate Review	Natural England	2014	Anon.
Space partitioning without territoriality in gannets. Science	Science, 341(6141), 68-70	2019	Wakefield *et al.*
Using a collision risk model to assess bird collision risks for offshore wind farms.	Strategic Ornithological Support Services.	2012	Band
Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS).	Natural England Commissioned Report	2015	Furness
The Migration Atlas: movements of the birds of Britain and Ireland	T. & A.D. Poyser, London.	2002	Wernham *et al.*

The following surveys, relevant to the Project, have been carried out to date:

- Winter aerial bird surveys conducted between September 2022 and February 2023 (APEM, 2023); and
- Further aerial bird surveys conducted in March 2023.

A survey is planned for July 2023 to establish the number of kittiwakes and other seabird species nesting on the Culzean platform (located approximately 2 km from the proposed WTG).

7.4.5 Baseline Environment

The Study Area is located approximately 222 km east of Aberdeenshire, Scotland, and approximately 271 km south-west of closest part of Norway. This extreme remoteness from land will affect the utilisation of the Study Area by birds. In particular it will affect the use of the Study Area by seabirds during the breeding season, a period when birds are spatially constrained by the need to attend their breeding colony. For example, the distance from the Study Area to the nearest land is greater than the typical breeding season foraging range of most seabird species (Woodward *et al.*, 2019). However, the Study Area lies comfortably within the mean maximum foraging range plus one standard deviation (MMFR+1SD) of gannets (MMFR+1SD 509 km) and fulmars (MMFR+1SD 1200 km), breeding at colonies in eastern England and eastern and northern Scotland (Figure 1) (Woodward *et al.*, 2019). The Study Area is also potentially within the assumed mean maximum foraging range plus 1 SD of kittiwakes (MMFR+1SD 301 km) and puffins (MMFR+1SD 265 km), and the maximum foraging range of common guillemots (maximum 338 km), razorbills (maximum 313 km), breeding at colonies in Aberdeenshire and Kincardineshire (Figure 1) (Woodward *et al.*, 2019), though it would be unusual for these species to forage this far from their nest unless prey resources closer to colonies are atypically scarce.

Out with the breeding season seabirds are typically highly mobile and are no longer spatially constrained by the need to attend their colony. Published information indicates that a range of seabird species with essentially pelagic lifestyles are likely to use the Study Area in the non-breeding months (Skov *et al.*, 1995; Kober *et al.*, 2010; Waggitt *et al.*, 2020). The species that are likely to commonly occur at this time are gannet, herring gull, great black-backed gull, kittiwake,

common guillemot and little auk, though several other species potentially occur in low numbers occasionally (see Figure 7-16 to Figure 7-18).

The only surface features in the vicinity of the Study Area are the three Culzean platforms, located approximately 2 km to the east of the proposed turbine location. A study by Tasker *et al.* (1986) into association by seabirds with oil production platforms gives an indication of how the nearby presence of the Culzean platform may effect seabird use of the Study Area. The Tasker *et al.* study found that oil production platforms can provide enhanced feeding and roosting opportunities that attracts some seabirds, in particular gull species, great skua and fulmar. The Culzean platform may also be used by certain seabirds for nesting, in particular kittiwake. Small numbers of kittiwakes are known to nest on several oil and gas platforms in the North Sea (Christensen-Dalsgaard *et al.*, 2019; Orsted Hornsea Project Four, 2021).

The seabed depth at the Study Area is approximately 90 m, a depth which is beyond the reach of diving seabirds species that target benthic and demersal habitats for foraging.

As with any location in the North Sea, the Study Area is likely to be overflown by a wide range of migrant land birds including passerine, wader and wildfowl species. These migrant land birds deploy a broad-front migration strategy when crossing the North Sea and so there is no expectation that migrating land birds would be disproportionately concentrated in the vicinity of the Study Area (Wernham *et al.*, 2002; Wildfowl and Wetlands Trust, 2014).

The close proximity to the operational Culzean platform means that the Study Area is subject to regular activity by rig supply vessels (mostly operating out of Aberdeen) and helicopters servicing the platform. The operation of the Culzean platform and associated vessel and helicopter activity may affect the baseline ornithological conditions in the Study Area, in particular with respect to existing levels of disturbance and displacement (or attraction) from fixed structures and lighting effects.

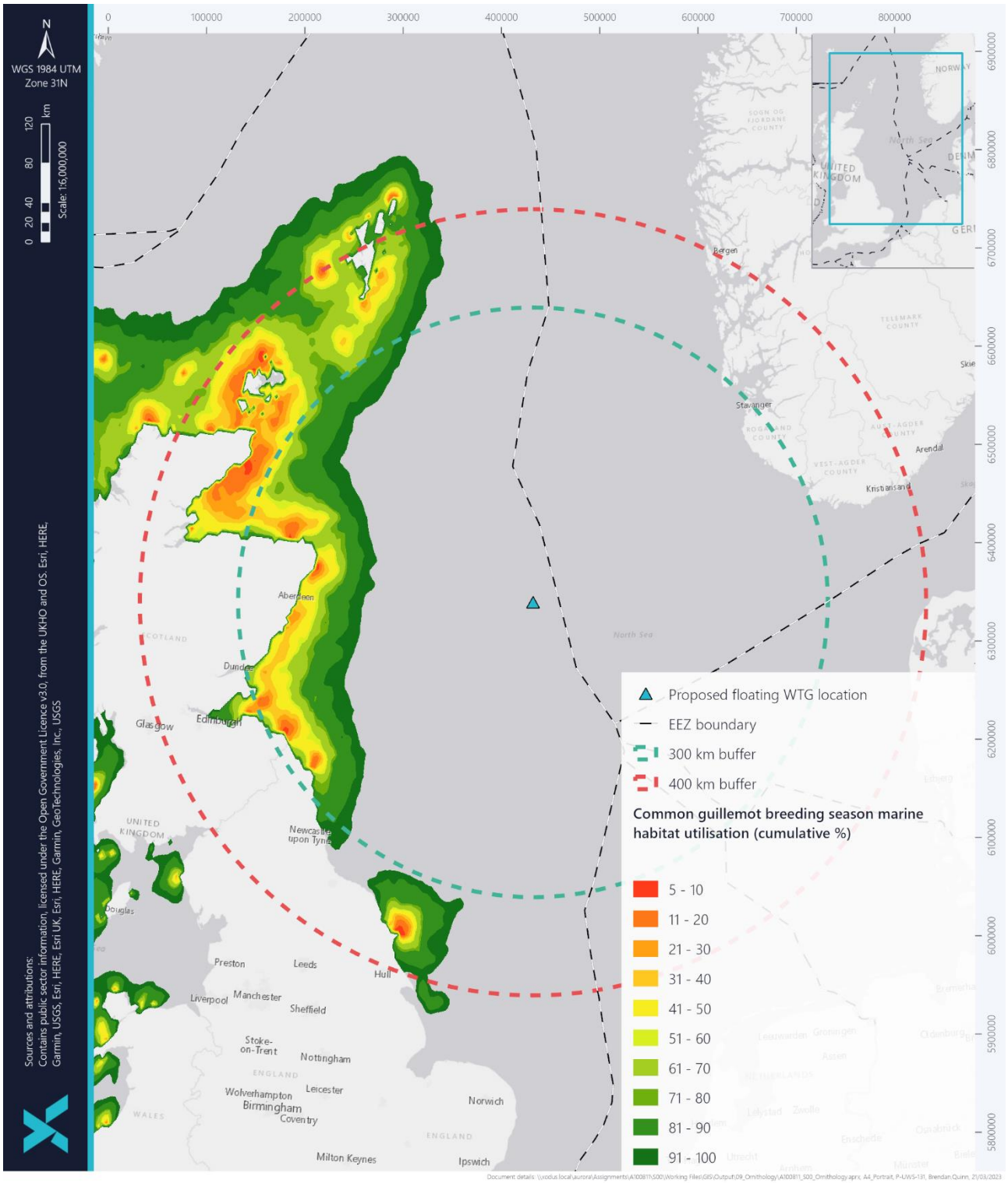

Figure 7-16 Common guillemot breeding season marine habitat utilisation (cumulative %)

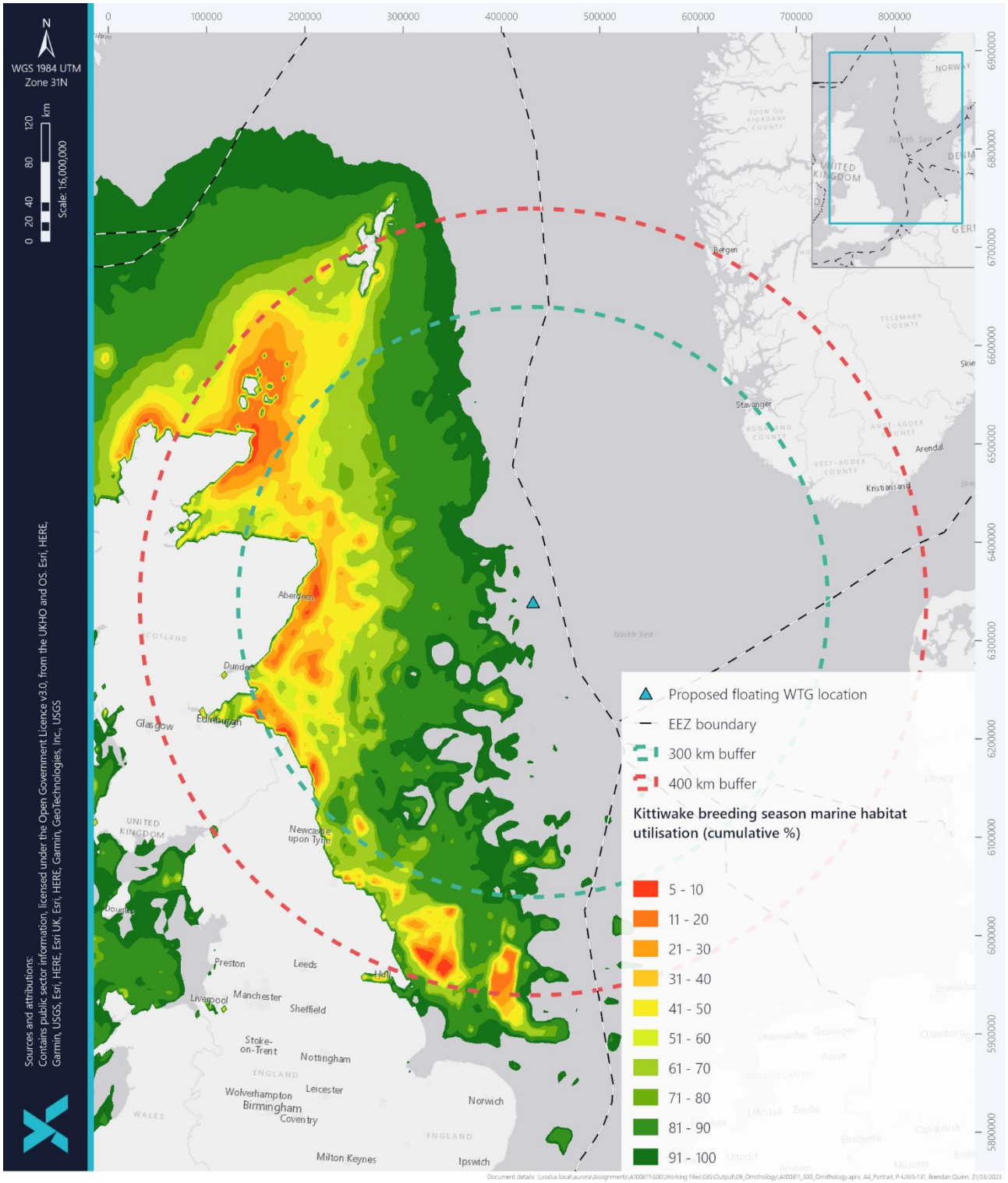

Figure 7-17 Kittiwake breeding season marine habitat utilisation (cumulative %)

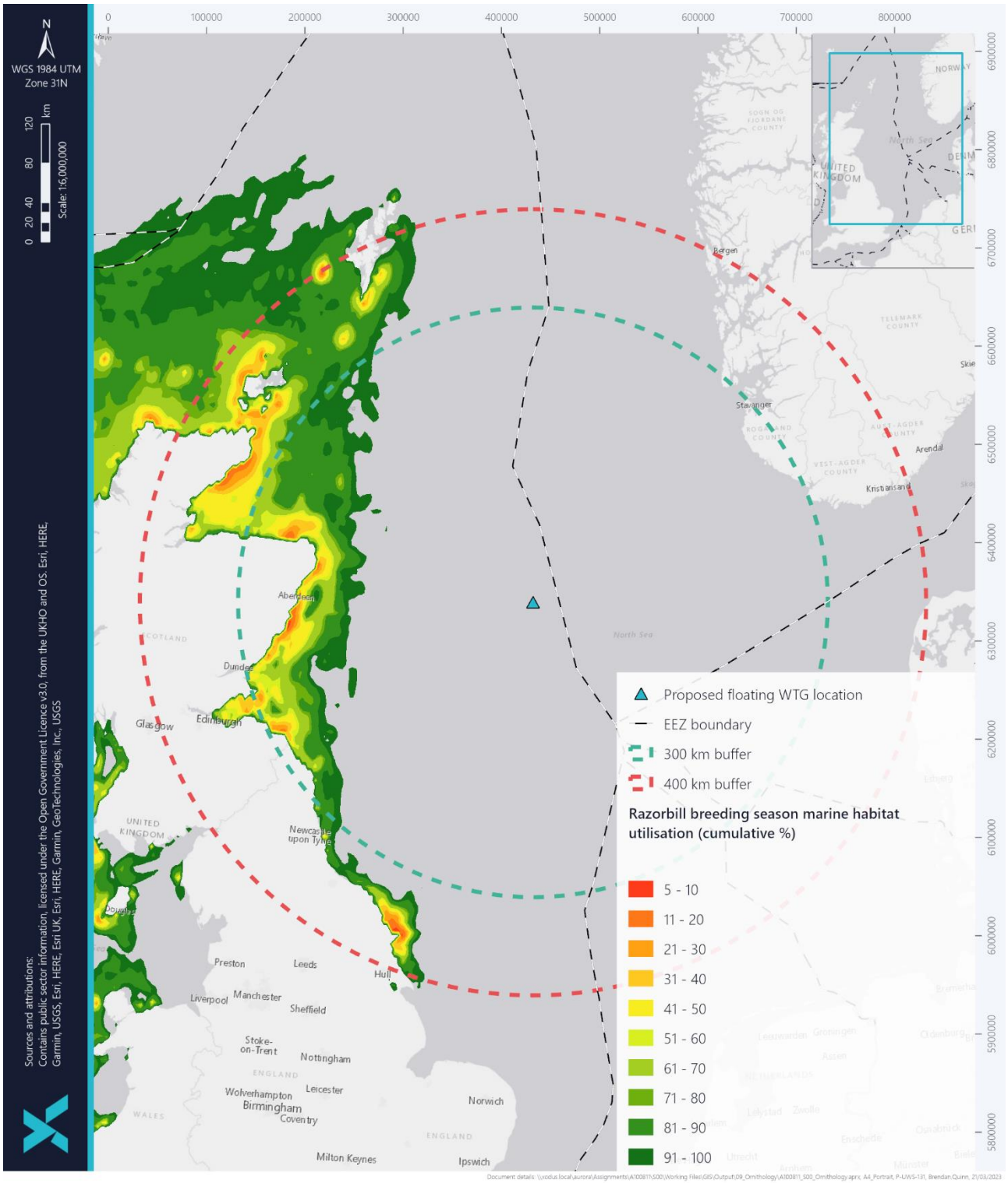

Figure 7-18 Razorbill breeding season marine habitat utilisation (cumulative %)

7.4.6 Summary of baseline survey

Digital Aerial Survey was undertaken by APEM Ltd between September 2022 and February 2023 (APEM, 2023). The survey area covered the candidate WTG locations buffered to 4 km.

The results of the baseline aerial survey generally accord with expectations based on published literature (e.g. Tasker *et al.*, 1986; Skov *et al.* 1995; Kober *et al.* 2010).The result show that the Study Area is utilised by the modest numbers of seabird species that occur in central part of the North Sea. Recorded densities were generally low and there were marked seasonal variations for some species. The species most commonly recorded on the autumn and winter months were common guillemot, razorbill, great black-backed gull, herring gull and fulmar. Puffin and kittiwake were also occasionally recorded in very low numbers. With the exception of common guillemot, average density of all species encountered in the survey area was low to very low (well below 1 bird per km^2). The densities of common guillemot recorded in the non-breeding months were relatively high, in the order of 10 birds per km^2 (provisional figure), an somewhat greater than expected based on published literature cited above.

The APEM Digital Aerial Survey is planned to continue to Q3 2023, to provide baseline abundance data for a full year.

A survey is planned for 2023 breeding season to determine if any seabirds nest on the Culzean platforms.

7.4.7 Designated sites

The Project's HRA report will present full details of screening to identify the potential for connectivity between the Study Area and sites that are designated as Special Protection Areas (SPA) under the European Council (EC) Directive 2009/147/EC on the conservation of wild birds ("the Birds Directive"). This screening will use the methods recommended by NatureScot, in particular the use of the mean maximum breeding season foraging range metric and will be informed by the Woodward *et al.* (2019) review of foraging range data. The HRA report will also consider the potential for the Study Area to have connectivity with SPA qualifying species outside the breeding season based on the information presented in the BDMPS approach developed by Furness (2015).

The results of a provisional examination of the potential for SPA breeding seabird qualifying species to have connectivity with the Study Area is presented in Table 7-14 (also see Figure 7-19). The potential for connectivity shown in Table 7-14 is based on whether the Study Area is within a qualifying species' mean maximum foraging range plus 1SD from the SPA under consideration. For some species with exceptionally large foraging ranges (e.g., fulmar, gannet, great skua and Manx shearwater) the Study Area is within the MMFR +1SD distance (measured by sea) of some breeding colonies in western Scotland (e.g., west of Cape Wrath). However, tracking data for these species for birds tagged at colonies in western Scotland show no evidence that they forage in the North Sea. Therefore breeding season connectivity to these west Scotland colonies is not considered likely and for this reason they are excluded from Table 7-14.

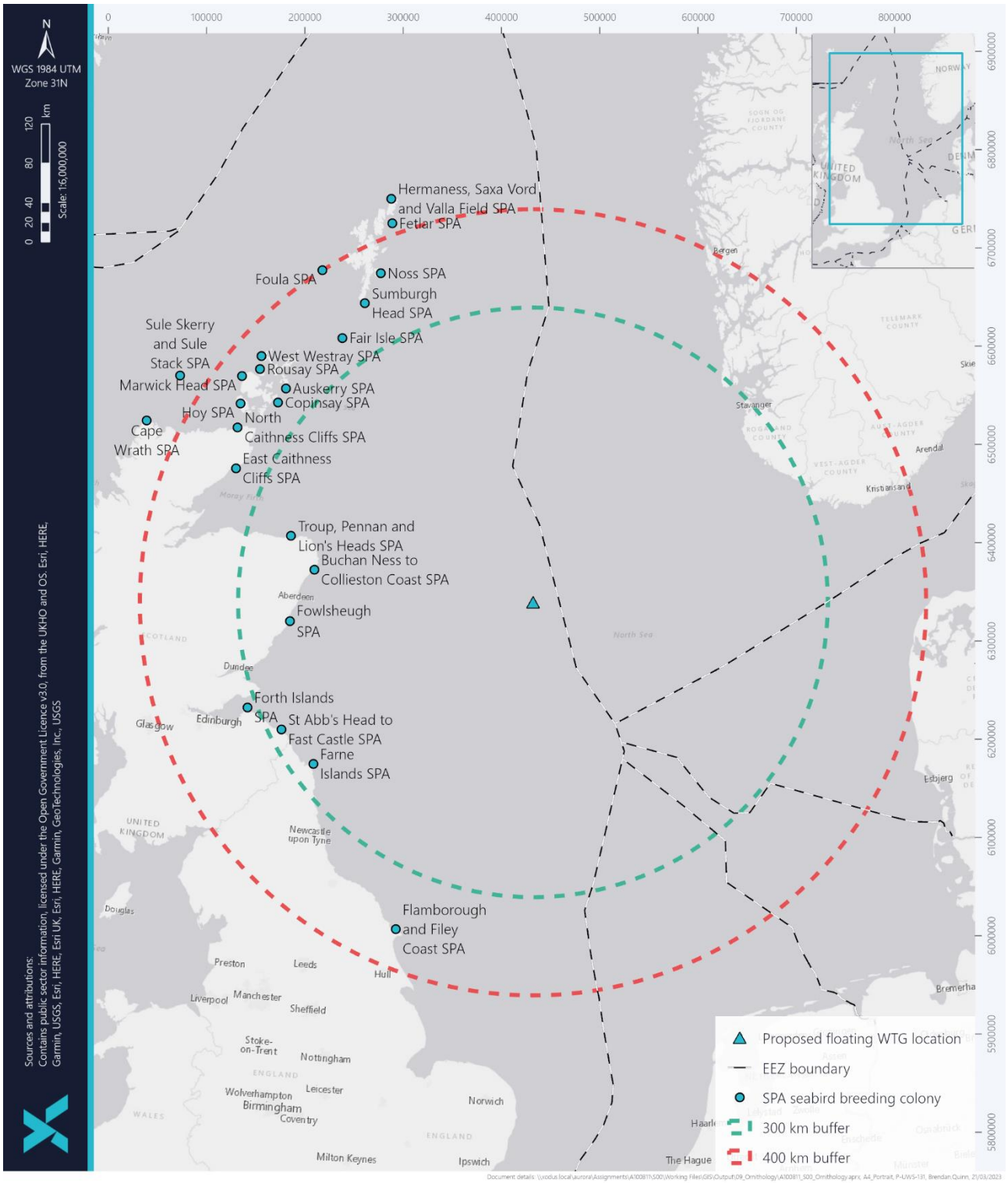

Figure 7-19 SPA seabird breeding colony

Table 7-14 List of breeding seabird Special Protection Area qualifying species provisionally identified as having potential for breeding season connectivity with the Study Area

SPA NAME	DISTANCE FROM STUDY AREA (KM)	SPECIES WITH POTENTIAL CONNECTIVITY
Buchan Ness to Collieston Coast SPA	223	Fulmar, kittiwake
Fowlsheugh SPA	249	Fulmar, kittiwake
Troup, Pennan and Lion's Heads SPA	254	Fulmar, kittiwake
St Abb's Head to Fast Castle SPA	287	Kittiwake
Forth Islands SPA	294	Fulmar, gannet, kittiwake
Copinsay SPA	329	Fulmar
Fair Isle SPA	331	Fulmar, gannet, great skua
Auskerry SPA	333	European storm petrel
East Caithness Cliffs SPA	333	Fulmar
Sumburgh Head SPA	348	Fulmar
North Caithness Cliffs SPA	352	Fulmar
Hoy SPA	358	Fulmar, great skua
Flamborough and Filey Coast SPA	364	Gannet
Rousay SPA	366	Fulmar, great skua
Noss SPA	368	Fulmar, gannet, great skua
West Westray SPA	369	Fulmar
Foula SPA	400	Fulmar, gannet, great skua
Fetlar SPA	411	Great skua
Ronas Hill - North Roe and Tingon SPA	417	Great skua
Sule Skerry and Sule Stack SPA	425	Gannet
Cape Wrath SPA	430	Fulmar
Hermaness, Saxa Vord and Valla Field SPA	434	Fulmar, gannet, great skua

7.4.8 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 7-15.

Table 7-15 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Turbine rotor surface clearance of at least 22 m	Best practice turbine design
Measures to prevent accidental release of contaminants into marine environment	Strict observance of MARPOL regulations by all vessel operators.
Vessel management to take into consideration disturbance to birds	Vessel Management Plan

7.4.9 Scoping of Impacts

The scope of potential impacts of the Project on ornithology receptors is examined in Table 7-16. The range of potential impacts listed in Table 7-16 and the nature of these impacts is based on a published literature reviewing how offshore wind developments can affect birds and the vulnerability of species to the various potential impacts (Garthe and Hüppop, 2004; Furness and Wade, 2012).

For each potential impact in turn, consideration is given in Table 7-16 to whether the Project could plausibly give rise to effect of a magnitude that could lead to a population level impact on ornithology receptors or materially contribute to a cumulative impact with other projects. Type of impacts for where there is potential for population level impacts or for a material contribution to a regional cumulative impact shown in Table 7-16 as being scoped-in for a detailed impact assessment in the Project's EIA. In coming to a judgement on whether an effect is scoped in or out the following information is taken into consideration:

- The location of the Project (222 km from the nearest coast, and 2 km from an operational gas platform);
- The scale of the Project (a single turbine of modest size);
- Existing baseline information on birds use of the Study Area, and their behaviour;
- The vulnerability of species that utilise the Study Area to the effect; and
- Embedded mitigation measures.

The process of scoping potential impacts in or out of requiring assessment in the Projects EIA presented in Table 7-16 is based on the information available at the time. Prior to undertaking EIA the scoping of impacts for assessment will be reviewed in light of any new information or guidance, and thereby ensure that all impacts that merit detailed assessment are considered.

Table 7-16. Potential impacts arising from the Project on ornithology receptors and scoping for detailed examination in EIA

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Vessel activity, construction noise, lighting and the presence of the WTG leading to disturbance seabirds and or their displacement of from foraging habitat	C, D, O&M	The potential for construction impacts to lead to disturbance/displacement / exclusion will be short term and temporary, with a number of monitoring studies providing an evidence base. The size of the area potentially affected is negligible in the context of the size of foraging area available to the seabird species that occur in the Study Area. All bird species anticipated to utilise the Study Area show moderate to high tolerance of vessel activity. The potential area affected is negligible in the context of the size of foraging area available to seabirds.	Scoped out
Barrier effect due to presence of WTG, leading to displacement of seabirds	C, D, O&M	It is not plausible that a single turbine would cause a barrier effect to seabirds.	Scoped out
Collision risk from WTG rotors to flying birds leading to bird mortality	O	The potential for collision risk is relatively well understood and is a serious concern for the industry for several species. This impact has been the subject of considerable research and there is detailed guidance on assessment methods and interpretation. Kittiwake and gannet are likely to be the species most at risk.	Scoped in
Potential change to seabird prey availability (e.g., small fish and squid)	C, D, O&M	The size of the area potentially affected is negligible in the context of the size of foraging area available to the seabird species that occur in the Study Area. Further details in Benthic Ecology (Chapter 7.1) and Fish and Shellfish (Chapter 7.2).	Scoped out
Potential increase in suspended sediment, leading to reduced visibility and potential for reduced seabird foraging success	C, D, O&M	The size of the area potentially affected is negligible in the context of the size of foraging area available to the seabird species that occur in the Study Area. As per Benthic Ecology (Chapter 7.1) and Fish and Shellfish (Chapter 7.2).	Scoped out
Potential accidental release of pollutants, leading to lethal and sub-lethal effects on seabirds.	C, D, O&M	Embedded mitigation measure (e.g. implementation of a pollution prevention plan agreed with agreed with the regulator) will avoid the risk of accidental releases of pollution and as a result seabird are unlikely to be adversely affected by this effect.	Scoped out

7.4.10 Potential Cumulative Effects

The potential for the Project to contribute, together with other marine projects in the North Sea, to cumulative impacts on ornithology receptors will be considered in the EIA.

Impacts to ornithology receptors using the Study Area are expected to be largely temporary and highly localised, therefore there will be limited scope for cumulative impacts. The turbine collision risk would persist over the medium term (the planned 10-year operational lifetime of the project) and is therefore considered relevant to the assessment of cumulative effects.

It proposed that the assessment of cumulative effects on ornithology receptors in the EIA is limited to examining species-appropriate regional-scale (e.g., defined on the basis of foraging range metrics) cumulative collision mortality. The assessment will include species for which Collision Risk Modelling (CRM) predicts an average annual collision mortality for the Project in isolation of at least one death per annum. Given the relatively large size of the receptor populations potentially effected, it is not considered plausible that Project collision mortality rates of less than one death per annum for a given species would materially contribute to a cumulative impact.

The cumulative impact assessment will consider other North Sea offshore wind farm projects, and will include projects that are present and/or reasonably foreseeable.

7.4.11 Potential Transboundary Impacts

The EIA will consider the potential for transboundary impacts on ornithology receptors. Given that the relevant seabird species are all highly mobile it is certain that many of the individuals that utilise the Survey Area and could be potentially affected by the Project will originate from breeding grounds outside the UK. This is particularly so in the non-breeding months (i.e., winter), a time when the central North Sea supports large numbers of seabirds from breeding colonies in countries such as Norway, Russia and Iceland. Although the Study Area is approximately equidistant from Scotland and Norway, there are no large seabird colonies on the Norwegian coast within approximately 500 km; the closest Norwegian colonies are considerably more distant from the Study Area than the closest Scottish colonies. For this reason it is likely that the great majority of seabirds that utilise the Study Area in the breeding season are from Scottish breeding sites.

The EIA will consider the proportion of the Project's WTG collision mortality on a species is attributable to populations from other countries. Attribution of impacts between countries will be based on the best available evidence for ringing and tagging studies (e.g., Wernham *et al.*, 2002; Frederiksen *et al.*, 2012).

Bearing in mind the small size of the Project and its remote location, it is anticipated that the magnitude of seabird collision mortality will be relatively small (perhaps a few individual birds killed per annum). Based on the understanding of movements of seabirds using the North Sea (e.g., Wernham *et al.*, 2002; Frederiksen *et al.*, 2012) it is also predicted that outside the breeding season the birds using the Study Area will comprise a mix of birds from a variety of widely spread breeding origins and potentially involving multiple countries in addition to the UK. The implication of this is that amount of collision mortality attributable to any one overseas country would be a small proportion of the total, and that this is unlikely to all fall on a single colony. It is concluded that, as a consequence of this spatial dilution, the

potential for the Project to have adverse impacts on the seabird receptor populations of other countries would be negligible. For this reason the assessment of transboundary effects is scoped out of the EIA.

7.4.12 Approach to Analysis and Assessment

The baseline information required to characterise ornithological conditions in the Study Area will be collated and reviewed. The baseline digital aerial survey will be completed in 2023 and the results will be written up to provide up-to-date site specific information on distribution and seasonal abundance of seabirds in the Study Area. The current data gap concerning the use of the Culzean platforms by nesting seabirds (in particular kittiwake) is planned to be addressed by additional survey work in 2023. Baseline information on the size of receptor populations that breed in the UK will be derived from the recently completed periodic coordinated seabird colony counts (Burnell *et al.*, 2023). The potential for connectivity between the Study Area and breeding colonies during the breeding season will be informed by NatureScot guidance (SNH, 2018) and relevant tracking data. Potential for connectivity to breeding sites outside the breeding season will be informed by the review of non-breeding populations undertaken by Furness (2015).

Collision risk is the only potential impact that is not scoped out of the ornithology assessment. Given that the development is for a single relatively small WTG at a location remote from the coast and breeding colonies, there is clearly only a relatively small potential for collision risk, for example compared to a multi-turbine wind farm closer to the coast. The potential for a species to be impacted by collision mortality will be informed by CRM if the density of birds in flight detected in the Study Area during baseline surveys is high enough to give rise to a CRM prediction of at least one death per annum. For the collision vulnerable species (gannet and various gull species) that use the Study Area it is not plausible that collision mortality below this level could lead to a population level impact. Using the Band CRM tool (Option 2) (Band, 2012) for a single 112 m diameter turbine installed with a 22 m surface clearance, generic flight-height-distribution data (Johnstone *et al.*, 2014) and SNCB recommended avoidance rates (Natural England, 2014), it is estimated that in order to exceed one collision death per annum the average flying bird density in the Study Area would be need to at least 0.5 birds km^2 . Therefore it is proposed that CRM to inform EIA would be undertaken for a species only if the average baseline density for that species exceeds 0.5 bird km^2. Based on the modelled densities presented by Kober *et al.* (2010) for the central parts of the North Sea, it appears that kittiwake is the only species likely to achieve an average flying-bird density in the Study Area of greater than 0.5 birds km^2.

Where the average density of a collision vulnerable species using the Study Area is sufficient to give concern for the potential collision risk, CRM will be used to estimate the number of collisions for each season of the year (Band, 2012). CRM will use a site-specific information on day-time flying bird density and generic information on flight height distribution, flight velocity and night-time flight activity, in accordance with best practice (e.g. Johnston *et al.*, 2014; Skov *et al.*, 2018). CRM outputs will be interpretated taking into account SNCB guidance on avoidance rates (Natural England, 2014) and recent empirical studies into avoidance behaviour (Skov *et al.*, 2018; Bowgen and Cook, 2018; AOWFL, 2023).

The assessment of collision risk will examine the potential change to the adult annual mortality rate of species receptor populations. Baseline information on mortality rates will be informed by the review of demographic rates undertaken by Horswill and Robinson (2015). Many UK seabirds species, including gannet and kittiwake, have recently experience high mortality from Highly Pathogenic Avian Influenza (HPAI) (Pearce-Higgins *et al.*, 2022), and this will inevitably

have had impacts on mortality rates. NatureScot and Marine Scotland will be consulted on how HPAI mortality should be taken into account in impact assessments.

7.4.13 Scoping Questions

- Do you agree with the study areas defined for ornithology?
- Do you agree with the data sources which are suggested for the assessment of ornithology?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified for ornithology?
- Do you agree with scoping out transboundary impacts?
- Do you agree that the project site-specific studies are sufficient to inform the proposed assessment approach?
- Do you agree with the proposed assessment approach?
- Do you have advice on how the EIA process for seabirds should take into consideration HPAI, in particular assumptions regarding baseline adulty mortality rate.

7.4.14 References

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8 OFFSHORE HUMAN ENVIRONMENT

8.1 Commercial Fisheries

8.1.1 Introduction

This chapter will provide an overview of the sensitivities associated with offshore commercial fisheries receptors within the Study area. An overview of the potential impacts of the Project on commercial fisheries, including during the construction, operation and maintenance and decommissioning of the Project, are also discussed.

Commercial fisheries is defined, for the purpose of this report, as activity by licensed fishing vessels undertaken for legitimate capture and sale of finfish and shellfish in the marine environment. Aquaculture, recreational fishing and fishing activities in rivers are not considered within this section.

Information that may be considered relevant to this section is also presented within the below sections:

- Fish and shellfish ecology, section 7.2;
- Shipping and navigation, section 8.3; and
- Socio-economics, section 8.9.

8.1.2 Legislation, Policy and Guidance

In addition to the relevant policy and legislation described in Chapter 2 Legislation and Policy, the following section outlines the legislation and guidance that will be taken into consideration on the potential impacts on commercial fisheries within the Project.

Legislation

- Fisheries Act 2020.

Policy – Scottish National Marine Plan

- Scotland's National Marine Plan (Marine Scotland, 2015): Sets out policies and objectives requiring marine planners and decision-makers to consider the potential impacts of development on fisheries interests and is useful to identify some of the key concerns and issues that should be addressed in any impact assessment. Policies under Section 6 Sea Fisheries (FISHERIES 1 - 5) and General Policies GEN 1, GEN 4, and GEN 17 are considered relevant to Commercial Fisheries and will be considered by the EIA.

Guidance

- Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison (FLOWW Group, 2014);
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds (FLOWW Group, 2015);
- Guidance on Licensing and EIA requirements for offshore wind farms (Centre for Environment, Fisheries and Aquaculture Science (Cefas, 2004);

- Guidance on Commercial Fisheries Mitigation and Opportunities from Offshore Wind commissioned by Collaborative Offshore Wind Research into the Environment (COWRIE) (Blyth-Skyrme, 2010);
- Fishing and Submarine Cables – Working Together (International Cable Protection Committee, 2009);
- MGN 661 (M+F) Navigation - safe and responsible anchoring and fishing practices (Maritime & Coastguard Agency, 2021);
- The Mariner's Handbook (NP100) (UKHO, 2020) – Section 9.45 Submarine Cables;
- Best practice guidance for fishing industry financial and economic impact assessments (UK Fisheries Economics Network, 2012); and
- Scottish Government and Xodus Group Limited (2022): Good Practice Guidance for Assessing Fisheries Displacement by Other Licensed Marine Activities (and associated Literature Review). These documents provide good practice guidance for assessing fisheries displacement by other licensed marine activities.

8.1.3 Study Area

The commercial fisheries study area is defined by the ICES rectangle within which the Project resides (hereafter referred to as the 'Study Area'). The Project is located within a single ICES rectangle, 43F1.

The Study Area is shown in Figure 8-1.

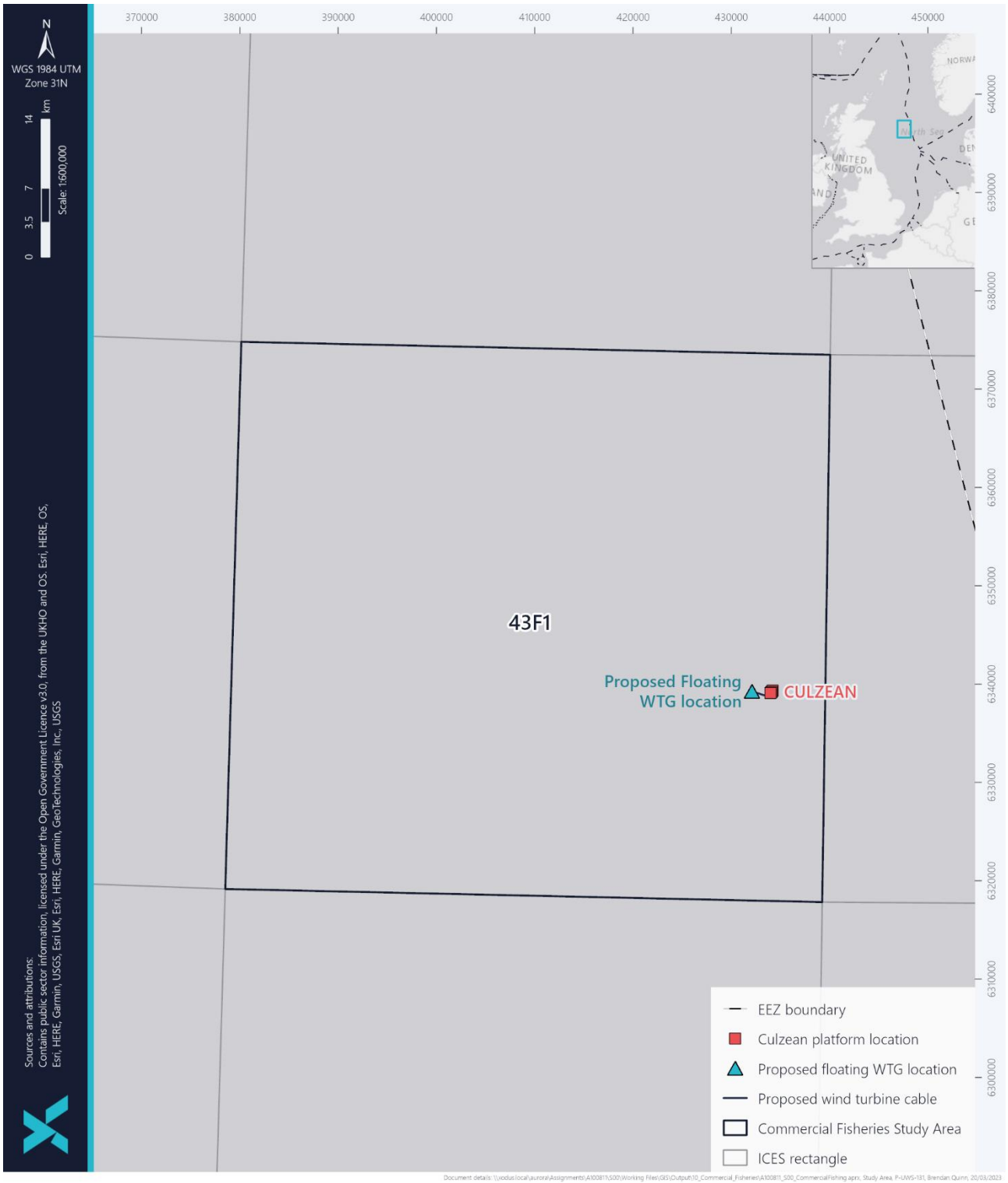

Figure 8-1 Study Area

8.1.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 8-1.

Table 8-1 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Average intensity (hours) of fishing using ICES Vessel Monitoring System (VMS) data sets	https://marine.gov.scot/information/average-intensity-hours-fishing-using-ices-vms-data-sets	2021	Marine Scotland
Automatic Identification System (AIS) data (2015 - 2019)8	https://data.gov.uk/search?q=MMO+1066+AIS	2019	MMO
Fishing Activity for over 15 m United Kingdom Vessels (2016 – 2019).	https://environment.data.gov.uk/dataset/4e725520-a7d0-4879-8e9c-cf1638545e82	2021	MMO
Fishing - tonnage, effort and value change- Shellfish, Pelagic and Demersal (also with vessels of 10 m length) from 2017 - 2021	https://marine.gov.scot/information/fishing-tonnage-effort-and-value-change-maps	2017-2021	Scottish Government
Spatial data on fisheries (e.g. Areas where fishing is restricted or prohibited)	https://marinescotland.atkinsgeospatial.com/nmpi/ and https://kingfisherrestrictions.org/fishing-restriction-map	2023	NMPi and Kingfisher Information Service
Fisheries Surveillance Sightings (2011-2021)	Access via request under the Freedom of Information Act (FOIA) via the MMO master data register: accesstoinformation@marinemanagement.org.uk. The most recent data will be used to inform the EIAR.	2022	MMO and Marine Scotland

[8] *Note the EIAR will include more recent AIS data, purchased to inform the NRA. However, this data will be analysed to inform commercial fisheries EIA chapter as well.*

Project Site-Specific Surveys

No site-specific surveys are planned for commercial fisheries. Consultations will be undertaken with various fishing representatives and local fishermen, where necessary, as part of the EIA process, to fill any data gaps and finalise baseline characterisation. This will be in line with relevant guidance (e.g. FLOWW, 2014).

Benthic surveys (e.g. geophysical surveys, drop down video and grab sampling) will be used to inform the potential suitability of the seabed for the spawning of commercially important fish species.

8.1.5 Baseline Environment

The Study Area lies within ICES Rectangle 43F1, located approximately 222 km east off the coast of Peterhead. The water depth of the Project is approximately 87 m – 91 m and lies approximately 20 km from the UKCS median line.

Figure 8-2 identifies the top 10 species landed within ICES Rectangle 43F1. Between 2017-2021, Norway Lobster (*Nephrops*) contributed the largest average landing values within ICES Rectangle 43F1. Other species which contributed a high proportion of the average landing values included haddock and lemon sole (Figure 8-2). The total average landing value within ICES 43F1 between 2017-2021 was £1,561,925. The vessel size recorded within ICES Rectangle 43F1 was exclusively greater than 10 m (Figure 8-2), which is expected given the offshore location.

Average VMS value, in ICES Rectangle 43F1, from 2016 to 2019 for pelagic, demersal, dredge and passive fishing methods are presented in Figure 8-3. The VMS data indicates that demersal trawling was the dominant activity in ICES Rectangle 43F1. Between 2017-2020 demersal trawling VMS value within ICES Rectangle 43F1 ranges between £0 – £50,000, however, the area of the higher value lies to the south of the ICES Rectangle, approximately 20 km from the project area. There is no average VMS data for the exact location of the Study Area, the closest recordings approximately 5 km to the south, where the average VMS value was between £1,000 - £5,000 (Figure 8-3) (MMO, 2020).

AIS data from 2019 indicates that there is very low fishing vessel activity within the Study Area (Figure 8-4), with only five fishing vessel tracks intersecting ICES Rectangle 43F1.

The Study Area lies within a fisheries management restrictions area (Figure 8-5). This area is for the conservation of spawning sea bass aggregations. The area is prohibited for union fishing vessels and commercial fisheries from shore to fish for European seabass in ICES divisions 4b and 4c, and in ICES subarea 7. It is also prohibited for vessels to retain, tranship, relocate or land European seabass.

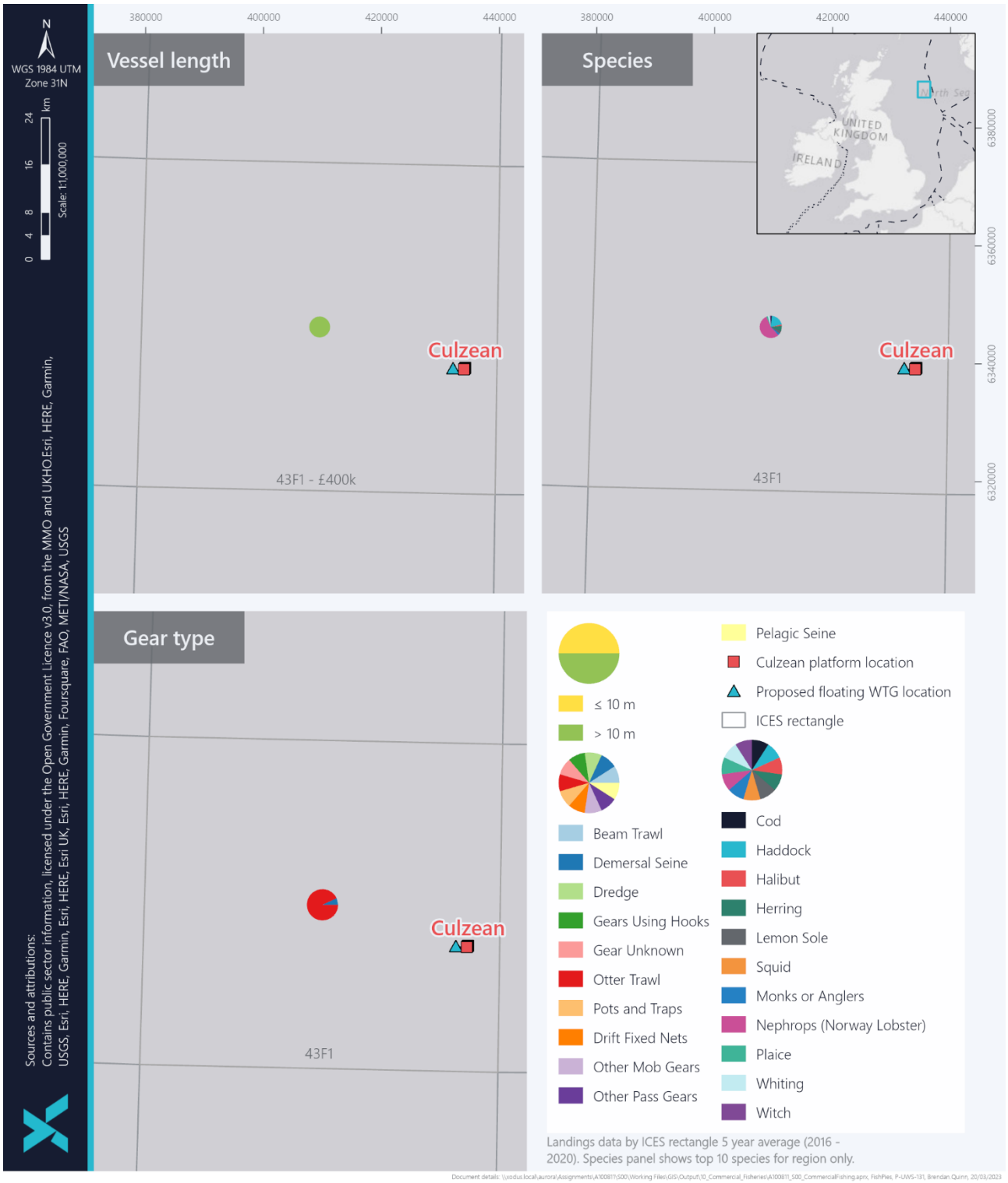

Figure 8-2 Average fisheries landings by vessel type, gear type and species (MMO, 2020)

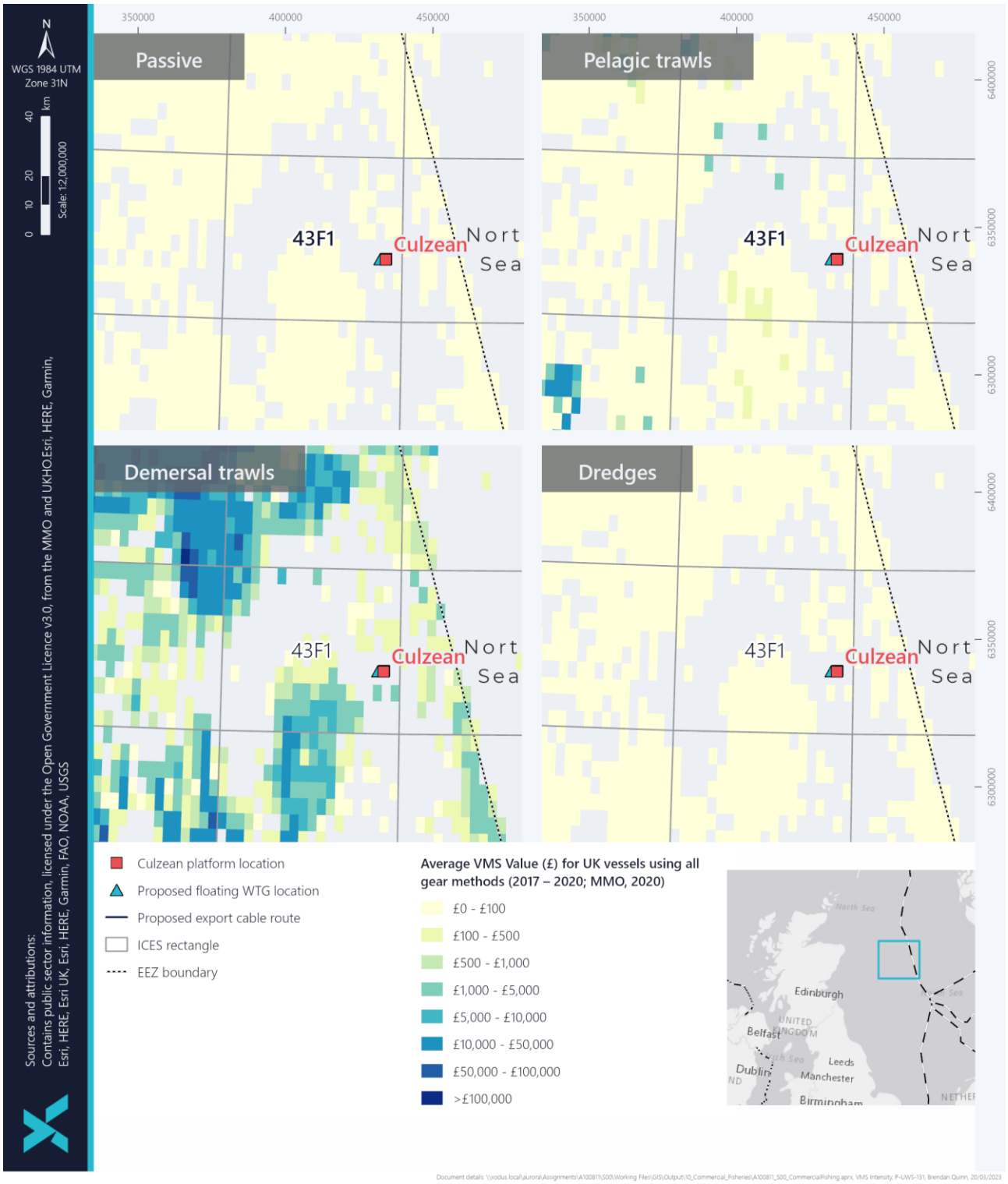

Figure 8-3 Average VMS value for UK vessels effort by Gear Type (MMO, 2021)

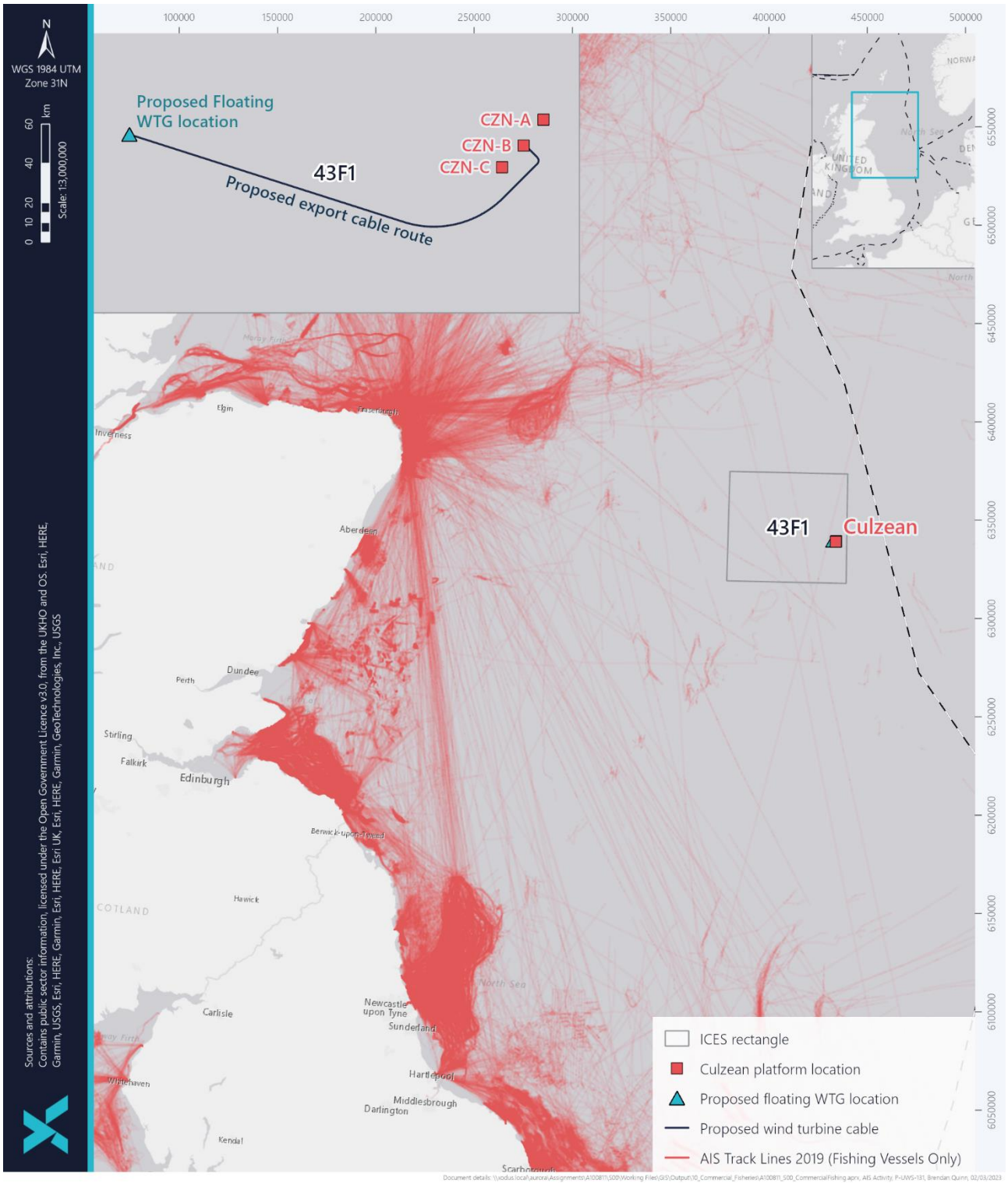

Figure 8-4 AIS Commercial fisheries shipping track lines for 2019 (MMO, 2021)

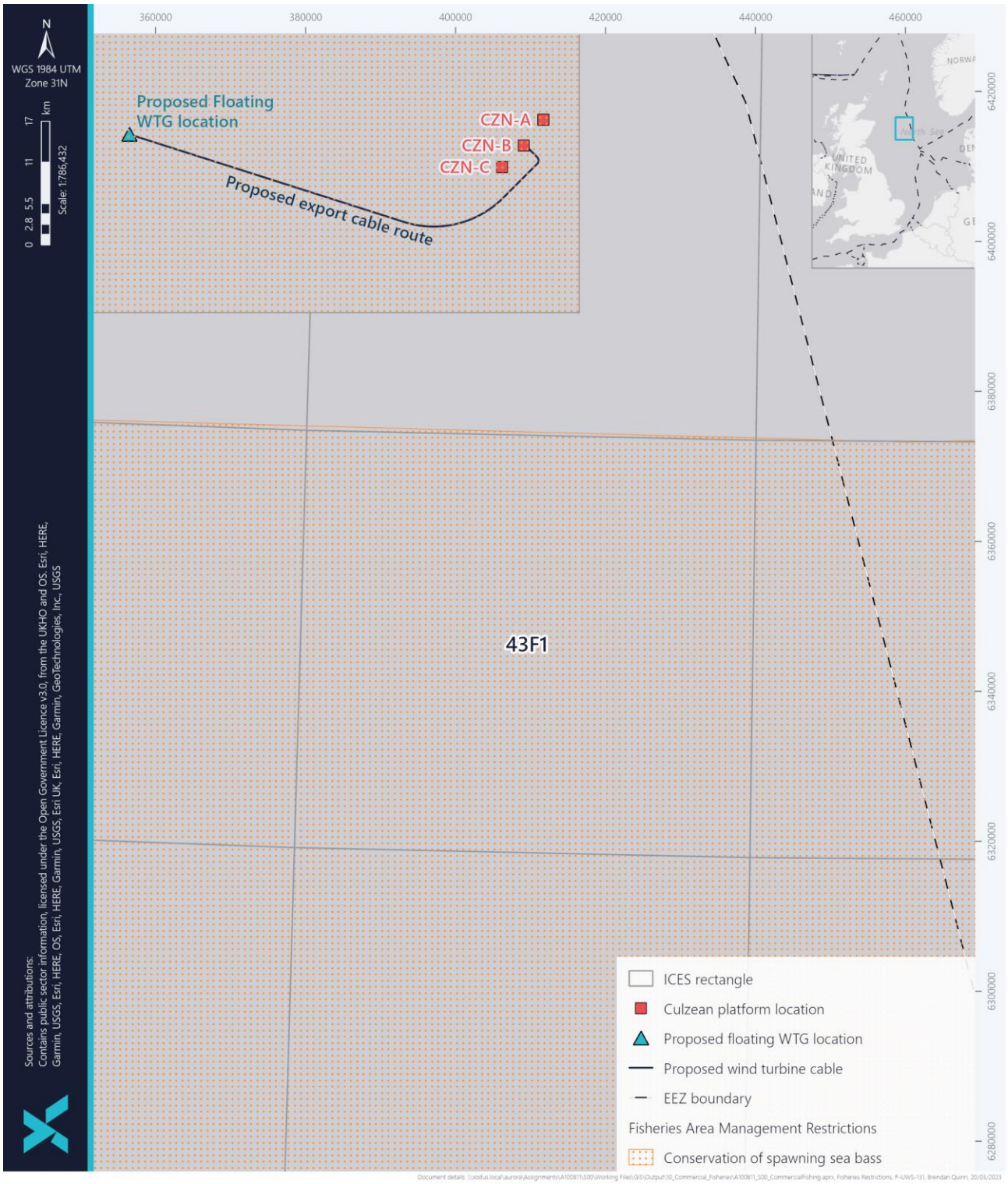

Figure 8-5 Fisheries Area Management Restrictions

8.1.6 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 8-2.

Table 8-2 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Cable will be routed to avoid sensitive features wherever practicable and buried as the primary cable protection method. Additional cable protection may be used where adequate burial cannot be achieved and this will be minimised as far as is practicable. External protection will be designed to minimise snagging risk as far as practicable. This will be informed by a cable burial risk assessment (CBRA), completed to determine the suitable cable protection measures, and implemented through relevant project plans.	Undertaken CBRA to determine required cable protection with an aim to minimise volume and spatial extent of protection. Secured under Marine Licence consent conditions.
Development and adherence to a VMP and Navigational Safety Plan (NSP).	Secured under Marine Licence consent conditions for VMP and NSP.
All vessels will comply with the provisions of the International Regulations for the Prevention of Collision at Sea (COLREGs) and the International Regulations for the Safety of Life at Sea (SOLAS)	Secured under Marine Licence consent conditions for VMP and NSP.
Development and adherence to a Fisheries Management and Mitigation Strategy (FMMS) e.g. appointment of Fisheries Liaison Officer (FLO) and Fisheries Industry Representative (FIR), implementation of gear claim procedures and use of guard vessels where required	Secured under Marine Licence consent conditions for FMMS.
Notice to Mariners and notices in the Kingfisher Bulletin will be issued	Secured under Marine Licence consent conditions.
Notification to the UK Hydrographic Office (UKHO)/ Kingfisher of the proposed works to facilitate sharing of maritime safety information	Secured under Marine Licence consent conditions for VMP, NSP and FMMS.
Procedures for dropped objects and claim processes for loss/damage to fishing gear/vessels.	Marine Licence consent conditions for FMMS and Environmental Management Plan.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on commercial fisheries receptors and will be consulted upon with consultees throughout the EIA process.

8.1.7 Scoping of Impacts

A number of potential impacts on commercial fisheries receptors have been identified, which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. The potential impacts have been summarised in Table 8-3.

Table 8-3 Potential impacts on commercial fisheries during construction/ decommissioning, operations and maintenance phases of the Project

IMPACT	RELEVANT PROJECT PHASE*	SCOPING JUSTIFICATION	SCOPED RESULT
Loss of access to fishing grounds due to the presence of vessels and safety zones	C, O&M, D	The introduction of safety zones around the Project area during construction, decommissioning, and operation and maintenance activities may result in a temporary restriction of access to fishing grounds	Scoped in
Displacement of fishing activity into other areas	C, D	Fishing activity may be temporarily displaced due to the temporary restriction of access to fishing ground following safety zone introduction. Given how far the Project is offshore, the very low fishing activity and the localised nature of the Project, displacement from fishing grounds is considered to not be significant. Therefore, this impact is proposed to be scoped out of the EIA.	Scoped out
Interference with fishing activity as a result of increased vessel traffic	C, O&M, D	Increased vessel traffic and activity relating to the construction, operation and maintenance, and decommissioning operations has the potential to interfere with fishing activity	Scoped in
Displacement to other fishing grounds due to the presence of floating foundations, associated moorings and safety zones	O&M	Fishing efforts may be displaced into other areas as activity within the Project area is restricted during the operation and maintenance phase of the Project. This displacement may increase the pressure on other fishing grounds and has the potential to impact a larger group of local fishers and communities. Displacement of fishing efforts may result in increased pressure on resources or conflicts with other users of the marine environment.	Scoped in
Obstruction of regular fishing vessel transit	O&M	Local navigation and transit routes may be disrupted throughout the operation and	Scoped out

IMPACT	RELEVANT PROJECT PHASE*	SCOPING JUSTIFICATION	SCOPED RESULT
routes due to the presence of floating foundations and associated moorings		maintenance phase of the Project. Given how far the Project is offshore, the very low fishing activity and the localised nature of the Project. Therefore, this impact is proposed to be scoped out of the EIA.	

* C = Construction, O&M = Operation and Maintenance, D = Decommissioning

8.1.8 Potential Cumulative Effects

There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect commercial fisheries receptors. Notable projects will be considered as part of the Cumulative Effects Assessment.

Cumulative effects on commercial fisheries resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in Section 5, with all relevant effects assessed for the Project in isolation considered on the cumulative level as required. Given the small-scale and localised nature of operations, there are not expected to be any cumulative impacts arising from the Project and other developments in the area.

8.1.9 Potential Transboundary Impacts

There is the potential for transboundary impacts upon commercial fisheries throughout the construction, operation and maintenance and decommissioning phases of the Project. As the Project area lies outside the 12 NM limit where EU member states have access to fish, the potential transboundary impacts should be considered for non-UK fishing vessels. Analysis of the EU Data Collection Framework (DCF) datasets (EU DCF, 2020) will be used to inform an EIA baseline of non-UK fishing activity within the Project area.

8.1.10 Approach to Analysis and Assessment

The assessment of impacts arising from the Project on commercial fisheries will include a desk-based study of available data and information (as identified in Section 8.1.3) and will be supplemented with stakeholder communication during the EIA phase of the Project. Consultation will be undertaken with key stakeholders such as, but not limited to: Scottish Fishermen's Federation (SFF), Scottish Whitefish Producers Association (SWFPA), and Fisheries Management Scotland.

Any vessels that are not consulted with as part of these identified organisations should be consulted with through other means (e.g., through the relevant fishery officer or local consultation).

Both the direct and indirect impacts of the Project on commercial fisheries will be considered. Direct impacts are defined here as any direct interaction between commercial fisheries receptors and the Project. The magnitude of

impact will be derived from the realistic worse case design scenarios for the Project. Assessments will be qualitative and undertaken on a fleet-by-fleet basis for demersal trawls/seines gear types only. Each fleet will be described through a detailed review of publicly available datasets and consultation, and the sensitivity to each impact will be categorised based on expert judgement, as per the EIA methodology described in section 5.3.

For information to inform the baseline characterisation of commercial fisheries within the Project area, the following specialist studies should be undertaken:

- Marine traffic survey;
- Navigational Risk Assessment (NRA); and
- Fisheries desktop study.

EIA Methodology

EIA methodology for commercial fisheries will be conducted in line with the processes identified in section 5.3 and the relevant commercial fisheries legislation identified in section 8.1.2.

8.1.11 Scoping Questions

- Do you agree that all relevant legislation, policy and guidance documents have been identified for the commercial fisheries assessment, or are there any additional legislation, policy and guidance documents that should be considered?
- Do you agree with the Study Area defined for commercial fisheries?
- Do you agree with the data and information sources identified to inform the baseline for commercial fisheries, or are there any additional data and information sources that should be considered?
- Do you agree with the suggested embedded mitigation measures?
- Do you agree that all potential receptors and impacts have been identified for commercial fisheries?
- Do you agree with the approach for cumulative effects assessment and transboundary impacts?
- Do you agree with the approach to analysis and assessment that will inform the EIA?

8.1.12 References

EU DCF (2020). European Commission - Data Collection Framework Available at: (DCF/DCR). https://datacollection.jrc.ec.europa.eu/

FLOWW. (2014). Best Practice Guidance for Offshore Renewables Developments. Recommendations for Fisheries Liaison. FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group). Available at: https://www.sff.co.uk/wp-content/uploads/2016/01/FLOWW-Best-Practice-Guidance-for OffshoreRenewables-Developments-Jan-2014.pdf

Kingfisher Information Service (2023). Spatial Data on Fisheries: Fishing Restriction Map. https://kingfisherrestrictions.org/fishing-restriction-map

Marine Scotland (2014). ScotMap data (2007-2011). https://marine.gov.scot/information/scotmap-inshore-fisheries-mapping-project-scotland

Marine Scotland (2019). Average Intensity (Hours) of Fishing Using ICES VMS Data Sets. https://marine.gov.scot/information/average-intensity-hours-fishing-using-ices-vms-data-sets

MMO (2021). Vessel Monitoring System (VMS) values by fishing method (average 2016 – 2019). https://www.gov.uk/government/publications/vessel-monitoring-system-devices

MMO (2020). Landing values by species, fishing method and vessel length (average 2015-2019). https://www.gov.uk/government/collections/uk-sea-fisheries-annual-statistics

NMPi (2023). Spatial Data on Fisheries. https://marinescotland.atkinsgeospatial.com/nmpi/

NSTA (North Sea Transition Authority) (2023). North Sea Transition Authority Interactive Map. Available online at: https://nstauthority.maps.arcgis.com/apps/webappviewer/index.html?id=cb3474a78df24139b1651908ff8c8975

8.2 Seascape and Landscape Visual Impact Assessment (SLVIA)

8.2.1 Introduction

This chapter of the Scoping Report considers the potential impacts on seascape, landscape, and visual amenity of relevance to the Project. It considers the potential effects arising from the construction, operation, and maintenance, and decommissioning of the Project's offshore infrastructure.

Consideration of the Project is based on a 'Design Envelope' approach following the guidelines from the Scottish Government (2022). The utilisation of a Design Envelope is intended to set out a realistic 'worst case scenario' for the different elements within the Project, in order for this to be appraised.

The 'Design Envelope' considered in relation to seascape, landscape and visual effects is that a floating turbine of up to 134 m to blade tip could be positioned within the Project Area.

It is not considered necessary to assess the potential impacts of the mooring lines, anchors, or export cable on views and visual amenity since these would be constructed along the sea-bed and would, therefore, not be visible during the operation and maintenance of the Project.

It is proposed that an assessment of seascape, landscape, and visual amenity is scoped-out of the EIA, for the reasons set out below. In coming to this conclusion Chartered Members of the Landscape Institute have referred to the Landscape Institute and IEMA (2013), Guidelines for Landscape and Visual Impact Assessment, Version 3 (GLVIA3).

8.2.2 Site Location and Context

The location of the Project is approximately 2 km west of the Culzean offshore platform facilities, in the East Central Graben area of the central North Sea.

The closest point of the Scottish coast is Buchan Ness, Aberdeenshire, approximately 222 km to the west of the Floating Wind Turbine.

The Project will be located far offshore, in the North Sea, within an area of expansive open sea. The seascape context is influenced by the presence of operational oil and gas production features, including the nearby 'Culzean' offshore platform facilities with a height of 114 m above Mean Sea Level (MSL), and the Floating Storage and Offloading (FSO) 'Ailsa' vessel. Further production facilities are found across large swathes of the North Sea where there are a number of offshore oil and gas fields, frequently served by tanker ships and maintenance vessels and helicopters.

To the west, the seascape context off the coast of Aberdeenshire, Angus, and outer Firth of Forth and Firth of Tay includes the operational Hywind Scotland Pilot Park floating wind farm, the Aberdeen Offshore Wind Farm (also referred to as the European Offshore Wind Deployment Centre), and Kincardine Phase 1 Floating Wind Farm. Further offshore wind farms currently under-construction or consented to the south include Neart na Gaoithe and Seagreen. Recent development management decisions / planning decision precedent has established an accepted seascape change from offshore wind farm development. In addition to the Neart na Gaoithe and Seagreen 1 offshore wind

farms which are under-construction, there will be further change to the south in the outer Firth of Forth and Firth of Tay seascape through the construction of the consented Inch Cape Offshore Wind Farm. All of these offshore wind farm schemes lie in excess of 150 km from the Floating Wind Turbine.

8.2.3 Scoping of Impacts

Study Area and Threshold of Significant Effects

In recent years SLVIA study areas for offshore wind farms have increased to cover areas of up to 60 km from the offshore wind farm being assessed. However, such increases have occurred in relation to wind turbine generators (WTGs) of over 300 m in locations where the coastal landscape and visual resource has a recognised higher value and sensitivity. For WTGs of over 300 m 60 km is the distance within which any potential significant effects area likely to arise. At distances over 50 km, the lateral spread of the Floating Wind Turbine will occupy a very small portion of available views. The vertical height of the Floating Wind Turbine would appear relatively small, and therefore significant visual effects are unlikely to arise at greater than this distance (even if the wind turbines are visible - in excellent visibility conditions).

In this instance where the Floating Wind Turbine is notably smaller than 300 m to tip a considerably smaller Study Area is likely to be applicable. This would be considered to be the outer limit for any significant effects to arise. Wind farm specific guidance published by Scottish Natural Heritage (SNH) (20177) 'Visual Representation of Wind Farms – Guidance' recommends (paragraph 48) the initial Zone of Theoretical Visibility (ZTV) distance for defining the Study Area based on WTG height, which for turbines between 131-150 m to blade tip is 40 km. Although wind turbines of the height proposed could theoretically be visible at distances beyond 40km, the EIA regulations (2017) require assessment of the 'likely significant effects' of the Project. Therefore, a Study Area should extend far enough to include all areas within which likely significant effects may occur. It need not cover all areas where there may be effects.

The UK Offshore Energy Strategic Environmental Assessment (OESEA) (2020) provides strategic guidance to developers and regulators on the likely limit of significant effects from offshore wind development.

The OESEA brings together a range of impact considerations including (*inter alia*) a range of wind turbine sizes, the influence of marine visibility modifiers e.g., haze and other weather conditions, visual acuity, the influence of lighting, and cumulative effects to reach its conclusions. In the precautionary scenario, which considers high sensitivity seascape receptors, described as a combination of National Park / AONB with coastal special qualities with a Heritage Coast, where a maximum 'small' effect is desirable, the OESEA suggested distance buffer for single offshore developments of a scale between 107-145m (approximately 3.6 MW), of the type proposed, is 34 km. In a Scottish context the landscape designations with equivalent high sensitivity would be National Scenic Areas and National Parks. There are no such designated areas located near to the coastal area closest to the site.

The variation of weather conditions influencing visibility off the Scottish coast has also informed a consideration of the threshold for significant effects. This is supported by the visibility analysis in the OESEA (2020), which considered Met Office visibility data for eight coastal stations. Averaging all coastal stations, the visual range recorded was just under 24 km around 50% of the time, just under 30 km for 33% of the time, around 34 km for 20% of the time, and 40 km+ for 10% of the time.

Effects on Visual Amenity

Relatively early work carried out on behalf of Scottish Natural Heritage (SNH) (University of Newcastle (2002), Visual Assessment of Windfarms Best Practice, Scottish Natural Heritage Commissioned Report F01AA303A, includes helpful information on the visibility and perception of wind turbines which considers the theoretical and actual visibility of objects located at a distance from observers.

Whilst it is noted that a 100m structure could theoretically be seen from near to sea level at a distance of 46 km (i.e., it would not be fully screened beyond the horizon formed due to the earth's curvature) it is also advised that: "*actual human perception is affected by the acuity of the human eye. In good visibility (visibility is meteorologically defined as the greatest distance at which an object in daylight can be seen and recognised), a pole of 100 mm diameter will become difficult to see at 1 km and a pole of 200 mm diameter will be difficult to see at 2 km. In addition, mist, haze or other atmospheric conditions may significantly affect visibility (Hill et al, 2001). Assuming this relationship is linear, and assuming absolute clarity of view, this suggests that the outer limit of human visibility in clear conditions of a pole (e.g., a notionally cylindrical wind turbine tower) 5000 mm (5 m) in diameter (a representative figure for a 60+ m high tower) will be of the order of 50 km; and the absolute limit of visibility imposed by the limit of the horizon viewed across a flat plane is similar at approximately 46 km*."

Regarding the potential impacts of the Floating Wind Turbine on onshore visual amenity, the nearest point of land is Buchan Ness, Aberdeenshire, located approximately 222 km to the west. There would be no theoretical visibility of the Floating Wind Turbine at this location, or from more elevated locations along the coast and its hinterland, accounting for the earth's curvature and standard refraction. Consequently, there would be no onshore location where visual receptors would experience visibility of the Floating Wind Turbine, resulting in zero impacts and no effects.

Offshore, the Floating Wind Turbine (134 m to blade tip height) would only be theoretically visible above the horizon where it is seen at a range of approximately 46 km or less, viewed from near sea level. At sea, actual visibility would be influenced by visibility modifiers, including weather and visual acuity. It is therefore reasonable to conclude that the prevailing visibility and weather conditions in the North Sea would combine to reduce the duration and potential for effects to periods with clear conditions when views of the Floating Wind Turbine are available.

Therefore, this section focuses only on potential offshore visual receptors such as those working at sea, on oil and gas platforms, on commercial or passenger vessels, or recreational boats, where the Floating Wind Turbine would theoretically be visible in clear conditions. These are:

Recreational Boats

The Project is located approximately 222 km from the coast of Scotland and therefore well to the east of the general density of sailing and racing areas identified by the Royal Yachting Association (RYA) Coastal Atlas of Recreational Boating (2019), available online.

While it is possible that cruising yachts may pass the Project travelling between the east coast of the UK and the continent, such sailings are expected to be relatively infrequent.

Passenger Vessels

NorthLink Ferries sail daily from Aberdeen to Shetland and Orkney. The publicised routes head north from Aberdeen, following the east coast of Aberdeenshire and sailing to the east of the Moray Firth. At distances well in excess of 150 km to the west of the Floating Wind Turbine, there would be no potential for visibility at this range and, therefore, no effect on these receptors. At the time of writing (March 2023) there are no well-publicised passenger ferry routes or cruises from the north-east coast of Scotland or England to Norway or parts of Scandinavia which cross this part of the North Sea.

Workers on Oil and Gas Platforms and Commercial Vessels

The Project is located 2 km west of the Culzean offshore platform facilities, in the East Central Graben area of the central North Sea.

Workers on the Culzean and nearby Ailsa facilities would gain relatively close to mid-range views of the Floating Wind Turbine in the open sea context to the offshore platform. If theoretically visible from offshore platforms within the surrounding seascape, in more distant views, the Floating Wind Turbine would be perceived in the context of the Culzean offshore platform (114 m height above MSL) and other tall man-made offshore energy infrastructure features and shipping visible across the wide sea horizons.

The majority of shipping traffic within the vicinity of the Project will consist of commercial freight and merchant vessels, deep sea fishing vessels, and vessels directly involved in the operation and maintenance of oil and gas production facilities in the North Sea.

Potential visual receptors who may gain view of the Floating Wind Turbine are, therefore, predominantly people at their place of work on commercial vessels. The Landscape Institute and Institute of Environmental Management and Assessment (2013) GLVIA3 states that visual receptors less likely to be sensitive to change include:

"*People at their place of work whose attention may be focused on their work or activity, not on their surroundings, and where the setting is not important to the quality of working life…*" (paragraph 6.34)

During the construction and decommissioning phases of the project the only effect on views and visual amenity would be the visibility of a small number of vessels out at sea, which is a common occurrence in proximity to the existing Culzean offshore platform.

During the operational phase of the Project, there is the potential for impact on the views and visual amenity of people at work on shipping and oil and gas platforms. Impacts on visual receptors may arise during the day and at night due to potential lighting of the Project, which may include Civil Aviation Authority (CAA) and marine navigation lighting, which may affect night time views. However, as described above, visual receptors are likely to be less sensitive to potential impacts of the Floating Wind Turbine on views. The surroundings and settings to their working life would include vast open seas, and the influence of the existing Culzean and Ailsa offshore platform facilities, which would further reduce their sensitivity to the change proposed. Given these factors, and the influence of distance, weather, and visual acuity, there are unlikely to be significant effects on workers on visual receptors on commercial shipping and oil and gas platforms.

Seascape and Landscape

The Marine Policy Statement (MPS) (UK Government, 2011) states *"references to seascape should be taken as meaning landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other"*.

In Scotland, "*the focus is on the coast and its interaction with the sea and hinterland, relationships that are quite distinctive in the Scottish context*" (NatureScot, 2018).

Given the definition in the MPS and the NatureScot coastal character assessment guidance, the assessment of seascape character effects relates to areas of onshore landscape with views of the coast or seas/marine environment, in other words the 'coastal character', on the premise that the most important effect of offshore wind energy development is on the perception of the character of the coast. In Scotland therefore it is effects on Coastal Character that are assessed rather than seascape character effects on wide open seas where they do not have a visual relationship with the coast.

The potential impacts on SLIVA have been summarised in Table 8-4.

Table 8-4 Potential impacts on SLVIA during construction/ decommissioning, operations and maintenance phases of the Project

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Effects on Visual Amenity	C, O&M, D	Potential offshore visual receptors including those working at sea, on oil and gas platforms, on commercial or passenger vessels, or recreational boats were considered for this assessment. The assessment concluded that these receptors will not be affected by the Project, and therefore is scoped out of the EIA.	Scoped out
Seascape and Landscape	C, O&M, D	The consideration of potential impacts on landscape character and coastal seascape character, although different to those effects that are purely visual, only occur as a result of the Floating Wind Turbine being visible. Therefore, they are inextricably tied. On this basis, taking into consideration that there would be no visibility of the Floating Wind Turbine from any part of the mainland, there would be zero impacts and no effect on either coastal seascape character or inland landscape character, and therefore is scoped out of the EIA.	Scoped out

8.2.4 Potential Cumulative Effects

Given the small-scale and localised nature of operations as well as the distance to shore (220 km), there are not expected to be any cumulative impacts arising from the Project and other developments in the area. Cumulative effects have therefore been scoped out.

8.2.5 Potential Transboundary Impacts

At its closest point, the Floating Wind Turbine would be situated approximately 270.9 km from the closest point of the west coast of Norway, south-west of the settlement of Vigrestad. On the basis of the above evidence, there are unlikely to be any transboundary SLVIA impacts due to the distance of the Project from other jurisdictions i.e., over 50 km.

8.2.6 Scoping Questions

- Do consultees agree that an assessment of potential impacts on seascape, landscape, and visual amenity should be scoped out of the EIA on the basis of no potential significant effects?

8.2.7 References

- Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment. Third Edition.
- Scottish Government (2022). Guidance for applicants on using the design envelope for applications under section 36 of the Electricity Act 1989.Scottish Natural Heritage (SNH) (University of Newcastle (2002). Visual Assessment of Windfarms Best Practice. Scottish Natural Heritage Commissioned Report F01AA303A.
- Royal Yachting Association (2019). UK Coastal Atlas of Recreational Boating. Map available online: https://www.rya.org.uk/knowledge/planning-licensing/uk-coastal-atlas-of-recreational-boating
- SNH (2018). Guidance note: Coastal Character Assessment. Version 1a.
- SNH (2017). Visual Representation of Wind Farms – Guidance. Version 2.2.
- White Consultants with Northumbria University (March 2020). Offshore Energy Strategic Environmental Assessment. Review and update of Seascape and Visual Buffer study for Offshore Wind farms.

8.3 Shipping and Navigation

8.3.1 Introduction

This chapter of the Scoping Report considers the potential likely effects of the Project associated with shipping and navigation and considers the potential impacts / risks from the construction, operation and maintenance, and decommissioning of the Project on maritime users. The planned approach to assessing the impacts / risks to the Project within a Navigational Risk Assessment (NRA) is also outlined.

8.3.2 Legislation, Policy and Guidance

The following legislation, policy and guidance are relevant to the assessment of impacts from the Project on shipping and navigation:

Legislation

- Convention on the International Regulations for Preventing Collisions at Sea (COLREGS) as amended (International Maritime Organization (IMO), 1972/77);
- International Convention for the Safety of Life at Sea (SOLAS) as amended (IMO, 1974); and
- United Nations Convention on the Law of the Sea (UNCLOS) (United Nations (UN), 1982).

Policy

- UK Marine Policy Statement (His Majesty's Government, 2011); and
- Scotland's National Marine Plan (Scottish Government, 2015).

Guidance

- Marine Guidance Note (MGN) 654 and its annexes (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (Maritime and Coastguard Agency (MCA), 2021);
- Revised Guidelines for FSA for Use in the IMO Rule-Making Process (IMO, 2018);
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guideline G1162 Guidance on the Marking of Offshore Man-Made Structures (IALA, 2021 (a)) and IALA Recommendations O-139 on The Marking of Man-Made Offshore Structures (IALA, 2021 (b)); and
- The Royal Yachting Association's (RYA) Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy ((RYA, 2019).

8.3.3 Study Area

The shipping and navigation study area has been defined as 10 nautical miles (NM)[18.52 km] around the proposed floating wind turbine (hereafter referred to as the 'Study Area'). The 10 NM)[18.52 km] Study Area is standard for shipping and navigation assessments as it is large enough to encompass any vessel routeing which may be impacted, while remaining site specific to the area being studied. The 10 NM [18.52 km] Study Area also includes the proposed export cable route for the Project which links the proposed floating wind turbine to the Culzean platforms. The Study Area is shown in Figure 8-6.

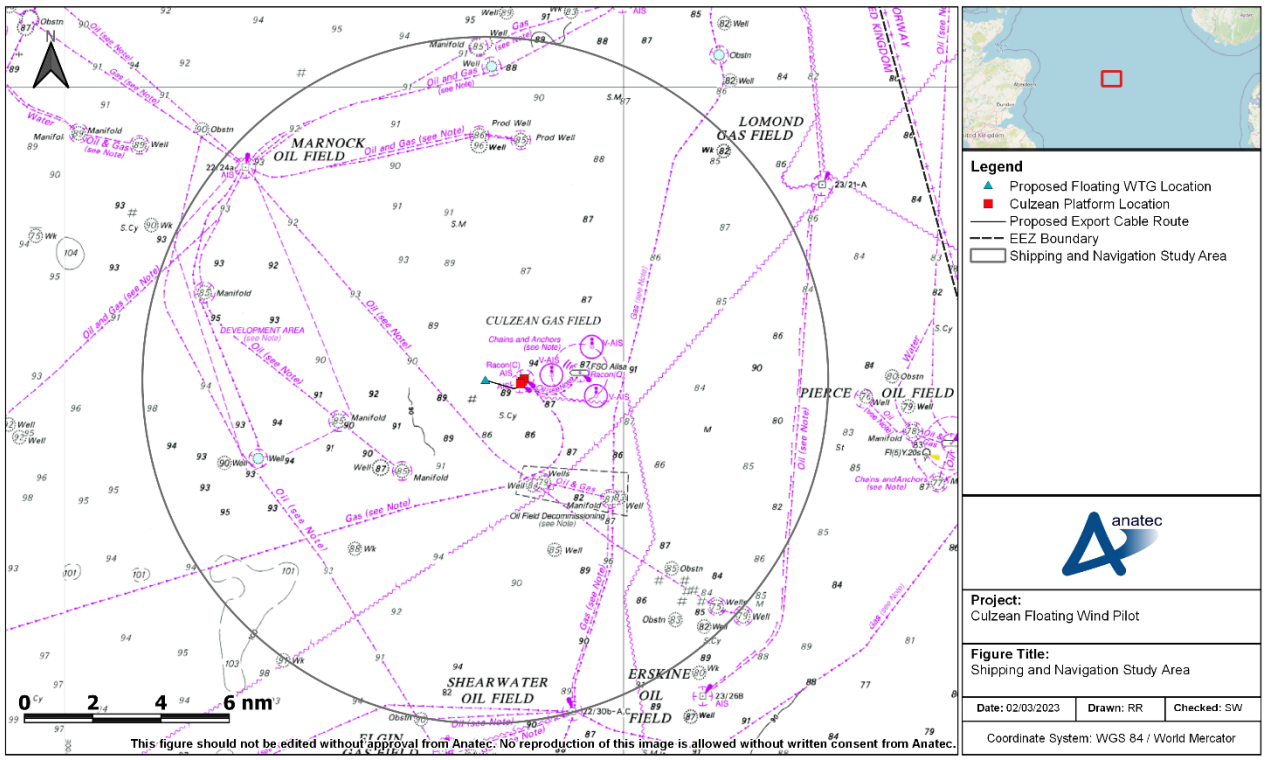

Figure 8-6 Shipping and Navigation Study Area

8.3.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA Report, are outlined in Table 8-5.

Table 8-5 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Automatic Identification System (AIS) data – Summer 14 Days	Anatec	2022	Anatec
AIS data – Winter 14 Days	Anatec	2022	Anatec
Incident data provided by the Marine Accident Investigation Branch (MAIB)	MAIB	2012-2021	MAIB
Incident data provided by the Royal National Lifeboat Institution (RNLI)	RNLI	2013-2022	RNLI
United Kingdom Hydrographic Office (UKHO) Admiralty Charts 272-0, 274-0, and 278-0	UKHO	2022	UKHO
UKHO Admiralty Sailing Directions North Sea (West) Pilot – NP54	UKHO	2021	UKHO

Automatic Identification System (AIS) data has been used within this Scoping study to identify vessel traffic within proximity to the Project. It is noted that AIS is required to be fitted aboard all vessels of 300 gross tonnage (GT) and upwards engaged on international voyages, cargo vessels of 500GT and upwards not engaged on international voyages, passenger ships irrespective of size built on or after 1st July 2002, and fishing vessels of 15 metres (m) length and greater. AIS carriage is not compulsory for fishing vessels below 15m length or for recreational or military vessels. Whilst a growing proportion of smaller vessels carry AIS voluntarily, such vessels will be under-represented within the vessel traffic data presented within this Scoping Report.

Project Site-Specific Surveys

A requirement of MGN 654 is for a minimum of 28-days of seasonally varied vessel traffic data to be collected during two, 14-day surveys, in summer and winter. Appropriate dates for the surveys and collection methods will be scheduled based on the timing of the application submission to ensure it is within 24-months, as required by the MCA.

In addition to the vessel traffic surveys, stakeholder consultation will be conducted to inform the baseline environment assessment. This will include in-depth consultation with both national and local stakeholders throughout the NRA / EIA Report process, and the completion of a Hazard Workshop to gather feedback from a representative cross-section of maritime users of the area. Further details of the planned consultation are included in Section 8.3.10.

8.3.5 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 8-5) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the Project environment and inform the Scoping process.

Navigational Features

An overview of the relevant navigational features in proximity to the Project is presented in Figure 8-7.

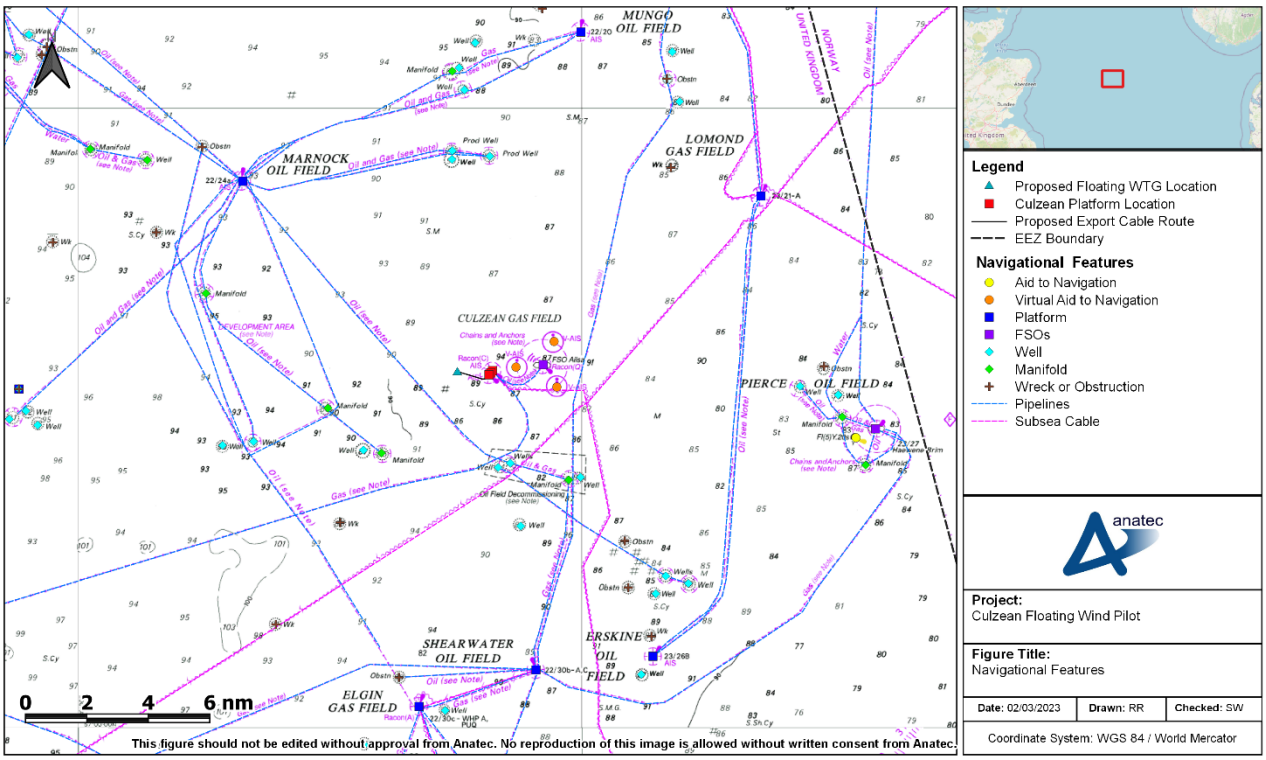

Figure 8-7 Navigational Features

The Project is located approximately 120 NM[222.24km] east from the closest point of mainland UK at Peterhead, with Peterhead Port being the closest port to the Project. The Project is situated in UK waters with the maritime border between the UK and the Norway approximately 14 NM [25.93 km] to the east of the proposed floating wind turbine. This border separates the North Sea into UK and Norwegian international waters and delineates the edge of the UK Exclusive Economic Zone (EEZ) / Renewable Energy Zone (REZ).

The sea area surrounding the Project is comprised of many oil and gas fields and their relevant surface and sub-surface infrastructure. The Project is situated within the Culzean Field with the Culzean platforms approximately 1 NM [1.85 km] to the east of the proposed floating wind turbine. To the east of the Culzean platforms, approximately 1.6 NM [2.96 km], is the stationary, and anchored, *Ailsa* floating storage and offloading (FSO) vessel. Marnoch Oil Field is approximately 9 NM [16.67 km] to the northwest of the proposed floating wind turbine. This oil field contains the Eastern Trough Area Project (ETAP) platform which is also connected to eight other smaller oil and gas fields in the Central North Sea covering an area up to 19 NM [35.19 km] in diameter. Other smaller ETAP fields in proximity to the Project include Mirren, Monan, Mungo, Heron, Egret, Machar, Skua, and Madoes fields all which are within 14 NM [25.93 km] of the Project. Of these fields, in addition to the ETAP platform, only Mungo Oil Field has a surface piercing structure (the Mungo platform) while the others consist of sub-surface wells and manifolds. Larger oil fields Shearwater and Erskine are situated approximately 10 NM [18.52 km] south of the proposed floating wind turbine, each with their associated surface platform. The Lomond Gas Field and platform are approximately 11 NM [20.37 km] to the northeast and the Pierce Oil Field and the *Haewene Brim* FSO approximately 12 NM [22.22 km] to the east. Directly south of the Culzean Field is the Scoter and Merganser fields which are not in production with decommissioning of wells expected in 2023.

It is noted that both FSO vessels, *Ailsa* and *Haewene Brim*, are surrounded by chains and anchors which radiate from the vessel to positions out with their 500m safety zones.

There are subsea pipelines associated with all oil and gas infrastructure in the surrounding area of the proposed floating wind turbine. The closest being a subsea oil pipeline, approximately 1 NM [1.85 km] to the southwest of the proposed floating wind turbine, connecting the Marnock and Machar oil fields. There are also two subsea pipelines from the Culzean platforms, one oil export flowline connected to the *Maersk Ailsa* FSO and the other the gas export flowline, both approximately 1 NM [1.85 km] to the east of the proposed floating wind turbine. The closest subsea cable to the proposed floating wind turbine is approximately 1 NM [1.85 km] and is the Judy-Culzean fibre optic cable. No cable or pipeline intersects the proposed export cable route.

The closest visual aid to navigation (AtoN) is approximately 13 NM [24.08 km] to the west and is situated within the Pierce oil field, it is positioned to the west, and so marking the danger, of the *Haewene Brim* FSO. The *Ailsa* FSO within the Culzean field is surrounded by three virtual aids to navigation.

The closest charted wreck or obstruction to the proposed floating offshore wind turbine is approximately 6 NM [11.11 km] to the south-west.

AIS Data Analysis

The AIS vessel traffic data recorded in summer 2022 (1st – 14th July 2022) is shown in Figure 8-8. Following this, the vessel data recorded in winter 2022 (1st – 14th December 2022) is shown in Figure 8-9. Both data sets were assessed, and vessels deemed as representing temporary traffic (i.e. non-routine), have been removed from the analysis to ensure that the focus of the assessment is on permanent traffic within the surrounding area only. Vessels which were removed from the data sets included survey vessels (subsea operations) present within the Culzean Field and their relevant guard vessels. These were only recorded within the summer data period. During both data periods, several temporary jack-up rigs were positioned within neighbouring oil and gas fields and so their AIS tracks along with vessels attending them have also been removed. Several fixed platforms which transmit AIS were also recorded within the data sets and removed.

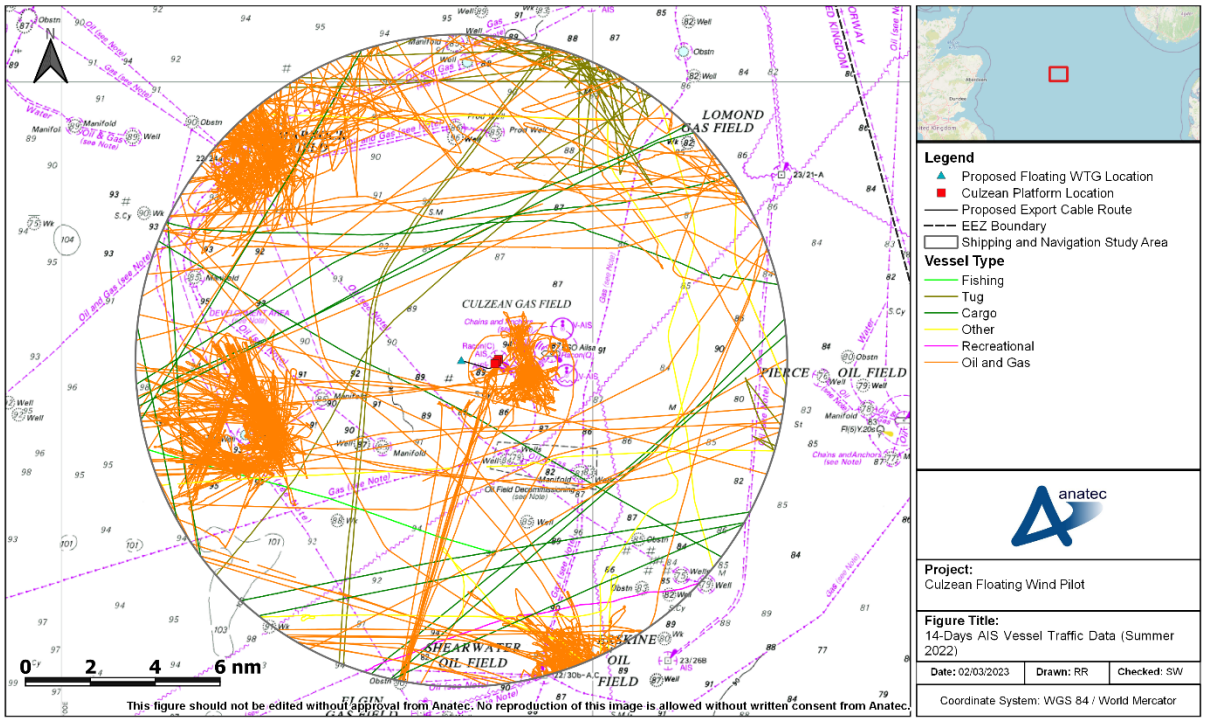

Figure 8-8 14-Day Vessel Traffic Data (Summer 2022)

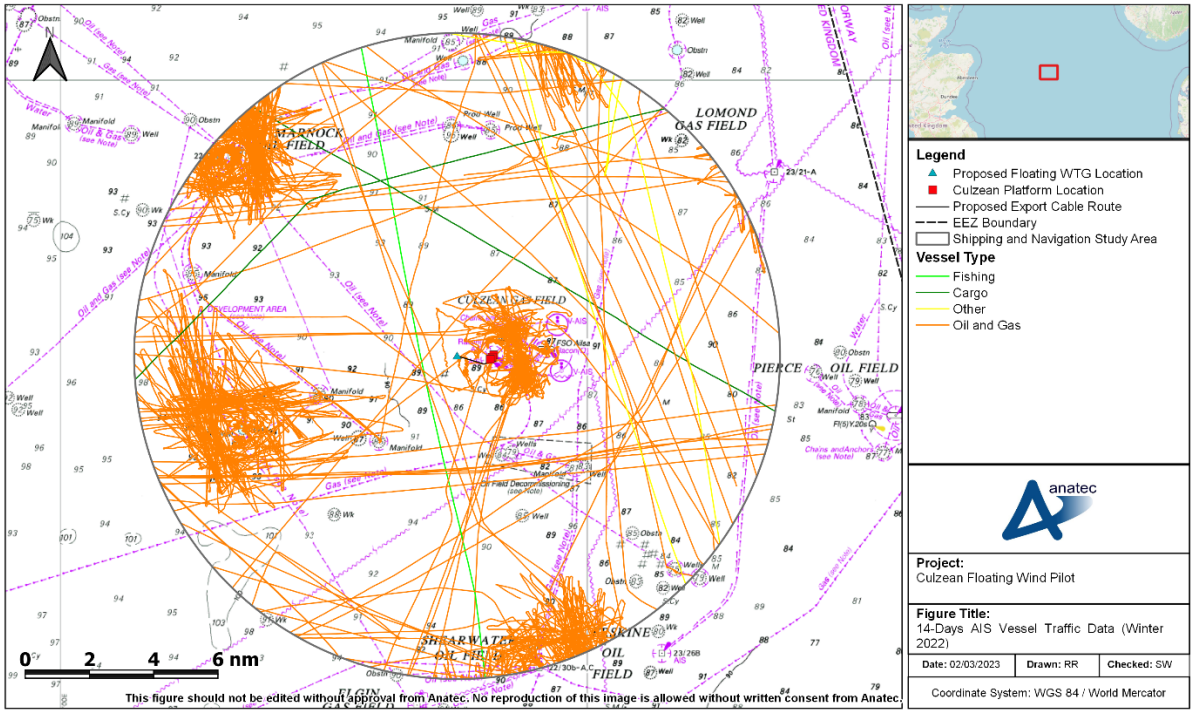

Figure 8-9 14-Day AIS Vessel Traffic Data (Winter 2022)

During the summer data period, an average of 11 unique vessels were recorded per day within the Study Area. The main vessel types recorded were oil and gas vessels (79%), tugs (10%), and cargo vessels (7%). It is noted that only one unique fishing vessel and one unique recreational vessel were recorded within the Study Area during the summer data period.

During the winter data period, an average of 13 unique vessels were recorded per day within the Study Area. The main vessel type recorded was oil and gas vessels (97%). Two unique cargo vessels and two unique research/survey vessels (classified as 'other') were recorded along with one unique fishing vessel. No recreational vessels were recorded within the Study Area during the winter data period; this is reflective of the distance offshore. Recreational and fishing vessel activity may also be underrepresented given AIS carriage requirements, as noted in Section 8.3.4, however, again due to Project's distance offshore there is not likely to be significant activity.

Vessel lengths ranged from a small recreational vessel of 14 m in the summer data period to a bulk carrier at 190 m in the winter data period. The bulk of vessels, which were oil and gas vessels (88% of vessel tracks across 28-days), ranged between 36m and 126m.

There are no clearly defined commercial vessel traffic routes (transiting) identified from the combined 28-days of AIS data within the Study Area and overall, there was minimal commercial traffic present within the Study Area over both data periods. Cargo vessels that were present were on routes between east UK and Baltic ports on a north-east south-west bearing and several other vessels were transiting north-west south-east and north south at the western extent of the Study Area. All cargo vessels were routing clear of offshore infrastructure in the area.

Oil and gas vessels were the most prominent vessel type recorded within the Study Area across both data periods, especially in the winter. This is due to the large presence of oil and gas infrastructure within the area. Most oil and gas vessels recorded were engaged in active operation and maintenance activities at oil and gas infrastructure as opposed to being on transit. Those vessels that were on transit were noted to be routeing between east UK ports, primarily Aberdeen and Peterhead, to offshore oil and gas fields and their relevant platforms within the North Sea, on the east and north-eastern boundary of the Study Area (based on information broadcast via AIS). Oil and gas vessels engaged in activities were noted mostly a Marnock Oil Field and the ETAP platform, between the Culzean platforms and the Ailsa FSO, within the Shearwater Oil Field and the Shearwater platform, and at wells within the Seagull Field. Vessel activity at these locations were prominent throughout both data periods.

Several tugs were noted to the northeast of the Study Area during the summer data period, at the edge of the Mungo Oil Field attending the Mungo platform.

Historical Incident Data

Marine Accident Investigation Branch (MAIB) data was reviewed for 2012-2021. No incidents were recorded within the Study Area. It is noted that the most recent incident to occur within the area was in 2010 and was an allision incident associated with an oil and gas vessel.

Royal National Lifeboat Institution (RNLI) data was reviewed for 2012-2021. No incidents were recorded within the Study Area, which is reflective of the distance offshore and the RNLI's 100 NM [185.2 km] operational limit.

8.3.6 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 8-6.

Table 8-6 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Compliance with MGN 654 and its annexes (particularly Search and Rescue (SAR) annex 5 (MCA, 2021c) and completion of a SAR checklist).	Secured under the Marine Licence consent conditions
Appropriate charting on UKHO Admiralty Charts.	Secured under the Marine Licence consent conditions
Promulgation of information as required via Notices to Mariners and Kingfisher bulletins.	Secured under the Marine Licence consent conditions.
Application for safety zones of up to 500m during construction (if required) and periods of major maintenance.	Application for safety zones to be made post consent under The Electricity (Offshore Generating Stations) (Safety Zones) (Applications Procedures and Control of Access) Regulations 2007 (SI No 2007/1948).
Suitable implementation and monitoring of cable protection (via burial, or external protection where adequate burial depth as identified via risk assessment is not feasible).	Secured under the Marine Licence consent conditions.
Marking and lighting of the floating wind turbine in agreement with NLB and in line with International Association of Lighthouse Authorities (IALA) Recommendation O-139 (IALA, 2013).	Secured under the Marine Licence consent conditions.
Blade clearance of at least 22 m above MHWS.	Adopted MGN 654 requirement.
Guard vessel(s) as required by risk assessment.	Adopted MGN 654 requirement.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures will be dependent on the risk to maritime users and will be consulted upon during the NRA / EIA Report process.

8.3.7 Scoping of Impacts

A number of potential impacts / risks to maritime users have been identified, which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. No impacts have been scoped out at this stage. Impacts have been summarised in Table 8-7.

Table 8-7 EIA Scoping Assessment for Shipping and Navigation

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Vessel displacement due to construction and/or installation activities.	C, D	Vessels may be displaced from their existing routes due to construction activities associated with the Project.	Scoped in
Vessel to structure allision risk	C, D, O&M	Partially complete and completed structure could create an allision risk (powered or drifting) to passing traffic.	Scoped in
Vessel to vessel collision between a 3rd-party vessel and a project vessel including infrastructure being towed to site	C, D, O&M	The presence of project vessels may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between third-party and project vessels. This includes the potential for encounters and collision risk with towage activities.	Scoped in
Increased vessel to vessel collision risk between 3rd-party vessels due to vessel displacement.	C, D, O&M	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in encounters and collision risk between third party vessels.	Scoped in
Vessel interaction with subsea cable and mooring lines associated with the Project.	O&M	The presence of subsea cables and mooring lines associated with the Project may increase the likelihood of anchor interaction for third-party vessels or impact under keel clearance.	Scoped in
Vessel traffic displacement due to the presence of the Project.	O&M	Commercial vessels may be displaced from their existing routes due to the presence of the Project.	Scoped in
Loss of station.	O&M	A mooring system failure could cause the floating structure to lose station and create a hazard to navigation.	Scoped in
Interference with marine navigation equipment	O&M	Marine navigation equipment such as Radar may be affected by the presence of the structure.	Scoped in
Reduction of emergency response capability due to increased incident rates and/or reduced access for SAR responders	O&M	The presence of the Project may result in an increased number of incidents requiring emergency response associated with work vessels or 3rd-party vessels. Also, the presence of the structure may reduce access for SAR responders, such as helicopters.	Scoped in

8.3.8 Potential Cumulative Effects

There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect shipping and navigation receptors. Notable projects will be considered as part of the Cumulative Effects

Assessment. The shipping and navigation Cumulative Effects Assessment will consider the maximum adverse design scenario for each project, plan, or activity in question in line with the MCA methodology.

Cumulative effects on shipping and navigation resulting from the effects of the Project and other developments will also be assessed in accordance with the guidance and methodologies set out in Section 5, with all relevant effects assessed for the Project in isolation considered on the cumulative level as required.

The developments included in the assessment of cumulative effects will be determined by a screening process where developments are tiered based on numerous criteria including (but not limited to) development status, distance from the Project and data confidence.

8.3.9 Potential Transboundary Impacts

There is the potential for transboundary impacts upon maritime users due to construction, operation, maintenance and decommissioning of the Project. A proportion of vessels recorded in the AIS survey data were on international voyages with destinations in the Baltic Sea. Potential transboundary effects on these vessels will be considered further in the NRA / EIA Report.

8.3.10 Approach to Analysis and Assessment

The assessment of impacts arising from the Project on shipping and navigation will utilise vessel traffic survey data, historical incident data and sources such as those outlined in Table 8-5, and will be augmented by consultation during the NRA / EIA Report phase.

AIS data over 2 x 14 days have been used to inform the baseline for this Scoping study. AIS data can be limited in terms of tracking small vessels, particularly fishing and recreational vessels. This will be supplemented by conducting site-specific surveys for the EIA to collect additional data to be agreed with the MCA. Stakeholder consultation will also be undertaken to verify the baseline environment.

MAIB and RNLI historical incident data will be updated based on the latest available data at the time of the NRA and assessed in detail to inform the risk.

Other data sources will include Admiralty Charts and Sailing Directions for the area, as well as statistics from nearby ports, harbours and marinas, where available.

Proportional quantitative modelling, including collision and allision risk modelling will be undertaken to assess the risk of the Project to vessels transiting the area. This will include modelling to assess the impacts as discussed in Table 8-7. Modelling will account for the maximum design scenario to establish the worst-case impact on shipping and navigation, to allow for design changes within the design envelope to be taken at a later date.

Consultation with various stakeholders will also be used to verify the baseline environment to be considered in the assessment, and to identify additional data sources and impacts to be considered in the NRA. In-depth consultation

will be undertaken during the NRA / EIA Report process with key stakeholders relevant to shipping and navigation, including:

- MCA;
- Northern Lighthouse Board (NLB);
- RYA Scotland;
- UK Chamber of Shipping;
- RNLI;
- Cruising Association;
- Local ports and harbours, e.g., Peterhead, Aberdeen;
- Regular vessel operators; and
- Local marinas and yacht clubs, including CCC.

EIA Methodology

The shipping and navigation EIA will be undertaken in line with the following guidance:

The assessment methodology will deviate from the methodology set out in Section 5.3, in order to ensure it complies with the International Maritime Organization's (IMO) Formal Safety Assessment (IMO, 2018), as set out in MCA guidance (Annex 1 to MGN 654 (MCA, 2021b)).

The methodology centres on risk control and will assess each impact in terms of both frequency and consequence in order to determine whether its significance is 'broadly acceptable', 'tolerable', or 'unacceptable'. Impacts assessed as 'unacceptable' will require additional mitigation measures beyond the embedded mitigations discussed in Section 8.3.6, in order to bring the impact within the 'tolerable' or 'broadly acceptable' parameters. This is the As Low As Reasonably Practicable (ALARP) approach.

Impact significance will be determined using a risk-ranking matrix assessing frequency and consequence. The frequency and consequence, as part of the NRA process, will be related to the parameters required by the IMO FSA and will be agreed with stakeholders at the Hazard Review Workshop. The risk-ranking matrix is presented in

Table 8-8. The frequency and consequence rankings per impact will be determined using a number of inputs, including:

- Proportional quantitative modelling undertaken in the NRA (Anatec's COLLRISK software);
- Hazard Review Workshop feedback from a cross-section of maritime users;
- Other stakeholder consultation feedback;
- Output of the baseline characterisation, including the vessel traffic surveys;
- Consideration of embedded mitigation measures;
- Lessons learnt from other offshore developments; and
- Expert Opinion.

Table 8-8 Risk-Ranking Matrix

CONSEQUENCE						
	Major	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable
	Serious	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Moderate	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
		Negligible	**Extremely Unlikely**	**Remote**	**Reasonably Probable**	**Frequent**
		FREQUENCY				

Mitigation measures (beyond those already embedded and listed in Table 8-6) will be developed where necessary to reduce the risks to shipping and navigation.

8.3.11 Scoping Questions

- Do you agree with the proposed approach to survey data collection?
- Do you agree with the proposed Study Area (incorporating a 10 NM [18.52 km] buffer around the proposed floating wind turbine)?
- Do you agree with the list of scoped impacts?
- Do you agree the embedded mitigation is appropriate, or are there other measures that should be included?
- Are there any additional shipping and navigation organisations that you would recommend be consulted?

8.3.12 References

IALA (2021a). Recommendation O-139 the Marking of Man-Made Offshore Structures. Edition 3.0. Saint Germaine en Laye, France: IALA.

IALA (2021b). G1162 The Marking of Offshore Man-Made Structures. Edition 1.0. Saint Germaine en Laye, France: IALA.

IMO (1972/77). Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) – Annex 3. London: IMO.

IMO (1974). International Convention for the Safety of Life at Sea. London: IMO.

IMO (2018). Revised Guidelines for Formal Safety Assessment. London: IMO.

MCA (2008). MGN 372 (Merchant and Fishing) Offshore Renewable Energy Installations (OREIs) – Guidance to Mariners Operating in the Vicinity of UK OREIs, Southampton: MCA.

MCA (2021). MGN 654 (Merchant and Fishing) Offshore Renewable Energy Installations (OREI) – Guidance on UK Navigational Practice, Safety and Emergency Response, Southampton: MCA.

RYA (2019). The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy. Southampton: RYA.

UKHO (2021). NP54 Admiralty Sailing Directions North Sea (West) Pilot Book 12th Edition: UKHO.

8.4 Other Sea Users

8.4.1 Introduction

This chapter will provide an overview of the sensitivities associated with offshore other users receptors (including oil and gas activities, offshore wind and marine renewable energy developments (including other potential Innovation and Targeted Oil and Gas (INTOG) projects) and submarine cables)) within the Other Sea Users Study Area (i.e. a 10 nautical miles (NM) radius around the Project). An overview of the potential impacts of the Project on other users, including during the construction, operation and maintenance, and decommissioning of the Project, are also discussed.

8.4.2 Legislation, Policy and Guidance

In addition to the relevant policy and legislation described in Chapter 2, the following section outlines the policy and guidance that will be taken into consideration as part of the scoping of potential impacts on other users of the marine environment within the Study Area.

Policy

- Scotland's National Marine Plan:
  - Provides sector-specific information and guidance relevant for the interaction between other users of the marine environment and an offshore renewable energy development. The relevant other users of the marine environment identified in this Scoping Report include:
    - Aquaculture;
    - Oil and gas activities, including carbon capture and storage;
    - Offshore wind and marine renewable energy;
    - Recreation and tourism;
    - Submarine cables; and
    - Military and defence activities.
- National Policy Statement for Renewable Energy Infrastructure (EN-3):
  - Outlines the relevant environmental considerations that applications for a single floating wind turbine generator (WTG) should consider. This includes the impacts of an offshore wind farm development on other users of the marine environment.

Guidance

- Assessment of Impact of Offshore Wind Energy Structures on the Marine Environment (Marine Institute, 2000);
- European Subsea Cables Association (ESCA) Guideline No 6, The Proximity of Offshore Renewable Energy Installations and Submarine Cable Infrastructure in UK Waters (ESCA, 2016) (currently being updated);
- International Cable Protection Committee (ICPC) recommendations (ICPC, 2019);
- Oil and Gas UK, Pipeline Crossing Agreement and Proximity Agreement Pack (Oil and Gas UK, 2015);
- The Crown Estate (TCE) Guidance: Export transmission cables for offshore renewable installations – Principles of cable routeing and spacing (TCE, 2012a); and
- TCE Guidance: Submarine cables and offshore renewable energy installation – Proximity study (TCE, 2012b).

8.4.3 Study Area

The other sea users study area is defined as the area that will be directly impacted by the Project (Figure 8-10)(hereafter referred to as the 'Study Area'). A buffer of 10 NM (~18 km) has also been placed around the Project to consider a wider area around the Project and consider the movement of mobile other users, consistent with the Study Area buffer used for shipping and navigation.

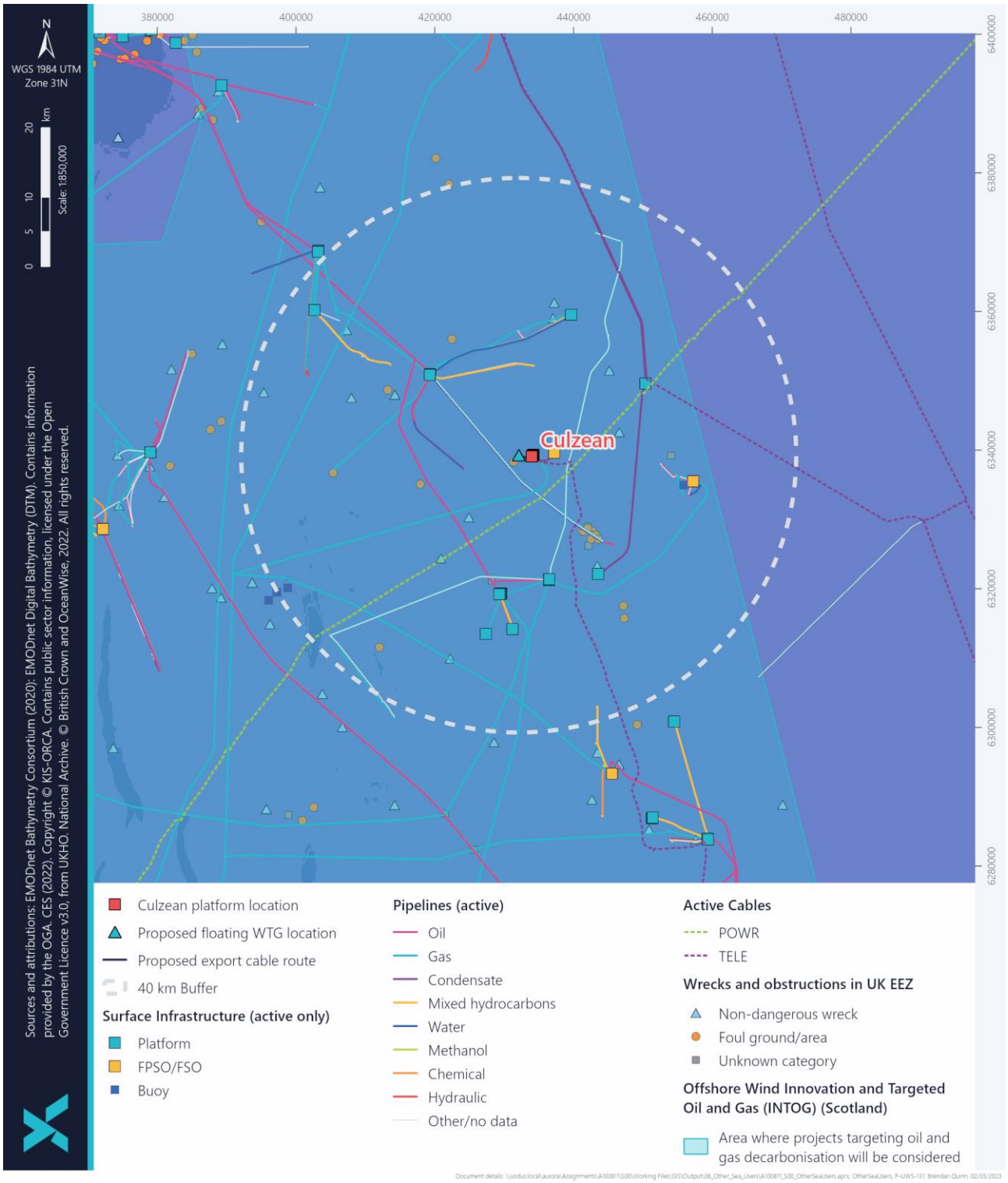

Figure 8-10 Other Sea Users Study Area

8.4.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 8-9.

Table 8-9 Summary of Key Datasets and Reports

TITLE	SOURCE	AUTHOR	YEAR
Scotland's National Marine Plan	https://www.gov.scot/publications/scotlands-national-marine-plan/	Marine Scotland	2015
Cables – power and telecoms	https://kis-orca.org/subsea-cables/	KIS-ORCA	2020
The North Sea Transition Authority Interactive Maps	https://nstauthority.maps.arcgis.com/apps/webappviewer/index.html?id=cb3474a78df24139b1651908ff8c8975	North Sea Transition Authority	2023
The Marine Scotland National Marine Plan Interactive (NMPi) Maps	https://marinescotland.atkinsgeospatial.com/nmpi/	Marine Scotland	2023
UK Offshore Energy SEA 3 – Appendix 1h – Other Users and Material Assets	https://www.gov.uk/government/consultations/uk-offshore-energy-strategic-environmental-assessment-3-oesea3#full-publication-update-history	DECC	2016
UK Offshore Energy SEA 4 – Appendix 1h – Other Users and Material Assets	https://www.gov.uk/government/consultations/uk-offshore-energy-strategic-environmental-assessment-4-oesea4#full-publication-update-history	BEIS	2022
Energy and Infrastructure Spatial Data	https://www.crownestatescotland.com/resources/documents	Crown Estate Scotland	2022
Aquaculture Spatial Data	https://www.crownestatescotland.com/resources/documents	Crown Estate Scotland	2022

TITLE	SOURCE	AUTHOR	YEAR
Scotland's Marine Atlas: Information for the National Marine Plan	https://marine.gov.scot/sma/content/scotlands-marine-atlas-information-national-marine-plan#:~:text=Scotland%27s%20Marine%20Atlas%3A%20Information%20for%20The%20National%20Marine,The%20Scottish%20Government%20%205%20more%20rows%20	Baxter *et al.*	2011
Draft Regional Locational Guidance	https://marine.gov.scot/information/regional-locational-guidance	Marine Scotland	2019

Project Site-Specific Surveys

No site-specific surveys with regards to other sea users have been carried out to inform this Scoping Report. Consultation with other user organisations will be an important source of data for the EIA. Initial consultation has been undertaken with the North Sea Transition Authority (NSTA), who will be further consulted during the EIA. TEPUK will consult with other oil and gas operators and other sea users that may be impacted upon by the Project.

8.4.5 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 8-9) has been undertaken to support this Scoping Report. The findings of this research are presented below in order to provide an understanding of the offshore Project environment and inform the Scoping process.

The key features of other sea users present in or around the Project area are (Figure 8-10):

- Oil and Gas, including Carbon Capture and Storage;
- Offshore Renewable Energy Projects (including other future INTOG projects);
- Subsea Cables; and
- Military and Defence Activity.

Due to the distance of the Project from the coast (222 km), no aquaculture sites are currently being developed as far offshore as the Project (BEIS, 2022; NMPi, 2023). Information on commercial fisheries activities in relation to the Project can be found in Chapter 8.1 Commercial Fisheries. Similarly, the vast majority of marine recreational activities fall within 10 km of the coastline (Marine Scotland, 2015), whilst the Project is located approximately 222 km from the coastline.

Therefore, aquaculture and tourism and recreation have been scoped out.

Oil and Gas Activities

The Project is located in the Central North Sea (CNS), a well-developed area for oil and gas infrastructure (DECC, 2016; BEIS, 2022). This includes pipelines, wells, and surface and subsurface structures. Given the extensive

infrastructure within the CNS, is it expected that decommissioning of existing assets will continue to increase in the future (DECC, 2016; BEIS, 2022), it is therefore possible that the decommissioning of these structures could overlap with the operational life of the Project.

TEPUK is currently the operator of the United Kingdom Continental Shelf (UKCS) Block in which the Project is located (22/25a). Therefore, it is considered that any activities within Block 22/25a would be limited to activities from TEPUK.

The Project includes connecting the WTG to the existing Culzean platform. There are no other existing surface installations associated with the Project. However, there are a number of surface installations located within Study Area. These are listed below in Table 8-10. The closest of which is the Ailsa floating, storage and offloading (FSO) which is linked to the Culzean platform via existing subsea infrastructure.

Table 8-10 Surface Installations Within 18 km of the Project (NSTA, 2023)

INSTALLATION	OPERATOR	DISTANCE
Ailsa Floating FSO	TEPUK	3.02 km northeast
Eastern Trough Area Project (ETAP) Platform	bp	16.30 km northwest
Shearwater Platform	Shell	17.05 km southeast

Most of the existing subsea infrastructure, both active and decommissioned, surrounding the Project relates to oil and gas activities. There are several subsea wells (both active and decommissioned) associated with the Culzean field that are located within the Study Area. There are also several pipelines that transect the Study Area. The pipelines identified are listed (but not limited to) in Table 8-11 along with their respective distance to the Culzean platform (NSTA, 2023).

Table 8-11 Pipelines within 18 km of the Project (NSTA, 2023)

PIPELINE	STATUS	OPERATOR	DISTANCE
Culzean 6-10" Condensate Pipe-In-Pipe	Active	TEPUK	0 km
Culzean 22" Gas Export Flowline	Active	TEPUK	0 km
ETAP To Machar	Active	bp	3.78 km southeast
12" Gas Shearwater - Columbus Tie In Structure	Active	Shell	5.07 km east

PIPELINE	STATUS	OPERATOR	DISTANCE
8" Gas Scoter Smes - Merganser Manifold	Not in use*	Shell	5.6 km southeast
East Egret To Heron	Not in use*	bp	7.66 km southwest
West Skua To Egret	Not in use*	bp	7.66 km southwest
12" Gas Scoter Shearwater A	Not in use*	Shell	7.92 km southeast
Seagull Wash Water/Production Pipeline	Pre-commissioned	Neptune E&P UK Ltd	10.20 km southwest
Elgin To ETAP	Active	INEOS FPS Ltd	14.7 km southwest
Erskine To Lomond Gas Condensate Line	Active		14.7 km east
12/20" P.I.P. Shearwater A To Starling Manifold	Active	Shell PLC	17.8 km south

** These pipelines are no longer in use as one or more of the fields they are connected to are no longer producing*

Of the pipelines listed above, the Culzean 6/10" Condensate Pipe-In-Pipe links the Culzean platform to the Ailsa FSO and is the nearest active pipeline that transects the Study Area.

Renewable Energy Developments

Scotland is a global leader in offshore renewable energy developments, with leasing rounds conducted by the Crown Estate and Crown Estate Scotland identifying regions suitable for wind, wave and tidal energy developments.

There are no carbon capture storage (CCS) areas located within the Study Area.

Leasing rounds for renewable energy developments from 2009, 2012 and most recently January 2022 have seen the east coast of Scotland win a number of bids for wind energy developments (Crown Estate Scotland, 2020). There are no offshore wind developments or lease areas located within the Study Area.

The Project forms part of the INTOG leasing round and is consequently located within the INTOG E-a area (NMPi, 2023). There will therefore likely be other INTOG projects in the vicinity of the Study Area. Further details on this will be available following the announcement of INTOG exclusivity agreements in April 2023.

There are no current leasing agreements for wave and tidal energy developments within the vicinity of the Study Area (NMPi, 2023).

Submarine Cables

There are several submarine cables within the North Sea. These cables are used for telecommunications and the transfer of power from onshore to offshore assets, and between Scotland and neighbouring countries (DECC, 2022).

The Active TAMPNMET telecommunications cable transects the Project and is the nearest submarine cable. The cable will intersect the proposed export cable route between the WTG and the Culzean platform (KIS-ORCA, 2023).

There are also three cables located within the 18 km buffer area, both of which are currently under construction. The Tampnet cable is located approximately 0.04 km from the Project and is currently active. The North Sea Link Interconnector is located approximately 4.99 km southeast of the Project at its closest point. The closest point of the North Sea Link Interconnector South is located approximately 5.05 km southeast of the Project. Both these cables are currently under construction (KIS-ORCA, 2023).

Future awards made under the INTOG leasing round may result in the application and development of additional cables routes and projects within or in proximity of the Study Area. There is the potential for cable routes and projects associated with the development of these projects to directly interact with the Study Area.

Military and Defence Activity

There are no military exercise areas and danger areas (PEXAs) that intersect the Study Area (NMPi, 2023).

There are no current or historic munitions disposal sites within the vicinity of the Project. The nearest disposal site is located approximately 227 km to the west of the Project. It is therefore considered that interaction between the Project and unexploded ordnance is low (NMPi, 2023).

Information on military aerial activity can be found in Chapter 8.8.

8.4.6 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 8-12.

Table 8-12 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Dissemination of information through: • **Notice to Mariners** • **Kingfisher bulletins** • **Fisheries liaison officer** • **Additional appropriate media outlets** **Consultation with all other users of the marine environment likely to be impacted by activities associated with the Project will be consulted with throughout the construction, operation and maintenance and decommissioning phases of the development. Any maintenance work required during the operational phase of the Project will be communicated effectively.**	Promulgation of information to the UKHO to ensure all information required is provided in a timely fashion for inclusion on charts, a condition of the Marine Licence via the VMP.
All crossings of other infrastructure should be implemented in line with standard good practice.	Secured under Marine Licence.
Consultation with owners and operators of other offshore infrastructure should occur to manage any works undertaken during the construction, operation and maintenance and decommissioning phases of the Project.	Secured through consultation with nearby asset owners
Consultation will be required with the owners of leased areas awarded within the INTOG leasing rounds.	Secured through consultation with asset owners, and subsequent Crossing Agreements.

8.4.7 Scoping of Impacts

The potential impacts of the Project on other users of the marine environment have been summarised in Table 8-13. This table identifies potential impacts during the construction, operation and maintenance and decommissioning phases of the Project, with a justification for scoping in or out provided.

Table 8-13 Scoping of Potential Impacts

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Obstruction of oil and gas activities due to the presence of safety zones and construction vessels during installation and decommissioning activities	C, D, O&M	There is extensive oil and gas infrastructure within the waters adjacent to the Project, with the potential for additional infrastructure in adjacent licensing blocks following the outcomes of the 33rd round of the oil and gas leasing round. However, TEPUK are the operator of the UKCS Block in which the Project is located. Therefore, no further activities are expected in the immediate vicinity of the Project. Further analysis and consultation will be needed to assess the impacts of the Project on oil and gas receptors.	Scoped in
Obstruction of marine renewable energy activities due to the presence of safety zones and construction vessels during installation activities	C, D, O&M	Following the INTOG Leasing round, there is the potential for activities associated with the construction and decommissioning of the Project to interact with operations associated with other decarbonisation activities. This is particularly likely given that the Offshore Development Area is located in the INTOG E-a area. For this reason, this potential impact has been scoped in for further assessment during the EIA phase.	Scoped in
Obstruction of military PEXA activities due to the presence of safety zones and construction vessels during installation and decommissioning activities	C, D, O&M	There are no areas of military activity within the vicinity of the Offshore Development Area. See Section 8.4 for additional information.	Scoped out
Obstruction of electricity cable installation activities due to the presence of safety zones and construction vessels during installation and decommissioning activities	C, D, O&M	The construction of Project infrastructure and implementation of safety distances around construction vessels may obstruct activities associated with the construction, operation and maintenance activities of other subsea cable asset owners.	Scoped in

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Obstruction of recreational and tourism activities	C, D, O&M	The Project is located approximately 222 km from the Aberdeen coast and as a result does not overlap with any areas associated with touristic or recreational activities. Therefore, this impact has been scoped out.	Scoped out
Obstruction of aquaculture activities	C, D, O&M	There are no aquaculture sites located within the vicinity of the Offshore Development Area. Therefore, this impact has been scoped out.	Scoped out

8.4.8 Potential Cumulative Effects

There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect other sea user receptors. Notable projects will be considered as part of the Cumulative Effects Assessment.

Cumulative effects on other sea users resulting from the effects of the Project and other developments will also be assessed in accordance with the guidance and methodologies set out in Section 5, with all relevant effects assessed for the Project in isolation considered on the cumulative level as required.

8.4.9 Potential Transboundary Impacts

The Project is located approximately 20 km for the UK/Norway transboundary line. This is outside the 18 km buffer zone set out for interactions with other sea users. Therefore, there is no potential for transboundary impacts on other users of the marine environment during the construction, operation and maintenance or decommissioning phases of the Project. No other users of the marine environment associated with other European Economic Areas (EEA) have been identified within the waters of the Study Area, therefore no further assessment is required.

8.4.10 Approach to Analysis and Assessment

Analysis and Assessment Approaches

The assessment of impacts associated with the Project will be conducted through a desk-based study of publicly available data and information (as listed in Section 8.4.4) and will be supported by consultation with relevant stakeholders during the EIA phase. Consultation will be undertaken with key stakeholders including oil and gas operators and offshore wind and marine renewable energy asset operators.

Consultation will develop a clearer understanding of the nature, timing and duration of any other works that will be ongoing in the waters adjacent to the Offshore Development Area during the construction, operation and maintenance and decommissioning phases of the Project.

The direct and indirect impacts of those potential impacts scoped into the EIAR will be considered, either cumulatively or alone. Any potential impacts to a receptor will vary on a case-by-case basis and will be influenced by the sensitivity of the receptor. The magnitude of any potential impacts will be influenced by the value of the receptor or activity impacted.

EIA Methodology

The EIA methodology for other users of the marine environment will be conducted in line with the processes identified in Chapter 5 and the relevant legislation identified in Section 8.4.2.

8.4.11 Scoping Questions

- Do you agree that all relevant legislation, policy and guidance documents have been identified for the other users of the marine environment assessment, or are there any additional legislation, policy and guidance documents that should be considered?
- Do you agree with the Study Area defined for other users of the marine environment?
- Do you agree with the data and information sources identified to inform the baseline for other users of the marine environment, or are there any additional data and information sources that should be considered?
- Do you agree with the suggested embedded mitigation measures?
- Do you agree that all potential receptors and impacts have been identified for other users of the marine environment?
- Do you agree that the impacts proposed can be scoped out of the other users of the marine environment EIA Chapter?
- Do you agree with the approach for cumulative effects assessment and transboundary impacts?
- Do you agree with the approach to analysis and assessment that will inform the EIA?

8.5 Offshore Air Quality and Airborne Noise

8.5.1 Introduction

The following chapter outlines the potential impacts of the Project and associated activities on offshore air quality, airborne noise, and vibration.

The potential impacts have been considered throughout the construction, operation and maintenance and decommissioning phases of the Project. Offshore airborne noise and vibration occurs primarily during the construction phase of the Project from activities such as vessel activity. Noise or vibration occur primarily during the operational phase of the Project from mechanical noise from the turbine and Project vessel activities. The potential impacts of air quality will be limited to the operation of vessels and the use of machinery throughout all phases of the Project.

The scope of this report considers work undertaken in the marine environment and the necessary legislation, Policy and Guidance.

8.5.2 Legislation Policy and Guidance

In addition to the relevant policy and legislation described in Chapter 2 Legislative Context and Regulatory Requirements, the following legislation and guidance will be taken into consideration as part of the scoping of potential impacts on the marine physical processes within the Project.

Legislation

- National Emission Ceilings Directive (NEDC 2016/2284/EU);
  - Set reduction targets for the total emissions of nitrogen oxides (NOx), sulfur oxides (SOx), non-methane volatile organic compounds (NMVOC), ammonia (NH_3) and particulate matter (PM2.5) in 2020 and 2030
- EU Directive 2008/50/EC Ambient Air Quality and Cleaner Air for Europe; and
- The Air Quality (Scotland) Regulations 2000.

Guidance

- Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014);
- Air Quality Monitoring in The Vicinity of Demolition and Construction Sites (IQM, 2018);
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (IAQM, 2020); and
- Pollution Prevention Guideline 6 (PPG6): Working on Construction and Demolition Sites (currently under review) (SEPA *et al.*, 2012).

8.5.3 Study Area

The offshore air quality, airborne noise and vibration study area is defined as the Project Area (Figure 8-11) (hereafter referred to as the 'Study Area'), in accordance with the Institute of Air Quality Management (IAQM) guidance.

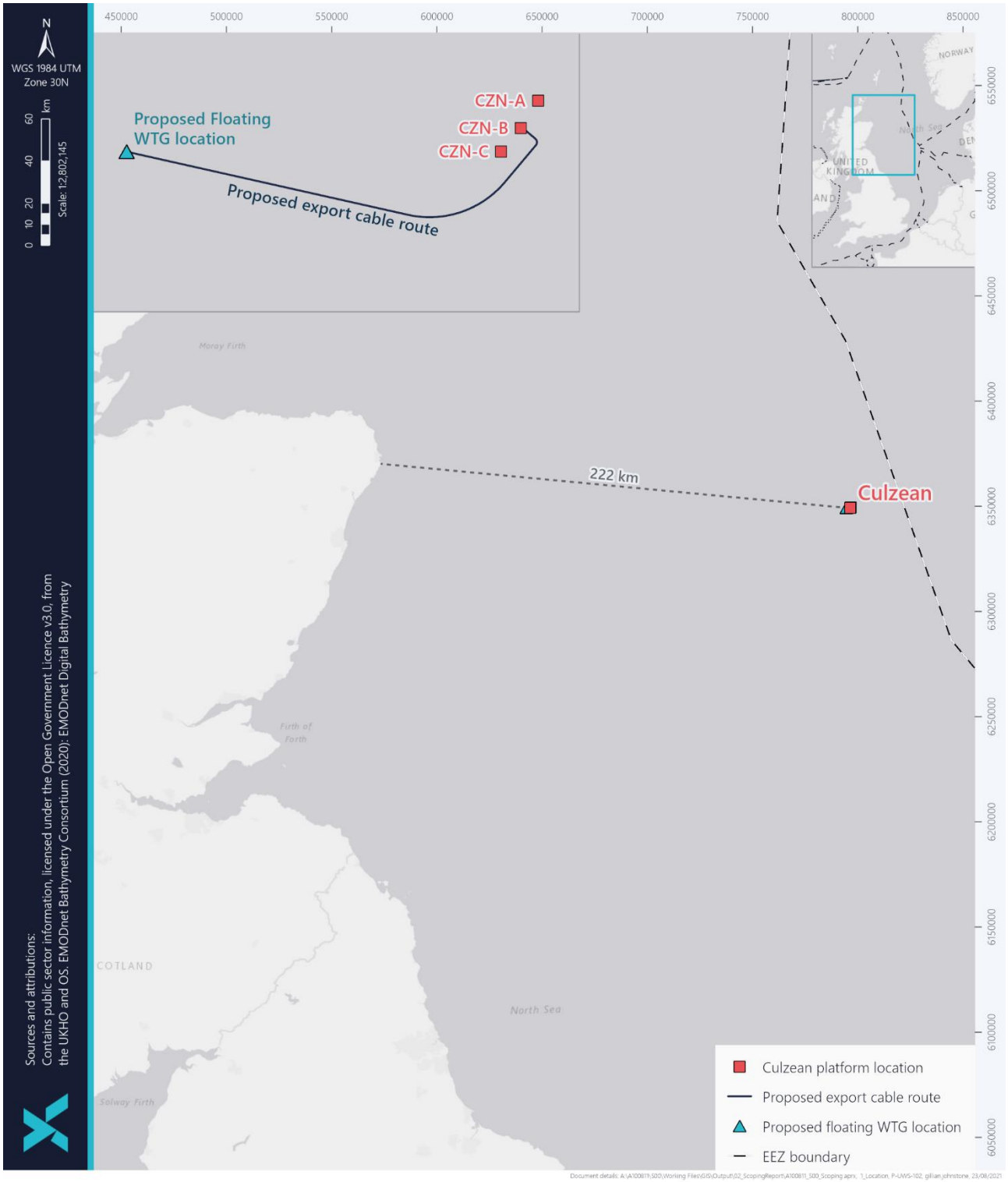

Figure 8-11 Offshore Air Quality Study Area

8.5.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 8-14.

Table 8-14 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Cleaner Air for Scotland (CAFS) The Road to a Healthier Future, 2018/2019 Progress Report	https://www.gov.scot/publications/cleaner-air-scotland-road-healthier-future/	2020	Scottish Government
Offshore Energy SEA 3, Appendix 1E: Air Quality	https://www.gov.uk/government/consultations/uk-offshore-energy-strategic-environmental-assessment-3-oesea3	2016	DECC
Air Pollutant Inventories for England, Scotland, Wales, and Northern Ireland: 2005- 2019	https://naei.beis.gov.uk/reports/reports?report_id=1030	2021	National Atmospheric Emissions Inventory
Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction V1.1	https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf	2014	Holman *et al.*

Project Site-Specific Surveys

No site-specific surveys have been undertaken to inform the Offshore EIA Scoping Report for ambient noise, vibration or air quality surrounding the Project. This is because there is sufficient information on the baseline environment to support the decision of scoping out offshore airborne noise, vibration and offshore air quality from the EIA Include survey (see Section 8.5.7).

8.5.5 Baseline Environment

Existing levels of offshore airborne noise and vibration are likely to be generated by both anthropogenic activities and natural sources. Natural sources of airborne noise include wind, wave action and precipitation, with key anthropogenic sources including vessel activity and offshore oil and gas developments. The primary atmospheric pollutants that are related to vessel activities are sulphur dioxide (SO_2), NO_x and carbon dioxide (CO_2). The main source of vessel traffic within the area includes cargo vessels, fishing vessels, and oil and gas vessels such as ERRV and supply vessels. Further information on fishing activity within the region can be found in Chapter 8.1 and information on shipping and navigation activities can be found in Chapter 8.3. At present, there is a general lack of offshore renewable developments within the region of the Project Area as discussed in Chapter 8.4.

Reports from The Scottish Government have highlighted a reduction in atmospheric pollutants and the subsequent improvement in air quality (Scottish Government, 2020). The National Atmospheric Emissions Inventory (NAEI) also

show a reduction in all priority pollutants between 2005 and 2019, with the exception of NH_3 which did not see a strong decline in emission levels (NAEI, 2021).

The offshore human receptors that are likely to have sensitivities to offshore air quality, airborne noise and vibration include:

- Offshore sensitive marine users within the defined Study Area:
  - Commercial shipping vessels and routes (see Chapter 8.3.); and
  - Commercial fishing vessels (see Chapter 8.1).

8.5.6 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 8-15.

Table 8-15 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Airborne Noise and Vibration	
An Environmental Management Plan will be established prior to the commencement of any works and will provide an on-site plan for all phases of the Project	Required under Marine Licence consent conditions
Air Quality	
A Vessel Management Plan (VMP). This should include compliance with the relevant national and international air quality standards and legislation	Required under Marine Licence consent conditions.

The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of the effects on offshore air quality, airborne noise and vibration receptors and will be consulted upon with consultees throughout the EIA process.

8.5.7 Scoping of Impacts

The potential impacts of the Project on offshore air quality, airborne noise and vibration have been summarised in Table 8-16. This table identifies potential impacts during the construction, operation and maintenance, and decommissioning phases of the Project, with a justification for scoping in or out provided.

Overall, the Project will be a source of clean, renewable energy and therefore as a whole will contribute to a reduction in emissions at a national level by facilitating a reduced reliance on fossil fuels and help move Scotland towards its

2045 goal of net zero emissions of all greenhouse gases set by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019. All operations and components of the Culzean Floating Offshore Wind Pilot will be located approximately 222 km offshore, with no components onshore, therefore, they have not been considered in Table 8-16.

Table 8-16 Potential impacts on offshore air quality, airborne noise and vibration during construction/ decommissioning, operations and maintenance of the Project

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Piling activities generating airborne noise/vibration that may impact other marine users	C, D	There will potentially be piling activities associated with the construction or decommissioning phase of the Project if an alternative anchor solution is required. Any piling would only be for a short period of time fand for a single WTG. If required, pin piling would occur 220 km from shore and from sensitive coastal receptors. The effects of airborne noise from piling activities on sensitive receptors is not considered to be significant. Therefore, this impact has been scoped out for further assessment.	Scoped out
Cable installation activities generating noise/vibration that may impact marine users	C, D	Airborne noise associated with cable installation activities relates to the cable laying vessels. Noise emissions from these vessels are generally low and localised around the activity and will only occur for a short time. Considering existing vessel activity within the region, it is unlikely that any noise generated by activities associated with the Project will be above the existing baseline, therefore this impact has been scoped out for further assessment.	Scoped out
Auxiliary construction activities (project vessels, use of other machinery and generators) generating noise and vibrations that may impact marine users	C, D	Noise relating to auxiliary construction activity is expected to be localised around Project vessels and unlikely to result in any significant increase to baseline levels of airborne noise. Therefore, this impact has been scoped out for further assessment.	Scoped out
Exhaust emissions from offshore vessels used in the construction phase having the potential to increase local ambient concentrations of SO2,	C, D	Vessels associated with the Project will contribute, on a small scale, to atmospheric emissions. These atmospheric emissions are considered to be infrequent and negligible when compared to other shipping activity within the area. The supporting Vessel Management Plan will outline the strategies for	Scoped out

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
NO2, PM10 and PM2.5 that may impact marine users		vessel activities during the construction, operation and maintenance and decommissioning phases of the Project. This will ensure compliance with relevant national and international policy and legislation. The potential impacts of exhaust emissions are considered to be negligible and have therefore been scoped out for further assessment.	
Operation of the WTG producing airborne noise/vibration	O&M	The operation of the turbine is expected to generate a low level of airborne noise. However, it is not expected that this airborne noise will be audible over existing airborne noise within the area. For this reason, this potential impact has been scoped out for further assessment.	Scoped out
Maintenance vessel and equipment activity noise, vibration or vessel emissions that may impact marine users	O&M	See construction and decommissioning impacts. All maintenance works associated with the Project will be short-term. Associated noise-levels and vessel emissions will be of a lesser scale than those anticipated during the construction phase. Therefore, this potential impact has been scoped out for further assessment.	Scoped out

*C = Construction, O&M = Operation and Maintenance, D = Decommissioning

8.5.8 Potential Cumulative Effects

Given the small-scale and localised nature of operations as well as the distance to shore (220 km), there are not expected to be any cumulative impacts arising from the Project and other developments in the area. Cumulative effects have therefore been scoped out.

8.5.9 Potential Transboundary Impacts

It is not anticipated that there will be any transboundary impacts associated with offshore air quality, airborne noise or vibration as a result of the Project. It is anticipated that all potential impacts will be localised and temporary. Transboundary impacts will not be considered for further assessment within the EIAR.

8.5.10 Scoping Questions

- Do you agree with scoping out all offshore airborne noise, vibration, and air quality impacts?
- Do you agree with the study areas defined for water and sediment quality?
- Do you agree with the data and information sources identified to inform the baseline for offshore air quality, airborne noise and vibration? Are there any additional data and information sources that should be considered?
- Do you agree with the suggested embedded mitigation measures?

- Do you agree that all potential receptors and impacts have been identified for offshore air quality, airborne noise and vibration?
- Do you agree that the impacts proposed can be scoped out of the offshore air quality, airborne noise and vibration EIA Chapter?
- Do you agree with the approach for cumulative effects assessment?
- Do you agree with the approach to analysis and assessment that will inform the EIA?

8.5.11 References

DECC (2016). UK Offshore Energy Strategic Environmental Assessment 3 (OESEA3). Appendix 1D - Water Environment (Regional Sea 6 &7). https://www.gov.uk/government/consultations/uk-offshore-energy-strategic-environmental-assessment-3-oesea3

Holman et al. (2014). Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction V1.1. https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf

IAQM (2014). Guidance on the Assessment of dust from demolition and construction. Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf

IAQM (2017). Guidance on land-use planning and development control: Planning for air quality. http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

IAQM (2018). Air Quality Monitoring in the vicinity of Demolition and Construction Sites. https://iaqm.co.uk/text/guidance/guidance_monitoring_dust_2018.pdf

IAQM (2020). A guide to the assessment of air quality impacts on designated nature conservation sites. https://iaqm.co.uk/text/guidance/air-quality-impacts-on-nature-sites-2020.pdf

National Atmospheric Emissions Inventory (NAEI) (2021). Air Pollutant Inventories for England, Scotland, Wales, and Northern Ireland: 2005- 2019. https://naei.beis.gov.uk/reports/reports?report_id=1030

Scottish Government & DEFRA (2017). Scottish Government and Defra background concentrations maps for nitrogen dioxide (NO2) and particulate matter (PM10) and (PM2.5). https://laqm.defra.gov.uk/documents/2017-based-background-maps-user-guide-v1.0.pdf

Scottish Government (2020). Cleaner Air for Scotland (CAFS) The Road to a Healthier Future, 2018/2019 Progress Report. https://www.gov.scot/publications/cleaner-air-scotland-road-healthier-future/

8.6 Climate Change

8.6.1 Introduction

The following chapter outlines the approach to assessment of Greenhouse Gas (GHG) emissions associated with construction, operation and maintenance and decommissioning phases of the Culzean Floating Wind Pilot (hereafter referred to as the Project), the potential risk of climate change to the Project and the way in which projected climate change may modify the significance of the Project on the receiving environment (in-combination climate change impact (ICCI)).

The Project will trial the new floater technology developed by TEPUK using a readily available turbine design. The new floater technology has the potential to deliver opportunities for significant cost savings, industrialisation of larger projects, and provide TEPUK with valuable experience in the hybridization of an oil and gas asset. The Project aims to harness wind power to generate electricity, reducing the use of fossil fuel by the Culzean Platform. The Project will be a 3 MW turbine that will provide power directly to the Culzean Platform; thus meeting over 40% of the Culzean power demand in 2024 with renewable energy, therefore, reducing non-renewable energy consumption.

The Project aims to support the Scottish and UK Governments in the achievement of their GHG emissions targets.

8.6.2 Legislation, Policy and Guidance

In addition to the relevant policy and legislation described in Chapter 2 Legislative Context and Regulatory Requirements, the following will be taken into consideration as part of the scoping of potential impacts on climate change within the Project.

- International frameworks for which the UK is a signatory, including:
  - The UN Framework Convention on Climate Change;
  - The Kyoto Protocol; and
  - The Paris Agreement

Legislation

- The Climate Change (Scotland) Act 2009;
- Climate Change (Emissions Reduction Targets) (Scotland) Act 2019; and
- The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended).

Policy

- Scotland's National Marine Plan (2015).

Guidance

- Climate Change Resilience and Adaptation (IEMA, 2020); and
- Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2022).

8.6.3 Study Area

Climate change occurs on a global scale, hence no specific Study Area has been defined for the assessment.

8.6.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and which will inform the baseline characterisation for the EIA are outlined in Table 8-17.

Table 8-17 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Reports prepared and published by MCCIP	https://www.mccip.org.uk/	2020	Various
UKCP18	https://www.metoffice.gov.uk/research/approach/collaboration/ukcp	2019	Met Office

8.6.5 Baseline Environment

Each chapter will have a future environmental baseline and will focus on any predicted climatic changes over the operational life of the Project. The future environmental baseline will give consideration to historic climate trends and future climate projections. This assessment will be undertaken with consideration of the data and information sources identified in Table 8-17 and through ongoing engagement with stakeholders which will inform the approach to assessment.

8.6.6 Embedded Mitigation Proposed for the EIA

Certain mitigation measures have been proposed across the range of topics assessed within this Scoping Report to reduce the potential impacts of the Project on the offshore physical, biological and human environment. It is anticipated that the embedded mitigation measures adopted as part of these assessments will be sufficient to reduce any potential impacts of climate change during all phases of the Project. There are no specific designed-in measures and management plans proposed in relation to climate change or climate change resilience for the Project.

8.6.7 Scoping of Impacts

The potential impacts of the Project relating to climate change have been summarised in Table 8-18. This table identifies potential impacts during the construction, operation and maintenance and decommissioning phases of the Project, with a scoping justification and scoping result provided.

Table 8-18 Potential Impacts Relating to Climate Change During Proposed Phases of the Project

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Greenhouse gas emissions	C, O&M, D	GHG emissions (and embodied carbon) during the construction, operation and maintenance and decommissioning phases of the pilot (i.e. associated with a single cable and turbine) are limited. The Project will make an overall contribution towards GHG emission reduction but the scale of the project prevents contextualisation relative to relevant carbon budgets	Scoped out
Project infrastructure with vulnerability to climate change	O&M, D	The Project has a minimum 5-year operational life with a design life of up to 10 years. The magnitude of change over this time period (e.g. sea level rise and storminess) will not significantly impact the Project infrastructure, facilities or activities	Scoped out
In-combination climate change impact	C, O&M, D	The Project has a minimum 5 year operational life with a design life of up to 10 years. The magnitude of change over this time period (e.g. sea level rise and storminess) will not alter the significance of the Pilot on the receiving environment and therefore no ICCI will result.	Scoped out

***C = Construction, O&M = Operation and Maintenance, D = Decommissioning**

8.6.8 Potential Cumulative Effects

There are no potential cumulative effects as any potential effects from the Project will not differ when considered cumulatively with other plans and developments. Cumulative effects have therefore been scoped out.

8.6.9 Potential Transboundary Effects

There are no potential transboundary impacts as any potential impacts from the Project would not differ when considered from a transboundary perspective.

8.6.10 Scoping Questions

- Do you agree that all relevant legislation, policy and guidance documents have been identified for the climate change assessment? Are there any additional legislation, policy and guidance documents that should be considered?
- Do you agree with the impacts which have been scoped out?

8.6.11 References

MCCIP (2020). Climate Change Reports. https://www.mccip.org.uk/

Met Office (2019). UKCP18. https://www.metoffice.gov.uk/research/approach/colaboration/ukcp

8.7 Marine Archaeology

8.7.1 Introduction

This chapter of the EIA Scoping Report considers the potential effects from construction, operation and maintenance, and decommissioning of Culzean Floating Wind Turbine Pilot (hereafter referred to as 'the Project') on marine archaeology and cultural heritage receptors.

Marine cultural heritage assets are defined in the Marine (Scotland) Act 2010, Section 73 (5) as vessels, aircraft, parts of such, contents of such, buildings and other structures, caves, deposits, artefacts or any other thing or groups that evidence previous human activity.

The baseline environment and data sources are described and the methodology that will be used in the EIA to assess the potential effects of the Project on marine cultural heritage is detailed.

8.7.2 Legislation, Policy and Guidance

The marine historic environment is protected through national legislation, and through national and local planning policies.

The Project is located within Scottish Exclusive Economic Zone (EEZ).

The Marine Scotland-Licensing Operations Team (MS-LOT) is responsible for licensing, regulating and planning marine activities in the seas around Scotland to ensure they are carried out in a sustainable way under the Marine (Scotland) Act 2009.

Historic Environment Scotland (HES) oversee the protection of designated sites of historical importance within Scotland, primarily historic Marine Protected Areas, A-Listed structures and Scheduled Monuments. It is also a Consultee for marine licensing with regards the archaeological resource within Scotland's territorial waters (to the 12 nautical miles (NM) limit). While the Project is located beyond the 12 NM limit, HES will still be considered as a key consultee.

The following section summarises the main components of the national legislative framework governing the treatment of relevant historic environment designated assets within the planning process.

Designated Heritage Assets

Designated heritage assets that may be encountered in a marine context in Scotland tend to include:

- Ancient monuments, which are designated through scheduling;
- Buildings and other structures which are designated through listing;
- Military remains; and
- Historic marine protected areas.

Marine Legislation

The Project is located beyond 12 NM limit from the Scottish coast. The following relevant legislation is applicable:

- Marine and Coastal Access Act 2009;
- Protection of Military Remains Act 1986 (PMRA 1986); and,
- Merchant Shipping Act 1995 (MSA 1995).

The above legislation provides a protection for marine historic assets of national importance, as well as allowing military wrecks and aircraft remains to be protected. The Merchant Shipping Act 1995 requires that all wreck material that is recovered is reported to the Receiver of Wreck.

International Conventions

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) Convention was concluded in 2001 and is a comprehensive attempt to codify the international law with regards to underwater cultural heritage. The UK has stated that is has adopted the Annex of the Convention, which governs the conduct of archaeological investigations, as best practice for archaeology. The Convention entered into force on 2 January 2009.

Marine Policy

UK Marine Policy Statement was adopted in 2011 by all UK Administrations in March 2011 as part of a new system of marine planning being introduced across UK seas (Defra, 2011). The statement was intended to facilitate and support the formulation of Marine Plans, ensuring that marine resources are used in a sustainable way in line with high level marine objectives.

The Scottish Marine Regions Order 2015 identifies 11 Scottish Marine Regions for the purposes of regional marine planning and establishes their boundaries. The National Marine Plan published in March 2015 sets out a single framework for sustainable development within Scotland's marine area. General Policy 6 for Historic Environment states "development and use of the marine environment should protect and where appropriate, enhance heritage assets in a manner proportionate to their significance" (Marine Scotland, 2015).

Marine Guidance

There are numerous sources of guidance relevant to maritime archaeology and the development process. Some are described below in chronological order of issue:

- Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers (English Heritage (now Historic England), 1998);
- Military Aircraft Crash Sites: Guidance on their significance and future management (English Heritage (now Historic England), 2002);
- The Code of Practice for Seabed Developers (Joint Nautical Archaeology Policy Committee (JNAPC) and The Crown Estate, 2006);
- Historic Environment Guidance for the Offshore Renewable Energy Sector (COWRIE, 2007);
- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage (now Historic England), 2008);
- Our Seas - A shared resource: High level marine objectives (Defra, 2009);

- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE, 2011);
- Ships and Boats: Prehistory to Present: Designation Selection Guide (English Heritage (now Historic England), 2012);
- Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes (English Heritage (now Historic England), 2013);
- Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England, 2015);
- Managing Change in the Historic Environment: Setting (Historic Environment Scotland 2016, updated 2020); and
- Standard and guidance for historic environment desk-based assessment (Chartered Institute for Archaeologists (CIfA) 2014, last updated 2020).

8.7.3 Study Area

The marine archaeology Study Area comprises the extent of the Project (Figure 1-1). A wider study area consisting of a 2 km buffer around the limits of the proposed Project was used as the search area for obtaining records from relevant archive databases (Section 8.7.4).

Subsequently, the boundary agreed for the EIA Study Area will encompass the area where any potential impact on marine archaeology receptors may occur in relation to the existing design envelope.

8.7.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 8-19.

An initial desk-based literature and data review has been undertaken to characterise the marine archaeology and cultural heritage baseline within the Study Area, and the findings are presented below. The desk-based review was completed in accordance with the relevant sections of the CIfA Standard and guidance for historic environment desk-based assessment (2014, last updated 2020).

Due to the significant distance offshore, the UKHO wreck database is the primary source of data (Historic Environment Records tend to be concentrated within 12 NM). These were examined and cross-checked with any entries in the National Record of the Historic Environment (Canmore database) and adjacent Local Authority Historic Environment Record (HER) to assess known and potential marine cultural heritage assets.

The potential for submerged prehistoric archaeology such as Quaternary palaeolandscapes and Palaeolithic and Mesolithic prehistoric remains was assessed primarily using recent published literature and context provided by the wider marine development in the North Sea basin.

The key reference sources examined for this report are listed in Table 8-19.

Table 8-19 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Charted wrecks and obstructions database	UKHO	February 2023	United Kingdom Hydrographic Office
Database of recorded archaeological sites, find spots, and archaeological events	Canmore	February 2023	The National Record of the Historic Environment of Scotland
Database of recorded archaeological sites, find spots, and archaeological events	Aberdeenshire, Moray, Angus & Aberdeen City Council HERs	February 2023	Historic Environment Scotland
BGS GeoIndex Offshore	British Geological Survey	2023	British Geological Survey
Maps and GIS database of glacial landforms and features related to the last British Ice Sheet	BOREAS; An international journal of Quaternary research	2018	Chris D. Clark, David J. A. Evans, Anjana Khatwa, Tom Bradwell, Colm J. Jordan, Stuart H. Marsh, Wishart A. Mitchell, Mark D. Bateman
Europe's Lost Frontiers: Volume 1	Archaeopress Archaeology	2022	Vincent Gaffney and Simon Fitch (eds.)

Project Site-Specific Surveys

If further primary data is obtained from geophysical surveys covering the proposed Project, an archaeological review and analysis is recommended with a view to identify anthropogenic geophysical anomalies with previously unknown or unconfirmed locations.

8.7.5 Baseline Environment

Statutory designations

No designated heritage assets within or in the immediate vicinity of the Study Area.

Seabed prehistory

There are no known submerged prehistoric assets within the Study Area.

The earliest archaeological evidence for Scotland comprises around the last 15,000 years and reflects Later Upper Palaeolithic and Early Mesolithic human activity at various locations across Scotland (Saville *et. al*, 2012) in periods when (now-inundated) coastal land was more extensive than today, due to lower global sea-levels following the end of the last ice age (Gaffney and Fitch, 2022).

However, due to the distance offshore, and northerly location, the Study Area during periods when submerged palaeolandscapes may have been habitable, this area of the North Sea is likely to have been fully marine and prior to that under full glacial conditions (e.g. Clark *et al.*, 2018).

There is likely to be no potential for *in situ* submerged prehistory receptors in the Study Area.

Maritime archaeology

Maritime archaeological sites can be considered to comprise two broad categories; the remains of vessels that have been lost as a result of stranding, foundering, collision, enemy action and other causes, and those sites that consist of vessel-related material.

Wreck related debris includes (but is not limited to) equipment lost overboard or deliberately jettisoned such as fishing gear, ammunition and anchors or the only surviving remains of a vessel such as its cargo or a ballast mound.

Shipwrecks on the seabed provide an insight on the types of vessels used in the past, the nature of shipping activity in the wider area and the changing usage of the marine environment through different periods. Such remains are considered more likely in sediments which promote the preservation of wreck sites (e.g. finer grained sediments that are not subject to high levels of mobility), particularly where such sediments have seen limited, recent disturbance.

The North Sea remains a vital region for communication, trade and military activity but shipwreck inventories and documentary sources are usually biased towards the 18th century and later when more systematic reporting began. There are far fewer historical records of wrecks from pre-industrial revolution, medieval or earlier periods. Generally, reports of wrecking events tend to be biased closer to coasts and located with reference to navigational hazards like headlands and sand banks.

Baseline documentary sources comprise one seabed obstruction located approximately 1.2 km southwest of the Project (Figure 8-12). UKHO record 2528 (Canmore 322112) is classified as an obstruction and consists of foul ground, first detected in 1994. This baseline reflects the very partial nature of documentary sources offshore, rather than an accurate record of known and potential marine heritage assets.

During the previous Project survey an area of debris consistent with a potential wreck was located approximately 0.9 km south of the Project (Gardline, 2013). Therefore, there is potential for other unknown wreck(s) to be present in the vicinity of the Study Area.

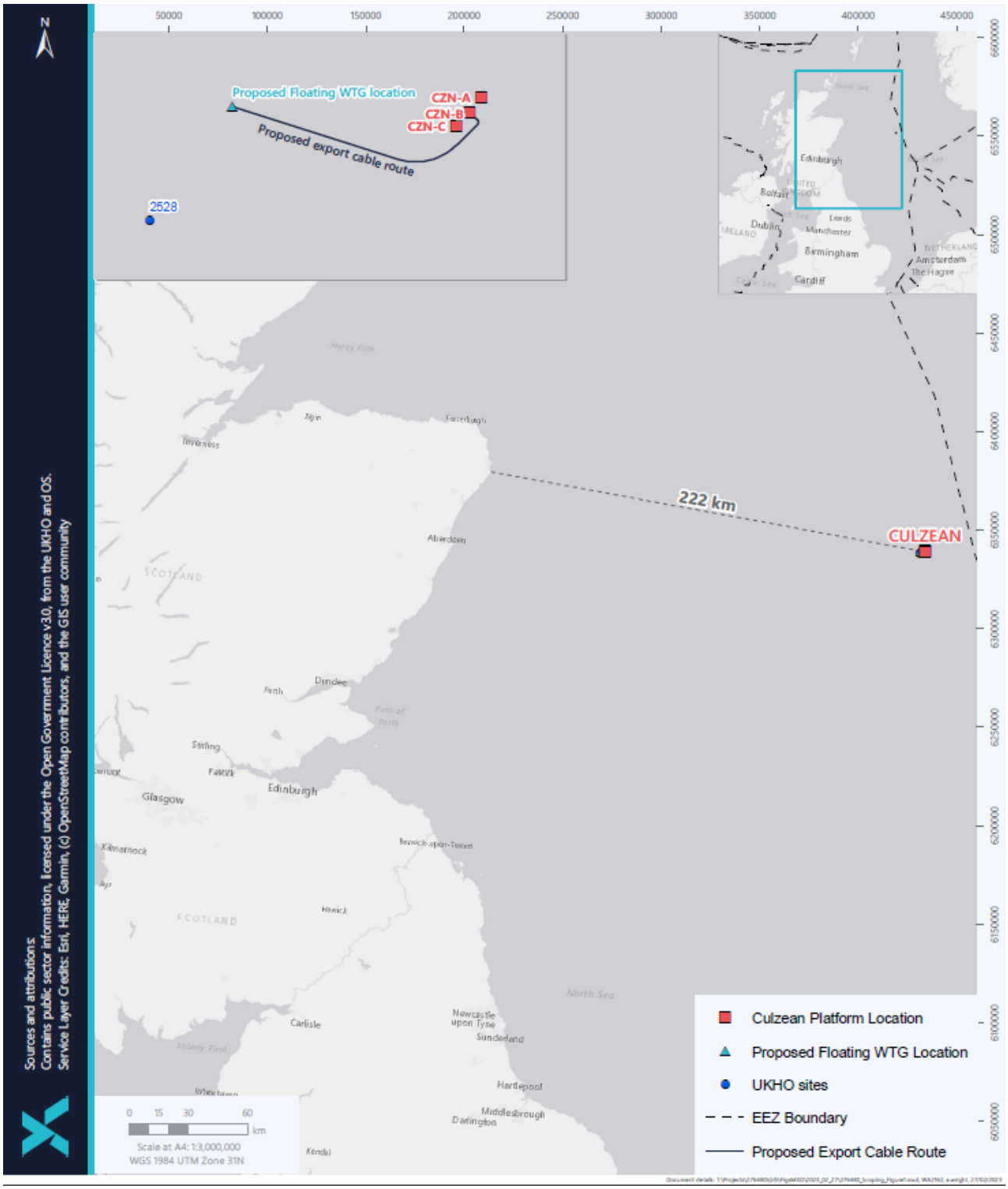

Figure 8-12 UKHO sites within the marine archaeology and cultural heritage study area

Aviation archaeology

Aviation archaeology assets in a marine context comprise the remains or associated remains of military and civilian aircraft that have been lost at sea. Evidence is divided into three primary time periods based on major technological advances in aircraft design: Pre-1939; 1939-1945; and post-1945.

There are no known aircraft remains within the Study Area. However, there is relatively high potential for the discovery of previously unknown aviation material dating from World War Two (Wessex Archaeology, 2008). From 1941 to 1945, a number of aviation bases were maintained in North East Scotland supporting various roles including maritime patrol, and defence; and, for example, Luftwaffe missions based from Norway to Scotland also suggest potential for historic aviation activity in the region.

Maritime aircraft crash sites can retain a significant amount of material, whilst being a difficult target to identify in survey datasets, with the potential for *in situ* human remains.

British military aircraft crash sites are protected under the Protection of Military Remains Act 1986 and there is potential for unknown crash sites (including non-British) within the Study Area.

8.7.6 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project development process in order to avoid or reduce potential impacts to the environment as much as reasonably practicable. Mitigation is likely to focus on addressing direct physical effects to marine cultural heritage assets. This includes prevention of accidental damage or potential destruction to marine cultural heritage assets. The approach to mitigation will be guided by industry best practice and appropriate procedures as laid out in the relevant standards and guidance documents from the CIfA. These measures are outlined within Table 8-20.

Table 8-20 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Avoidance of known marine cultural heritage receptors	Seabed preparation, installation activities and installed infrastructure will avoid any identified seabed marine cultural heritage assets through the implementation and monitoring of Archaeological Exclusion Zones (AEZs).
Archaeological Assessment of Marine Geophysical data for baseline enhancement	It is recommended that in order to enhance the marine archaeology and cultural heritage baseline in order to support effective receptor identification, impact assessment and embedded mitigation, an archaeological assessment of available marine geophysical survey datasets is recommended.

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Protocol for Archaeological Discoveries (PAD)	If previously unknown sites or material are encountered during the different phases of the Project, measures would be taken to reduce the level of impact. In order to provide for unexpected archaeological discoveries a PAD would be adopted. The PAD is a simple system for reporting and investigating unexpected archaeological discoveries encountered during seabed activities, with a Retained Archaeologist providing guidance and advising on the implementation of the PAD. The PAD also makes provision for the implementation of temporary exclusion zones around areas of possible archaeological interest, for prompt archaeological advice, and, if necessary, for archaeological inspection of important features prior to further activities in the vicinity. The PAD provides a mechanism to comply with the Merchant Shipping Act 1995, including notification of the Receiver of Wreck, and accords with the Code of Practice for Seabed Developers (2006).

8.7.7 Scoping of Impacts

There is potential for encountering marine archaeology and cultural heritage receptors and impact assessment is recommended to be scoped in.

It is judged that *in situ* Seabed Prehistory receptors are not likely to be present in the Study Area and are recommended to be Scoped Out of subsequent EIA.

The main impact pathways that may affect marine cultural heritage receptors have been identified in Table 8-21. This will ensure that all development activities will be considered and provides structure for the identification of the significance of any potential effects on marine cultural heritage receptors.

The potential activities during proposed Project construction and decommissioning phases are:

- Direct physical impacts:
  - Intrusive seabed surveys such as geotechnical campaigns;
  - Installation of infrastructure (e.g. anchors, mooring systems, transmission cables, buoys) on/into the seabed and in the water column or above the surface;
  - Use of vessels during installation, deployment, operations / maintenance and decommissioning ([e.g. jack-up barge; multi cat; workboat; dive-support vessel; crane-barge; tug; specialist cable-laying vessel);
  - Removal of device(s), transmission cables and other infrastructure (e.g. anchors, mooring systems, buoys) from the seabed; and
- Indirect physical impacts:
  - Scour associated with the disturbance from construction activities.

The potential activities during proposed Project operations and maintenance are:

- Direct effects such as:

  - Physical presence of floating turbine above the sea surface, anchors, moorings, buoys and other infrastructure on the seabed, in the water column or above the surface;
  - Other maintenance activities (e.g. biofouling removal; Remotely Operated Vehicles (ROV)/diver inspection or repairs);
  - Use of vessels (e.g. jack-up barge; multi cat; workboat; dive-support vessel; crane-barge; tug); and
  - Use of equipment to monitor devices in situ or other environmental parameters (e.g. ROV, cameras or acoustic devices).
- Indirect effects such as changes in local scouring and sedimentation patterns from installed foundations, inter-array cabling and other seabed infrastructure.

Table 8-21 Potential impacts on marine archaeology during construction/ decommissioning, operations and maintenance of the Project

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Loss of or damage to known marine archaeology and cultural heritage receptors from direct impacts	C & D	Any of the device designs, transmission cables and other infrastructure that impact the seabed have the potential to result in the damage/loss of archaeological features if such receptors are shown to be present. Similar effects may be expected from vessel anchoring systems that impact the seabed, or the removal of devices and other infrastructure in ways that disturb the seabed during decommissioning activities. Effects are considered to be permanent.	Scoped in
Loss of or damage to unknown marine archaeology and cultural heritage receptors from direct impacts	C & D	Any of the device designs, the transmission cables and other infrastructure that impact on the seabed have the potential to result in the damage/loss of unknown archaeological features, which may lie undiscovered on or below the surface of the seabed, if any are present. Similar effects may be expected from vessel anchoring systems that impact the seabed, or the removal of devices and other infrastructure in ways that disturb the seabed during decommissioning activities. Effects are considered to be permanent.	Scoped in
Loss of or damage to submerged prehistory receptors from direct impacts	C & D	Based on offshore project location and current published research context, it is judged that *in situ* submerged prehistory, particularly palaeolandscape receptors would not be encountered in in the Study Area.	Scoped out
Indirect disturbance to marine archaeology and cultural heritage receptors caused by	C & D	Indirect impacts to known and potential marine archaeology and cultural heritage receptors caused by changes to the hydrodynamic and sedimentary regimes due to sediment redistribution.	Scoped in

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
anchoring and mooring systems			
Loss or damage to known and unknown marine archaeology and cultural heritage receptors from direct impacts	O&M	Any of the device designs, transmission cables and other infrastructure on the seabed or in the water column above that result in localised scouring have the potential to result in the damage/loss of known and unknown archaeological features lying on or below the seabed if such receptors are shown to be present. Maintenance vessel anchoring systems that impact the seabed, or the repeated removal and replacement of devices and other infrastructure in ways that disturb the seabed also have the potential to result in the damage/loss of any archaeological features lying on the seabed. Effects are considered to be permanent.	Scoped in
Indirect disturbance to marine archaeology and cultural heritage receptors caused by additional cable protection used during repair and maintenance	O&M	Indirect impact to known and potential marine archaeology and cultural heritage receptors caused by potential scour and plume effects resulting in increased protection to, or deterioration through erosion.	Scoped in

8.7.8 Potential Cumulative Effects

There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect marine archaeology receptors. Notable projects will be considered as part of the Cumulative Effects Assessment.

Cumulative effects on marine archaeology resulting from the effects of the Project and other developments will also be assessed in accordance with the guidance and methodologies set out in Section 5, with all relevant effects assessed for the Project in isolation considered on the cumulative level as required.

8.7.9 Potential Transboundary Impacts

With regards to effects on the marine cultural heritage receptors, the potential impacts of the proposed Project in the Scottish Marine Area are unlikely to lead to any significant transboundary effects. Direct impacts resulting from the proposed Project are expected to be confined to the Study Area, and therefore are not predicted to result in transboundary effects.

The Project does not extend beyond the limits of Scottish or UK territorial waters. There is no potential for transboundary impacts as a result of activities undertaken during the construction, operation and maintenance and

decommissioning phases of the Project. Potential transboundary impacts have been scoped out of the EIA and have not been considered further.

8.7.10 Approach to Analysis and Assessment

Data sources to inform the EIA baseline characterisation

The key desktop data sources that will be examined for the EIA marine archaeology and cultural heritage baseline characterisation include those listed below:

- The National Record of the Historic Environment (NRHE) of Scotland;
- Statutory lists, registers and designated areas (for example Listed Buildings, Scheduled Monuments, and Historic Marine Protected Areas);
- Aberdeenshire Council Historic Environment Records (HERs);
- UK Hydrographic Office (UKHO) wreck register and relevant nautical charts; and
- Relevant published secondary sources and other appropriate archives.

Consultation

In order to agree the scope of the assessment, liaison between key stakeholders and consultees is recommended. Key consultees include:

- Marine Scotland Licencing Operations Team (MS-LOT);
- Historic Environment Scotland; and
- Aberdeenshire Council Archaeology Service.

Guidance

The data gathering, analysis, impact assessment and mitigation recommendations for the EIA will be conducted to standard professional guidelines, appropriate and proportionate to the proposed development, listed below:

- JNAPC and Crown Estate, 2006. Code of Practice for Seabed Development;
- Wessex Archaeology, 2007. Historic Environment Guidance for the Offshore Renewable Energy Sector;
- Oxford Archaeology & George Lambrick Archaeology and Heritage, 2008. Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy;
- Gribble, J. and Leather, S. for EMU Ltd., 2011. Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector;
- Plets, R., Dix, J., & Bates, R., 2013. Marine Geophysics Data Acquisition, Processing and Interpretation: Guidance Notes;
- The Crown Estate, 2021. Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects;
- The Crown Estate, 2014. Protocol for Archaeological Discoveries: Offshore Renewables Projects;
- CIfA, Codes, Standards and Guidance. Available at https://www.archaeologists.net/codes/cifa; and
- Scottish Natural Heritage & Historic Environment Scotland, 2018. Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland. V5. Edinburgh.

As the proposed development is located within Scottish waters, there is guidance to consider in relation to the marine historic environment. These are outlined below and will also be considered in relation to the marine archaeology and cultural heritage Offshore EIA:

- Scotland's National Marine Plan: A Single Framework for Managing Our Seas (March 2015) covers both Scottish inshore waters (out to 12nm) and offshore waters (12 to 200 NM). It contains policies and advice concerning the marine historic environment, including that development and use of the marine environment should protect and, where appropriate, enhance heritage assets in a manner proportionate to their significance and that as well as designated marine heritage assets there are likely to be a number of undesignated sites of demonstrably equivalent significance, which are yet to be fully recorded or await discovery;
- Scotland's National Marine Plan also recommends that Historic Marine Planning Partnerships and licensing authorities should seek to identify significant historic environment resources at the earliest stages of planning or development process and preserve them in situ wherever feasible. Adverse impacts should be avoided, or, if not possible, minimised and mitigated. Where this is not possible licensing authorities should require developers to record and advance understanding of the significance of the heritage asset before it is lost, in a manner proportionate to that significance;
- The Historic Environment Policy Statement for Scotland (HEPS) (2019) includes policies that decisions affecting any part of the historic environment require understanding of its significance and consideration of avoiding or minimising detrimental impacts; and
- Historic Environment Scotland Designation Policy and Selection Guidance (2019) stands alongside HEPS 2019 and outlines the principles and criteria that underpin the designation of HMPAs.

Assessment Methodology

The approach adopted for the EIA will follow that outlined above and will be based on the maximum design envelope approach and on relevant legislation and policy in order that the licensing authorities have sufficient and adequate information on which to base a decision.

A desk-based assessment will be conducted to capture known marine historic assets along with those that have the potential to be present due to an unknown location of loss. The desk-based assessment would be conducted to appropriate professional standards (CIfA Standards and guidance, 2014 and as revised). The importance of marine historic environment assets would be evaluated to inform the assessment. The level of importance assigned depends on a number of factors, including intrinsic, contextual and associative characteristics. This will be based on:

- HES, 2019. Designation Policy and Selection Guidance, including Annexes;
- English Heritage (now Historic England), 2012. Ships and Boats: Prehistory to Present. Designation Selection Guide; and
- Wessex Archaeology, 2011. Assessing Boats and Ships 1860-1913, 1914-1938 and 1939-1950. Archaeological Desk-Based Assessments in 3 volumes.

The assessment 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 HES.

For any marine archaeology impacts scoped in, the assessment will be conducted based on analysis of desk-based sources (including GIS based gazetteer) and as available geophysical and geotechnical data collected specifically for the proposed development. The assessment of the magnitude of impact and the significance of effect on marine historic environment assets will be based on Scottish Natural Heritage & Historic Environment Scotland's Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others

involved in the EIA process in Scotland, V5, 2018. Specific detailed methodology for the historic environment will be agreed in consultation with Consultees.

8.7.11 Scoping Questions

The following questions are posed to consultees to frame and focus responses to the marine archaeology scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree that the identification of what constitutes the baseline marine archaeology and cultural heritage is adequate?
- Do you agree that the sources listed for conducting a DBA to identify the baseline archaeology and cultural heritage are sufficient?
- Do you agree with the recommendation for reviewing any available marine geophysical and geotechnical surveys to enhance the baseline historic marine environment?
- Have all potential impacts on archaeology and cultural heritage resulting from the proposed development been identified within this Scoping Report?
- Do you agree that the embedded mitigations proposed for the proposed development will provide suitable means by which to manage and mitigate the potential effects of the proposed development on the marine historic environment?

8.7.12 References

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8.8 Aviation

8.8.1 Introduction

This chapter of the Scoping Report identifies the aviation receptors of relevance to the offshore aspects of the Project and considers the potential impacts from the construction, operation and maintenance and decommissioning of the proposed Project.

The potential effects of turbines on aviation are widely publicised, but the primary concern is one of safety. Despite innumerable subtleties in the actual effects, there are two dominant scenarios that lead to potential impacts:

- Physical obstruction: turbines can present a physical obstruction to aircraft; and
- Impacts on aviation radar systems and the provision of radar-based Air Traffic Services (ATS): Turbines can create unwanted radar clutter which appears on radar displays and can affect the provision of ATS to pilots. Radar clutter (or false radar returns) can confuse air traffic controllers making it difficult to differentiate between aircraft and those radar returns resulting from the detection of turbines. Furthermore, the appearance of multiple false targets in close proximity can generate false aircraft tracks and seduce those returns from 'real' aircraft away from the true aircraft position.

It should be noted that adverse effects on radar systems are only possible if the wind turbine blades are moving, therefore this impact is applicable to the operation and maintenance phase only.

8.8.2 Legislation, Policy and Guidance

Legislation

- Civil Aviation Publication (CAP) 393 – Air Navigation, The Order and the Regulations, 2016 (Version 6, 12 February 2021): Contains the Air Navigation Order (ANO) 2016 and Regulations made under the order; and defines the Rules of the Air regarding civil aviation in the United Kingdom (UK).

Policy

- CAP 670 – Air Traffic Services Safety Requirements (Issue 3, 7 June 2019): Sets out the safety regulatory framework and requirements associated with the provision of Air Traffic Services (ATS).
- CAP 764 – CAA Policy and Guidelines on Wind Turbines (Version 6, February 2016): Provides CAA policy and guidance on a range of issues associated with wind turbines and their effect on aviation that need to be considered by aviation stakeholders, wind energy developers and Local Planning Authorities (LPAs) when assessing the viability of wind turbine developments.
- CAP 774 – The UK Flight Information Services (Version 4, 15 December 2021): Details the suite of ATS which (excluding aerodrome services) are the only services provided in Class G airspace within the UK Flight Information Region (FIR). This document is equally applicable to civilian and military pilots and air traffic controllers.
- Military Aviation Authority (MAA) Regulatory Publication 3000 Series: Air Traffic Management Regulations (last updated 28 March 2023): Provides the regulatory framework and instructions to military personnel for provision of military Air Traffic Control (ATC).

- MAA Manual of Military Air Traffic Management (last updated 30 September 2019): Provides regulations for military ATC and emergency procedures and utilisation of military designated airspace.

Guidance

- Ministry of Defence (MoD) Obstruction Lighting Guidance (1 January 2020): Sets out the MoD's minimum requirements and standards for installation of aviation lighting of onshore and offshore wind turbine developments.
- CAA 1:500,000 Visual Flight Rules (VFR) Aviation Chart (2023): Designed to assist in the navigation of aircraft. Enables pilots to determine their position, safe altitude and route to a destination, highlighting navigation aids along the way, alternative landing areas in case of an in-flight emergency, and other useful information such as radio frequencies and airspace boundaries.
- UK Integrated Aeronautical Information Package (UK IAIP) (2023): Provides comprehensive information on UK civilian aerodromes and aviation procedures within UK airspace.
- UK Military Aeronautical Information Publication (UK Mil AIP) (2023): Provides comprehensive information on UK military aerodromes and guidance to military aircrew on in-flight navigation procedures.
- Marine Guidance Note (MGN) 654 – Safety of Navigation: Offshore Renewable Energy Installations (OREIs), Guidance on UK Navigational Practice, Safety and Emergency Response (28 April 2021): Highlights issues with assessing the impact on navigational safety and emergency response caused by OREIs in UK internal waters.

8.8.3 Study Area

The aviation study area is defined as a 9 nautical mile (NM) (17 kilometre (km)) buffer around the Project which will enable the impact on aviation in the immediate vicinity of the site to be determined; in particular in respect of low-visibility helicopter operations into offshore installations (oil and gas platforms).

A secondary aviation study area is defined by the range of the affected aviation receptors; in particular, Air Traffic Control (ATC) and Air Defence (AD) Primary Surveillance Radars (PSRs). The aviation study area covers radars in the north of Scotland that could potentially detect wind turbines within the Project; with the extent of the aviation study area defined by the furthest potential aviation receptor. The operating range of aviation radars can be up to 200 NM (370 km); however, it is only the likely radar coverage over the Project that needs to be taken into account, as the question of whether the wind turbine itself is visible to radar is the determining factor relating to aircraft safety. This has assisted in identifying whether any relevant PSRs, and stakeholders, may be affected. The aviation study area can be seen in Figure 8-13 and Figure 8-14 shows the Study Area together with the locations of the relevant aviation receptors.

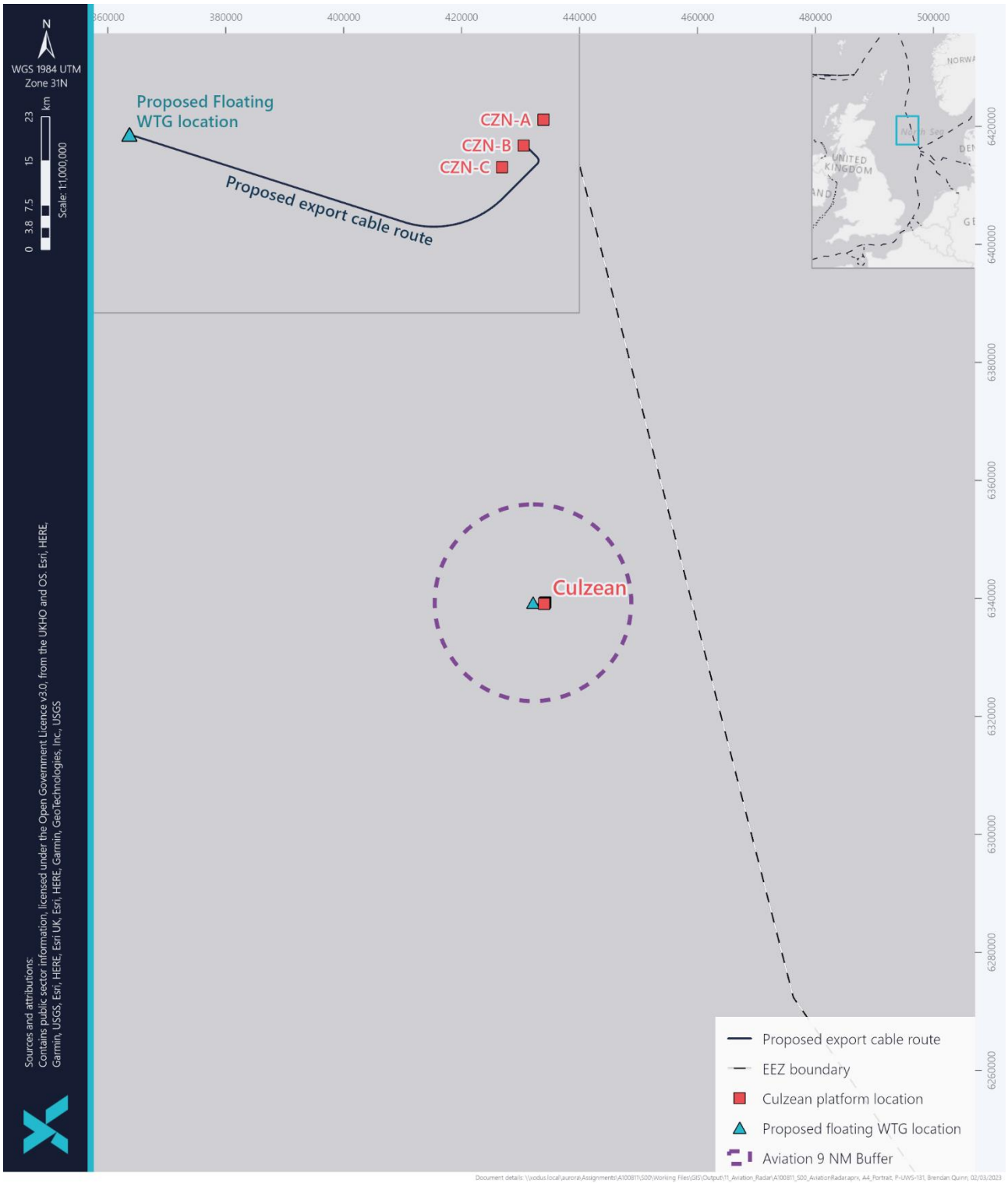

Figure 8-13 Study area

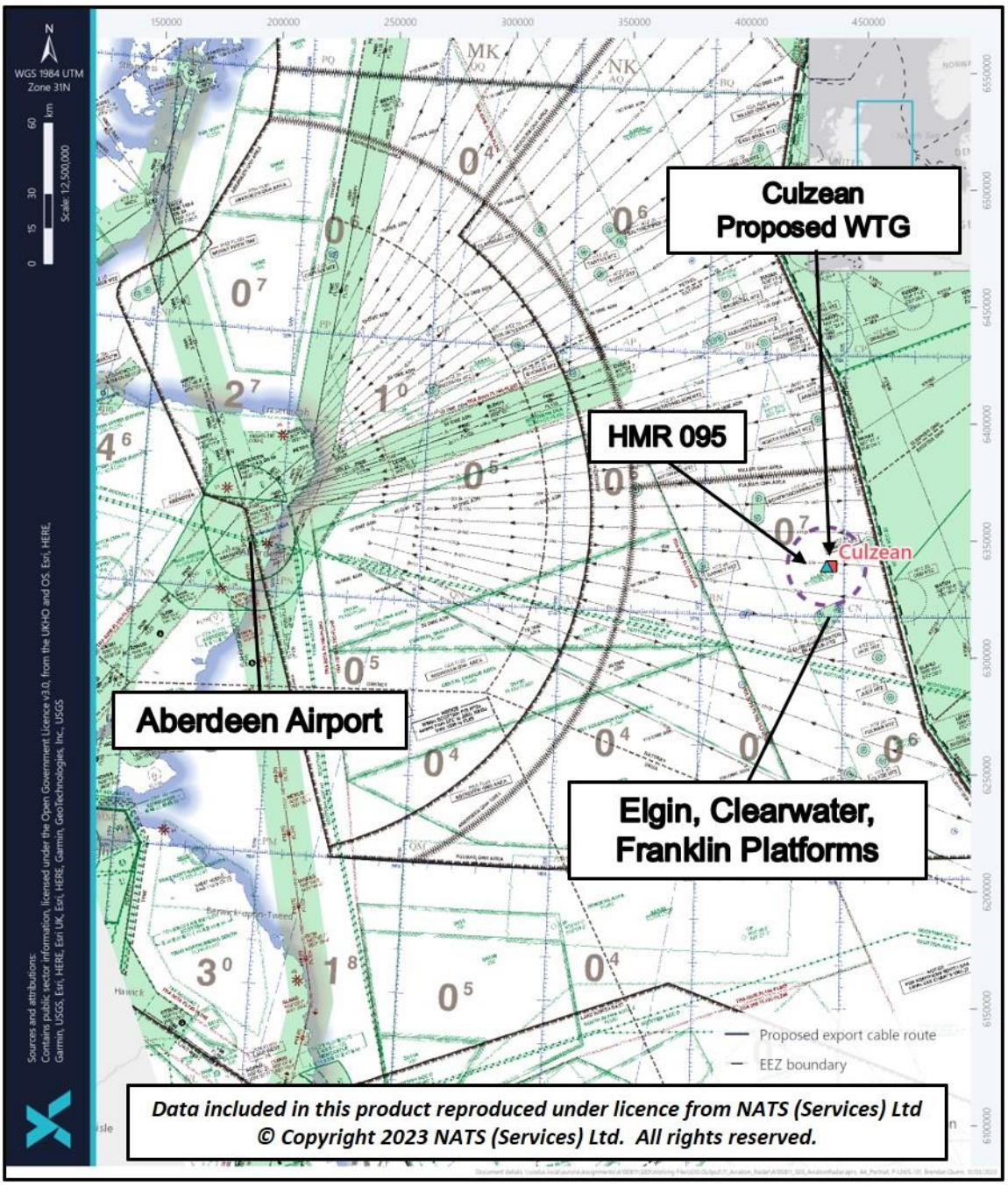

Figure 8-14 Aviation Study Area and Locations of Aviation Receptors

8.8.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA, are outlined in Table 8-22.

Table 8-22 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
CAA 1:500,000 VFR Aviation Chart	CAA	2023	CAA
UK IAIP	CAA	2023	CAA
UK Mil AIP	MoD	2023	MOD
NATS Self-Assessment Maps	NATS	2023	NATS
Scottish Government (SG) Sectoral Marine Plan for Offshore Wind Energy	SG	2020	SG
Beatrice Offshore Wind Farm Ltd (BOWL) Environmental Statement (ES)	BOWL	2012	BOWL
Moray East Offshore Wind Farm (Moray East) ES	Moray East	2012	Moray East
Moray West Offshore Wind Farm (Moray West) EIA Report	Moray West	2018	Moray West
Dounreay Tri ES	Dounreay Tri	2016	Dounreay Tri

8.8.5 Baseline Environment

A desk-based review of literature and available data sources (see Table 8-22) has been undertaken to support this scoping chapter. The key aviation receptors potentially impacted by the Project are:

- Civil airport IFPs;
- Military aerodrome IFPs;
- Civil ATC radar;
- Military ATC radar;
- Military AD radar;
- Low flying Areas (including Search and Rescue (SAR));
- Helicopter Main Routes (HMRs);
- Offshore helicopter installations (oil and gas platforms);
- Local Airspace Restrictions (Prohibited/Restricted/Danger Areas and Military Practice and Exercise Areas (PEXAs); and
- Meteorological (Met) Office radar.

The aviation environment within the vicinity of the Project can be described as follows:

Airspace

The Project is located approximately 130 NM (241 km) off the northeast coast of Scotland. In aviation terms, the Project is situated in a relatively uncomplicated piece of airspace but with an active HMR routeing west to east approximately 2 NM (3.7 km) north of the proposed WTG's location.

Civil Airports

The nearest major civil airport to the Project is Aberdeen Airport, located approximately 133 NM (246 km) to the west. The published obstacle safeguarding area for airports of this nature is 30 NM (56 km), therefore the proposed WTG will not impact on any airport IFPs.

Civil ATC Radars

The nearest civil ATC radars to the Project are the NATS Allanshill and Perwinnes radars both of which are located more than 130 NM (246 km) from the array area. There is no possibility that the proposed WTG will be in radar line of sight (RLOS) of either radar. Consequently, no civil ATC radar systems are expected to be affected by the Project.

Military ATC and AD Radars

The nearest military ATC and AD radars to the Project are the Leuchars Station ATC radar and the Buchan AD radar both of which are located more than 130 NM (246 km) from the array area. There is no possibility that the proposed WTG will be in radar line of sight (RLOS) of either radar. Consequently, no military ATC and AD radar systems will be affected by the Project.

Low flying (including UK SAR)

The Project is located more than 12 NM (22 km) from the UK coastline and, therefore, is technically outside the UK Military Low Flying System; however, it is recognised that military aircraft may still be required to operate at low-level in the vicinity of the Project. Installation and presence of WTG can pose a physical obstruction to aviation operations and wind turbines can be difficult to see from the air, particularly in poor meteorological conditions, leading to a potential increase in obstacle collision risk. Furthermore, during the construction phase, the presence and movement of installation vessels (with onboard cranes) may also present a potential obstacle collision risk to aircraft operations. Military aircraft can operate down to 100 ft above surface level over the sea.

UK SAR helicopters conducting operational missions are not constrained by the normal rules of the air and operate in accordance with their Aircraft Operator Certificate (AOC), which allows them flexibility to manoeuvre, as required, for the particular mission being carried out. An Emergency Response Co-operation Plan (ERCoP) will be compiled in conjunction with the Maritime and Coastguard Agency (MCA) and is a likely consent condition requirement for any offshore development. Additionally, a Lighting and Marking Plan (LMP) will need to be developed in conjunction with the relevant aviation stakeholders and agreed prior to the construction of the Project.

HMRs

HMRs are established to support the transport of personnel and logistics to offshore oil and gas installations. HMRs provide a network of offshore routes used by civilian helicopters to facilitate an obstacle free zone for safe flight when in-flight Visual Meteorological Conditions (VMC) cannot be met. The HMR structure therefore provides both an identification of common flight paths and a safe means of traffic flow. HMR 095 is the nearest HMR to the proposed WTG and is located approximately 2 NM (3.7 km) to the north; it is primarily used for helicopter flights from Aberdeen Airport to the offshore oil and gas installations in the North Sea.

Construction of turbines within 2 NM either side of an HMR would have the potential to restrict operations below the routine operational altitudes when icing conditions exist. The ability of a helicopter to operate at the expected altitudes would be dependent upon the icing level (the 0° isotherm). In this situation, helicopters operating on HMRs

need an 'escape-route' if icing conditions are encountered unexpectedly; this would inevitably involve a descent. However, as outlined in CAP 764, CAA guidance is that, provided there are no WTGs within 2 NM either side, then helicopter operations on HMRs should not be affected.

Offshore helicopter installations (oil and gas platforms)

CAA recommend that wind farm developers consult with the owners/operators of offshore helicopter installations when a development is within 9 NM (17 km) of any proposed development. The nearest offshore helicopter installations to the proposed WTG are the Elgin, Shearwater and Franklin platforms, the nearest of which is located just outside 9 NM (17 km) to the south. The Lomond platform is also located approximately 12 NM (22 km) to the northeast of the proposed WTG. As no offshore helicopter installations are within 9 NM of the proposed WTG, helicopter operations into offshore installations are not expected to be affected by the Project.

Local Airspace Restrictions (Prohibited/Restricted/Danger Areas and Military PEXAs)

The Project lies underneath Air-to-Air Refuelling Area (AARA) 3 which is established from Flight Level (FL) 100 (10,000 ft) up to FL 290 (29,000 ft). An AARA is utilised by military aircraft to practice transferring aviation fuel from one aircraft (the tanker) to another (the receiver) while both aircraft are in flight. This is the only restricted airspace in the vicinity of the Project but, as operations with the AARA are carried out no lower than 10,000 ft, the Project will not affect military operations within this airspace.

Met Office Radar

The closest Met Office radar system is located at Hill of Dudwick near Ellon, Aberdeenshire. It is located more than 130 NM (246 km) from the Scooping Area which is outside the 20 km safeguarding area for radars of this nature.

8.8.6 Embedded Mitigation Proposed for the EIA

Certain measures have been proposed as part of the Project development process in order to reduce the potential for impacts to the environment. These measures will follow best practice and are outlined within Table 8-23.

Table 8-23 Proposed Embedded Mitigation Measures

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
Approval and implementation of a Lighting and Marking Plan (LMP), which will set out specific requirements in terms of aviation lighting to be installed on the wind turbines, as required under CAA (2016). Civil Aviation Publication (CAP) 393, Air Navigation: The Order and the Regulations (2016).	The LMP will be prepared in consultation with the CAA, MoD and MCA and will take into account requirements for aviation lighting as specified in Article 223 of the UK ANO, 2016 and changes to ICAO Annex 14 Volume 2, Chapter 6, paragraph 6.2.4 promulgated in November 2016. The production and approval of an LMP will be a condition of the Marine Licence.
All structures of more than 91.4 m in height will be charted on aeronautical charts and reported to the Defence Geographic Centre (DGC), which maintains the UK's database of tall structures	Consultation with the CAA, MCA, MoD and NLB prior to agreement of the LMP and the Design Specification and Layout Plan (DSLP). Both the LMP and the DSLP will be conditions of the Marine Licence consent.

EMBEDDED MEASURE	HOW THE MITIGATION WILL BE SECURED
(Digital Vertical Obstruction File) at least ten weeks prior to construction.	
Any temporary obstacles associated with wind farms which are of more than 91.4 m in height (e.g. construction infrastructure such as cranes and/or meteorological masts) are to be alerted to aircrews by means of the Notice to Airmen (NOTAM) system.	Consultation with CAA will be required to ensure that temporary obstacles of more than 91.4 m are identified to aircrews by NOTAM. Notification of temporary obstacles will be a condition of the Marine Licence consent.
CAA will be informed of the locations, heights and lighting status of the wind turbines, including estimated and actual dates of construction and the maximum heights of any construction equipment to be used, prior to the start of construction.	Consultation with CAA will be required. Inclusion of locations, heights and lighting status of the wind turbines on aviation charts and in the UK IAIP will be a condition of the Marine Licence consent.

There is a commitment for the Project to implement these measures and they have been considered within the scoping assessment. The requirement for additional mitigation measures will be dependent on the significance of the effects on aviation receptors and will be consulted upon with consultees throughout the EIA process.

8.8.7 Scoping of Impacts

A number of potential impacts on aviation receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Project. A number of impacts are proposed to be scoped out of the assessment for aviation receptors. These impacts are outlined in Table 8-24, together with a justification for scoping them out.

Table 8-24 Potential impacts on aviation during construction/ decommissioning, operations and maintenance of the Project

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Civil airport patterns and procedures	C, D, O&M	The Project's WTG is outside the safeguarding area of any civil airports. The Project will therefore not create any physical obstacles within the safeguarding area for any civil airports and, as such, this impact has been scoped out of the EIA.	Scoped out
Military aerodrome patterns and procedures	C, D, O&M	The Project's WTG will not create physical obstacles within the safeguarding area of any military aerodrome. As such, this impact has been scoped out of the EIA.	Scoped out

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Civil ATC radar	C, D, O&M	The Project's WTG is not within radar coverage of any civil ATC radar systems. As such, this impact has been scoped out of the EIA.	Scoped out
Military ATC radar	C, D, O&M	The Project's WTG is not within radar coverage of any military ATC radar systems. As such, this impact has been scoped out of the EIA.	Scoped out
Military AD radar	C, D, O&M	The Project's WTG is not within radar coverage of any military AD radar systems. As such, this impact has been scoped out of the EIA.	Scoped out
Low flying (including SAR)	C, D, O&M	There is potential for the Project's WTG to impact on low-flying aircraft and, as such, the impact has been scoped into the EIA. A LMP will be agreed with all relevant aviation stakeholders and details of the Project's WTG will be included in aviation documentation and displayed on aviation charts.	Scoped in
HMRs	C, D, O&M	In line with CAA guidance, the Project's WTG is more than 2 NM (3.7 km) from any HMR. Helicopters operations on HMRs will not be affected. As such, this impact has been scoped out of the EIA.	Scoped out
Offshore helicopter installations (Culzean platform)	C, D, O&M	In line with CAA guidance, the Project's WTG is more than 9 NM (17 km) from any offshore helicopter installation. Consequently, helicopter operations into offshore installations are not expected to be affected by the Project. As such, this impact has been scoped out of the EIA.	Scoped out
Local Airspace Restrictions (Prohibited/Restricted/Danger Areas and Military Exercise and Training Areas (MEXAs)	C, D, O&M	There is no potential for the Project to impact on local airspace restrictions. As such, this impact has been scoped out of the EIA.	Scoped out
Met Office radar	C, D, O&M	The Project's WTG is not within radar coverage of any Met Office radar systems. As such, this impact has been scoped out of the EIA.	Scoped out

8.8.8 Potential Cumulative Effects

There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect aviation receptors. Notable projects will be considered as part of the Cumulative Effects Assessment.

Cumulative effects on aviation resulting from the effects of the Project and other developments will also be assessed in accordance with the guidance and methodologies set out in Section 5, with all relevant effects assessed for the Project in isolation considered on the cumulative level as required.

8.8.9 Potential Transboundary Impacts

There is no potential for transboundary impacts upon aviation receptors due to construction, operation, maintenance and decommissioning of the Project. The potential impacts are localised and therefore do not need to be considered further.

8.8.10 Approach to Analysis and Assessment

Analysis and Assessment Approaches

A detailed desk-top review will be undertaken to characterise existing and future aviation baseline conditions in the aviation study area to inform the EIA Report. This will be undertaken by reviewing the relevant aviation legislation and guidance documents, in particular the UK IAIP, and will be augmented by consultation during the EIA phase. Key consultees will include:

- CAA;
- MCA;
- MoD; and
- North Sea helicopter operators.

EIA Methodology

The aviation EIA will be undertaken in line with the methodology set out in section 5.3.

8.8.11 Scoping Questions

- Do you agree with the study areas defined for aviation?
- Do you agree with the data sources which are suggested for the assessment of aviation?
- Are there any additional data sources or guidance documents that should be considered?
- Do you agree with the suggested embedded mitigation measures and is this mitigation appropriate?
- Do you agree that all receptors and impacts have been identified for aviation?
- Do you agree with scoping out transboundary impacts?
- Do you agree that the project site-specific studies are sufficient to inform the proposed assessment approach?
- Do you agree with the proposed assessment approach?

8.8.12 References

CAA (2016). CAP 393, Air Navigation: The Order and the Regulations (2016). Available online at: Regulations made under powers in the Civil Aviation Act 1982 and the Air Navigation Order 2016 (caa.co.uk) [Accessed on: 31/03/2023]

CAA (2016). CAP 764 - CAA Policy and Guidelines on Wind Turbines (Version 6, February 2016). Available online at: https://publicapps.caa.co.uk/docs/33/CAP764%20Issue6%20FINAL%20Feb.pdf [Accessed on: 31/03/2023]

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MAA (2023). MAA Regulatory Publication 3000 Series: Air Traffic Management Regulations (28 March 2023). Available online at: https://www.gov.uk/government/collections/3000-series-air-traffic-management-regulations-atm [Accessed on: 31/03/2023]

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UK Government (2021). Marine Guidance Note 654: Safety of Navigation - Offshore Renewable Energy Installations - Guidance on UK Navigational Practice, Safety and Emergency Response (28 April 2021). Available online at: MGN 654 (M+F) (publishing.service.gov.uk) [Accessed on: 31/03/2023]

8.9 Socio-economics

8.9.1 Introduction

This chapter will provide an overview of the sensitivities associated with socio-economics receptors in relation to the Project. An overview of the potential impacts of the Project on socio-economic receptors including during the construction, operation and maintenance, and decommissioning of the Project, are also discussed.

The Project will trial the new floater technology developed by TEPUK using a readily available turbine design (currently stored outside of the UK, ready for assembly and later installation at Culzean). The Project is located solely in offshore waters, approximately 220 km from the Aberdeenshire coastline, and would constitute one wind turbine only.

Information that may be considered relevant to this chapter can be found in the following chapters:

- Commercial Fisheries (Chapter 8.1);
- Shipping and Navigation (Chapter 8.3); and
- Other Sea Users (Chapter 8.4).

8.9.2 Legislation, Policy and Guidance

In addition to the relevant policy and legislation described in Chapter 2 Legislative Context and Regulatory Requirements, the following policy and guidance will be taken into consideration as part of the scoping in and out of potential impacts on socio-economic receptors in relation to the Project.

Policy

- Scottish Government's Offshore Wind Policy Statement (2020).

Guidance

- Marine Scotland's Defining 'Local Area' for assessing impact of offshore renewables and other marine developments – Guidance Principles (2022).

8.9.3 Study Area

The socio-economic impacts of the Project have the potential to spread beyond the fixed offshore location of the Project and any impacts buffer that has been considered within other sections of this Scoping Report. The potential impacts of the Project at a local (Aberdeenshire), regional (the east coast of Scotland), national (Scotland) and wider UK scale have been considered within this Chapter due to the distance from shore (Figure 8-15).

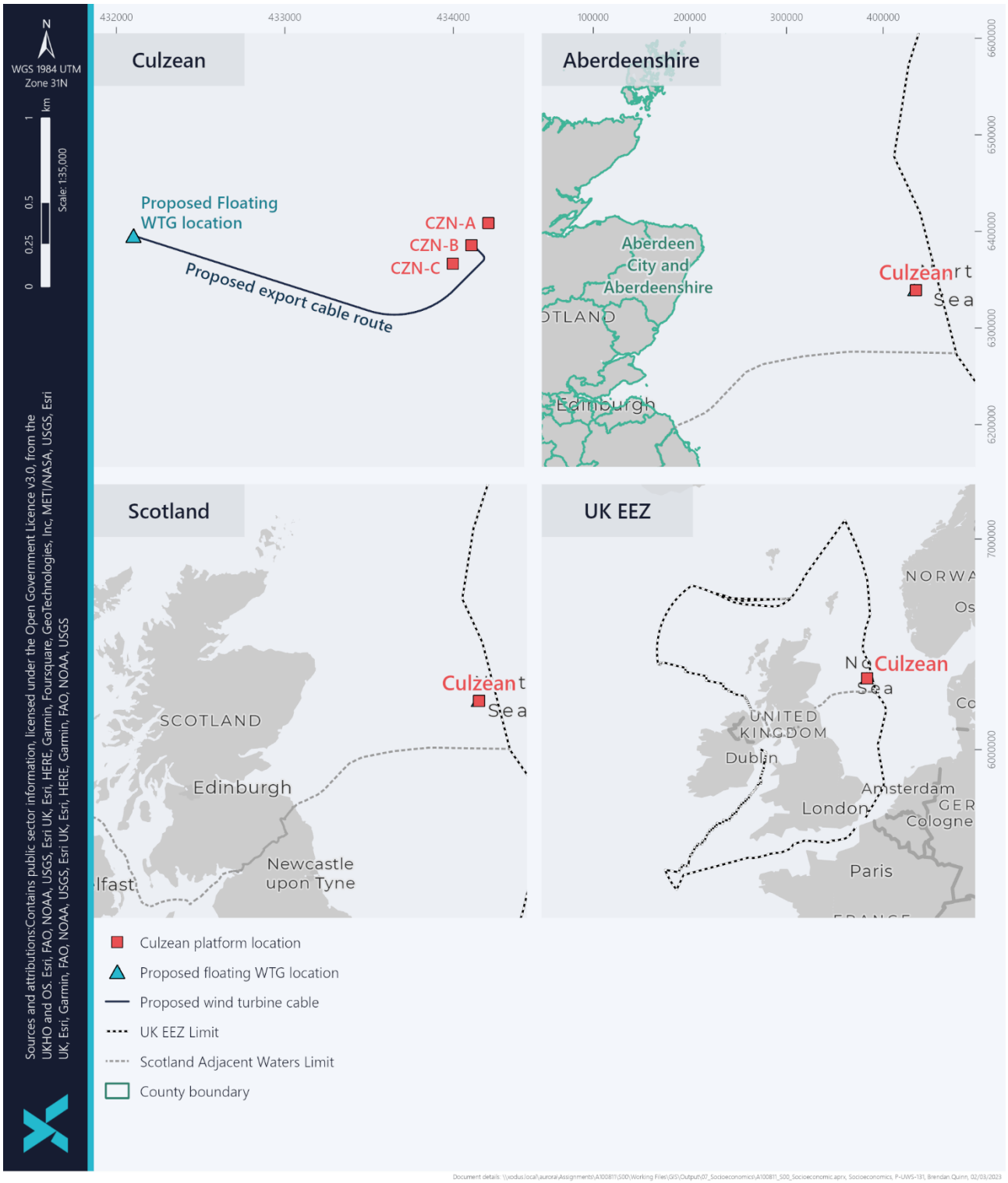

Figure 8-15 Socio-Economics Study Area

8.9.4 Data and Information Sources

The existing data sets and literature with relevant coverage to the Project, which have been used to inform this Scoping Report and will inform the baseline characterisation for the EIA are outlined in Table 8-25.

Table 8-25 Summary of Key Datasets and Reports

TITLE	SOURCE	YEAR	AUTHOR
Regional Gross Value Added (balanced) by industry: all NUTS level regions	https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalandrealregionalgrossvalueaddedbalancedbyindustry	2019	Office of National Statistics (ONS)
Working age population: local authorities	https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/populationprofilesforlocalauthoritiesinengland/2020-12-14	2020	ONS Mid-Year Population Estimates
Sectoral Marine Plan for Offshore Wind Energy: Social and Economic Assessment report	https://www.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy-encompassing-deep-waterplan-options/	2019	Scottish Government

8.9.5 Baseline Environment

An initial desk-based review of literature and available data sources (see Table 8-25) has been undertaken to support this EIA Scoping Report. The findings of this research are summarised in this sub-section to provide an understanding of the regional study area baseline environment and to inform the Scoping process.

The Project will be located offshore, approximately 220 km from the Scottish coastline. There will be very limited impact to onshore socio-economic receptors from the Project therefore impact pathways associated with these receptors have been scoped out. The Project is small in scale and will use existing supply chain, associated with TEPUK, to deploy the WTG and cable. It should also be noted that the WTG is readily available and is currently stored for future deployment. The WTG will be assembled in a yard prior to installation. Therefore, the offshore receptors assessed are limited to commercial fisheries (Chapter 8.1), shipping and navigation (Chapter 8.3), and other sea users (Chapter 8.4) receptors and have been assessed within these chapters.

8.9.6 Embedded Mitigation Proposed for the EIA

Certain mitigation measures have been proposed across the range of topics assessed within this Scoping Report to reduce the potential impacts of the Project on the offshore physical, biological and human environment. It is anticipated that the embedded mitigation measures adopted as part of these assessments will be sufficient to reduce

any potential impacts of socio-economic receptors during all phases of the Project. There are no specific designed-in measures and management plans proposed in relation to socio-economic receptors for the Project.

8.9.7 Scoping of Impacts

The potential impacts of the Project on socio-economic receptors have been summarised in Table 8-26. This table identifies potential impacts during the construction, operation and maintenance, and decommissioning phases of the Project, with a justification for scoping in or out provided.

Table 8-26 Potential impacts on socio-economics during construction/ decommissioning, operations and maintenance of the Project

IMPACT	RELEVANT PROJECT PHASE	SCOPING JUSTIFICATION	SCOPED RESULT
Employment in the supply chain	C, D, O&M	The turbine to be used for the Project has already been sourced and is readily available. Construction will be short in duration (1 month) and therefore effects on employment are expected to be very limited.	Scoped out
Economic output effects in the supply chain	C, D, O&M	The turbine to be used for the Project has already been sourced and is readily available. Construction will be short in duration (1 month) and therefore effects in the supply chain are expected to be very limited.	Scoped out
Access to job opportunities by local residents	C, D, O&M	The Project is solely located offshore. Construction will be short in duration (1 month) and any local employment, resulting from the Project, is considered unlikely.	Scoped out
Impacts on demand for housing and local services	C, D, O&M	The Project is solely located offshore. Construction will be short in duration (1 month) and any impact on housing, resulting from the Project, is considered unlikely.	Scoped out
Impacts on the economic value of tourism and recreation activities	C, D, O&M	The Project is solely located offshore. Construction will be short in duration (1 month). No impacts on tourism are expected due to distance from shore.	Scoped out
Socio-cultural effects	C, D, O&M	The Project is solely located offshore. Construction will be short in duration (1 month). No impacts on socio-culture effects are expected.	Scoped out

8.9.8 Potential Cumulative Effects

Given the small-scale and localised nature of operations, there are not expected to be any cumulative impacts arising from the Project and other developments in the area. Cumulative effects have therefore been scoped out.

Potential cumulative effects associated with commercial fisheries (Chapter 8.1), shipping and navigation (Chapter 8.3), and other sea users (Chapter 8.4) will be assessed in the relevant chapters.

8.9.9 Potential Transboundary Impacts

The potential for transboundary impacts relating to the Project could arise from the purchasing of goods, equipment and services or sourcing a workforce from outside the UK. The turbine is currently being stored outside the UK and will require assembling prior to installation at the Project.

8.9.10 Scoping Questions

- Do you agree that all relevant legislation, policy and guidance documents have been identified for the socio-economic receptors? Are there any additional legislation, policy and guidance documents that should be considered?
- Do you agree that all socio-economic impacts should be scoped out of the EIA?

8.9.11 References

Marine Scotland (2022). Defining 'Local Area' for assessing impact of offshore renewables and other marine developments – Guidance Principles. https://www.gov.scot/publications/defining-local-area-assessing-impact-offshore-renewables-marine-developments-guidance-principles/.

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Scottish Government (2020). Offshore Wind Policy Statement. https://www.gov.scot/publications/offshore-wind-policy-statement/.

9 SUMMARY OF POTENTIAL IMPACTS

The environmental chapters within this Scoping Report identified the impacts that will be scoped in and out of the EIAR. A summary of the environmental impacts that will potentially occur during the construction, O&M and decommissioning of the Project have been summarised in Table 9-1.

Table 9-1 Summary of the potential impacts

IMPACT	CONSTRUCTION		O&M		DECOMMISSIONING		CEA
	Scoped in	Scoped out	Scoped in	Scoped out	Scoped in	Scoped out	
Marine Physical Processes							
Impacts on designated features within designated sites		x		x		x	Scoped out
Loss / alteration of seabed morphology (bathymetry and sediment type)	x						Scoped In
Increase in suspended sediments	x				x		Scoped In
Changes to tide and wave regime				x			Scoped out
Impacts on local sediment transport regime and seabed morphology				x			Scoped out
Introduction of scour				x			Scoped out
Impacts to stratification				x			Scoped out
Water and Sediment Quality							
Impacts on water quality status of designated waters		x		x		x	Scoped out

IMPACT	CONSTRUCTION		O&M		DECOMMISSIONING		CEA
	Scoped in	Scoped out	Scoped in	Scoped out	Scoped in	Scoped out	
Changes in water and sediment quality due to accidental discharges from vessels		x		x		x	Scoped out
Benthic Ecology							
Long-term loss to benthic habitats and species.	x				x		Scoped In
Temporary habitat loss or disturbance	x				x		Scoped In
Increased suspended sediment concentrations and associated deposition	x				x		Scoped In
Increased risk of introduction and spread of INNS		x		x		x	Scoped out
Impact to habitats or species as a result of pollution or accidental discharge		x		x		x	Scoped out
Disturbance of contaminated sediments	x				x		Scoped In
Removal of artificial hard substrate during decommissioning					x		Scoped In
Hydrodynamic changes leading to scour around subsea infrastructure		x		x		x	Scoped out
Colonisation of hard structures			x				Scoped In
Impact of cable thermal load or EMF on benthic ecology				x			Scoped out
Fish and Shellfish							
Electromagnetic fields (EMF)				x			Scoped out

IMPACT	CONSTRUCTION		O&M		DECOMMISSIONING		CEA
	Scoped in	Scoped out	Scoped in	Scoped out	Scoped in	Scoped out	
Disturbance or damage to sensitive species due to underwater sound generated from construction and decommissioning activities		x				x	Scoped in
Disturbance or damage to sensitive species due to underwater sound generated during the operation and maintenance phase				x			Scoped out
Temporary habitats loss or disturbance during the installation of the cable and the anchors	x				x		Scoped in
Temporary habitat loss or disturbance due to the presence of the cable and the anchors				x			Scoped out
Temporary increases in suspended sediment concentrations and potential sedimentation / smothering on fish and shellfish during construction and decommissioning activities		x		x		x	Scoped out
Long term habitat loss due to presence of WTG anchors and the cable on the seabed and associated scour protection				x			Scoped out
Impact to habitats or species as a result of pollution or accidental discharge		x		x		x	Scoped out
Fish aggregation around the floating structure and associated infrastructure				x			Scoped out
Marine Mammals							
Noise-related impacts to marine mammals associated with construction/ operational/ decommissioning noise, including the risk of injury and disturbance/displacement		x		x		x	Scoped in

IMPACT	CONSTRUCTION		O&M		DECOMMISSIONING		CEA
	Scoped in	Scoped out	Scoped in	Scoped out	Scoped in	Scoped out	
Indirect impacts of construction noise on the prey species of marine mammals		x		x		x	Scoped out
Vessel disturbance		x				x	Scoped out
Risk of injury resulting from collision of marine mammals with installation vessels		x				x	Scoped out
Impacts associated with effects upon marine water quality, particularly due to any disturbed sediments affecting turbidity		x				x	Scoped out
Risk of injury resulting from entanglement of marine mammals with mooring lines or cable, including secondary interactions with derelict fishing gears, or entrapment with mooring systems				x			Scoped out
Risk of injury resulting from collision of marine mammals with WTG substructures				x			Scoped out
Displacement or barrier effects resulting from the physical presence of devices and infrastructure				x			Scoped out
Risk of injury resulting from collision of marine mammals with operations and maintenance vessels				x			Scoped out
Risk associated with Electromagnetic Fields (EMFs) associated with subsea cabling				x			Scoped out
Impacts associated with effects upon marine water quality due to any accidental release of pollutants.				x			Scoped out
Long term habitat change, including the potential for change in foraging opportunities				x			Scoped out

IMPACT	CONSTRUCTION		O&M		DECOMMISSIONING		CEA
	Scoped in	Scoped out	Scoped in	Scoped out	Scoped in	Scoped out	
Commercial Fisheries							
Loss of access to fishing grounds due to the presence of vessels and safety zones	x		x		x		Scoped in
Displacement of fishing activity into other areas		x		x		x	Scoped out
Interference with fishing activity as a result of increased vessel traffic	x		x		x		Scoped in
Displacement to other fishing grounds due to the presence of floating foundations, associated moorings and safety zones			x				Scoped in
Obstruction of regular fishing vessel transit routes due to the presence of floating foundations and associated moorings				x			Scoped out
SLVIA							
Effects on Visual Amenity		x		x		x	Scoped out
Seascape and Landscape		x		x		x	Scoped out
Shipping and Navigation							
Vessel displacement due to construction and/or installation activities	x				x		Scoped in
Vessel to structure allision risk	x		x		x		Scoped in
Vessel to vessel collision between a 3rd-party vessel and a project vessel including infrastructure being towed to site	x		x		x		Scoped in
Increased vessel to vessel collision risk between 3rd-party vessels due to vessel displacement.	x		x		x		Scoped in

IMPACT	CONSTRUCTION		O&M		DECOMMISSIONING		CEA
	Scoped in	Scoped out	Scoped in	Scoped out	Scoped in	Scoped out	
Vessel interaction with subsea cable and mooring lines associated with the Project			x				Scoped in
Vessel traffic displacement due to the presence of the Project			x				Scoped in
Loss of station			x				Scoped in
Interference with marine navigation equipment			x				Scoped in
Reduction of emergency response capability due to increased incident rates and/or reduced access for SAR responders			x				Scoped in
Other Sea Users							
Obstruction of oil and gas activities due to the presence of safety zones and construction vessels during installation and decommissioning activities	x		x		x		Scoped in
Obstruction of marine renewable energy activities due to the presence of safety zones and construction vessels during installation activities	x		x		x		Scoped in
Obstruction of military PEXA activities due to the presence of safety zones and construction vessels during installation and decommissioning activities		x		x		x	Scoped out
Obstruction of electricity cable installation activities due to the presence of safety zones and construction vessels during installation and decommissioning activities	x		x		x		Scoped in
Obstruction of recreational and tourism activities		x		x		x	Scoped out
Obstruction of aquaculture activities		x		x		x	Scoped out

IMPACT	CONSTRUCTION		O&M		DECOMMISSIONING		CEA
	Scoped in	Scoped out	Scoped in	Scoped out	Scoped in	Scoped out	
Offshore Air Quality, Airborne Noise and Vibration							
Piling activities generating airborne noise/vibration that may impact other marine users		x				x	Scoped out
Cable installation activities generating noise/vibration that may impact marine users		x				x	Scoped out
Auxiliary construction activities (project vessels, use of other machinery and generators) generating noise and vibrations that may impact marine users		x				x	Scoped out
Exhaust emissions from offshore vessels used in the construction phase having the potential to increase local ambient concentrations of SO2, NO2, PM10 and PM2.5 that may impact marine users		x				x	Scoped out
Operation of the WTG producing airborne noise/vibration				x			Scoped out
Maintenance vessel and equipment activity noise, vibration or vessel emissions that may impact marine users				x			Scoped out
Climate Change							
Greenhouse gas emissions		x		x		x	Scoped out
Project infrastructure with vulnerability to climate change				x		x	Scoped out
In-combination climate change impact		x		x		x	Scoped out
Marine Archaeology							
Loss of or damage to known maritime and aviation receptors from direct impacts	x				x		Scoped in

IMPACT	CONSTRUCTION		O&M		DECOMMISSIONING		CEA
	Scoped in	Scoped out	Scoped in	Scoped out	Scoped in	Scoped out	
Loss of or damage to unknown maritime and aviation receptors from direct impacts	x				x		Scoped in
Loss of or damage to submerged prehistory receptors from direct impacts		x				x	Scoped out
Indirect disturbance to maritime and aviation receptors caused by anchoring and mooring systems	x				x		Scoped in
Loss or damage to known and unknown maritime and aviation receptors from direct impacts			x				Scoped in
Indirect disturbance to maritime and aviation receptors caused by additional cable protection used during repair and maintenance			x				Scoped in
Aviation							
Civil airport patterns and procedures		x		x		x	Scoped out
Military aerodrome patterns and procedures		x		x		x	Scoped out
Civil ATC radar		x		x		x	Scoped out
Military ATC radar		x		x		x	Scoped out
Military AD radar		x		x		x	Scoped out
Low flying (including SAR)	x		x		x		Scoped in
HMRs		x		x		x	Scoped out
Offshore helicopter installations (Culzean platform)		x		x		x	Scoped out

IMPACT	CONSTRUCTION		O&M		DECOMMISSIONING		CEA
	Scoped in	Scoped out	Scoped in	Scoped out	Scoped in	Scoped out	
Local Airspace Restrictions (Prohibited/Restricted/Danger Areas and Military Exercise and Training Areas (MEXAs)		x		x		x	Scoped out
Met Office radar		x		x		x	Scoped out
Socio-economic							
Employment in the supply chain		x		x		x	Scoped out
Economic output effects in the supply chain		x		x		x	Scoped out
Access to job opportunities by local residents		x		x		x	Scoped out
Impacts on demand for housing and local services		x		x		x	Scoped out
Impacts on the economic value of tourism and recreation activities		x		x		x	Scoped out
Socio-cultural effects		x		x		x	Scoped out

10 SUGGESTED STRUCTURE OF THE EIA REPORT

The proposed structure for the EIAR is provided in Table 10-1. The EIAR will be produced in line with the legislative requirements in relation to Scotland, and comply with the EIA Regulations and other relevant good practice guidance. For individual topics, it is recognised that will have their own specific guidance and standards which will be applied in addition to the generic EIA wide standards.

Table 10-1 Proposed structure for the EIAR

CHAPTER	TITLE
Non-technical summary	
1 Introduction and Overview	
1.1	Introduction
1.2	Legislative Context and Regulatory Requirements
1.3	Site Selection and Consideration of Alternatives
1.4	Project Description
1.5	Stakeholder Engagement
1.6	EIA Methodology
2 EIA Chapters	
2.1	Marine Physical Processes
2.2	Benthic Ecology
2.3	Fish and Shellfish Ecology
2.4	Marine Mammals
2.5	Ornithology
2.6	Commercial Fisheries
2.7	Shipping and Navigation
2.8	Aviation and Radar
2.9	Marine Archaeology
2.10	Other Sea Users
3 Conclusion	
3.1	Summary of Impacts and Mitigations

APPENDIX A GLOSSARY AND ABBREVIATIONS / ACRONYMS

A.1 Glossary

TERM	DEFINITION
Applicant	TotalEnergies E&P UK Ltd (TEPUK) is the applicant.
Cumulative Effect	Changes to the environment caused by the potential impacts of the Project combined with the potential impacts of present and future projects, plans or activities.
Culzean Floating Wind Pilot (CFWP) (the Project)	The entire Offshore Development, including all offshore components (Floating wind turbine, mooring lines/ Anchoring, transmission cable) and all project phases from development to decommissioning.
Culzean Platform	Oil and gas platform complex, comprising a Well Head Platform (WHP), a Central Processing Facility Platform (CPF) and a separate Utilities and Living Quarter Platform (ULQ) in the Central North Sea (CNS) in the Culzean field.
Design Envelope	Project parameters to be assessed as part of the EIA process.
EIA Regulations	The term used to refer to The Marine Works (Environmental Impact Assessment) Regulations 2007.
Embedded Mitigation	Mitigation measures included in the Project design.
Environmental Impact Assessment (EIA)	Process of identification and assessment of the potential environmental impacts associated with the Project.
Environmental Impact Assessment Report (EIAR)	A report documenting the findings and conclusions of the EIA process in accordance with the EIA Regulations.
Electromagnetic Fields (EMF)	EMF emissions are generated from the transmission of electricity through the cable.
European Protected Species	Species listed in Annex IV of the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna) are classified as EPS. This provision identifies species of community interest in need of strict protection, as per Article 12 of the Directive.
Exclusivity Offer	Agreement awarded by the Crown Estate Scotland (CES) following successful INTOG big and prior to seabed lease.
Export Cable	The cable tying the WTG to the Culzean platform.
Innovation and Targeted Oil and Gas (INTOG) Leasing Round	Process by which developers will be able to apply for the rights (under the Crown Estate Scotland) to build offshore wind farms specifically for the purpose of providing low carbon electricity to power oil and gas installations and help to decarbonise the sector.
Marine Licence	Licence granted under The Marine and Coastal Access Act 2009
Maximum Design Scenario	Maximum Project design parameters

TERM	DEFINITION
Navigation Risk Assessment (NRA)	Process of identifying and assessing hazards and risks to vessel navigation from a proposed installation
Study Area	Receptor specific area used to characterise the baseline.
Survey Area	The area surveyed during specific site surveys
Floating Wind Turbine Generator (WTG)	The Culzean floating WTG and floater.
Safety Zone	A defined area around an infrastructure that other vessels should not enter.
Scoping Opinion	The Scoping Opinions that will be provided by Marine Scotland Licensing Operations Team ("MS-LOT") on behalf of Scottish Ministers under the EIA Regulations
Scoping Report	A document setting out the Project's EIA proposed content.
Scour Protection	Protective material required to avoid/mitigate against sediment being eroded around anchors
Subtidal	The region of waters below the level of low tide.
Transboundary Effects	Effects that arise when impacts from a development within one European Economic Area (EEA) state's territory affects the environment of another EEA state(s).

A.2 Acronyms/Abbreviations

ACRONYM AND ABBREVIATION	TERM
AARA	Air-to-Air Refuelling Area
AD	Air Defence
AEZ	Archaeological Exclusion Zones
AIS	Automatic Identification System
AL1	Action Level 1
AL2	Action Level 2
AOC	Aircraft Operator Certificate
ATC	Air Traffic Control
ATON	aid to navigation
ATS	Air Traffic Services
ATT	Admiralty Total Tide
BGS	British Geological Survey
BODC	British Oceanographic Data Centre

ACRONYM AND ABBREVIATION	TERM
C	Construction
CAA	Civil Aviation Authority
CAFS	Cleaner Air for Scotland
CAP	Civil Aviation Publication
CBRA	Cable Burial Risk Assessment
CCS	Carbon Capture Storage
CEA	Cumulative Effects Assessment
CEF	Cumulative Effects Framework
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CES	Crown Estate Scotland
CFWP	Culzean Floating Wind Pilot
CGNS	Celtic and Greater North Seas
CIfA	Chartered Institute for Archaeologists
CNS	Central North Sea
CO_2	Carbon Dioxide
CoCP	Cod of Construction Practice
COLREGs	International Regulations for the Prevention of Collision at Sea
COP	Conference of Parties
CPA	Coast Protection Act
CPF	Central Processing Facility Platform
CRM	Collision Risk Modelling
CSEMP	Clean Seas Environment Monitoring Programme
CTD	Conductivity Temperature Depth
CTV	Crew Transport Vessels
D	Decommissioning
DCF	Data Collection Framework
DGC	Defence Geographic Centre
DSLP	Design Specification and Layout Plan
DTI	Department of Trade and Industry
EBS	Environmental Baseline Survey
EC	European Council

ACRONYM AND ABBREVIATION	TERM
EcIA	Ecological Impact Assessment
EEA	European Economic Area
EEZ	Economic Exclusive Zone
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMF	Electromagnetic Fields
EMP	Environmental Management Plan
EPS	European Protected Species
EPSRC	Engineering and Physical Sciences Research Council
ERCoP	Emergency Response Co-operation Plan
ESCA	European Subsea Cables Association
ETAP	Eastern Trough Area Project
EU	European Union
FAD	Fish Aggregation Device
FEAST	Feature Activity Sensitivity Tool
FEPA	Food and Environmental Protection Act
FIR	Fisheries Industry Representative
FIR	Flight Information Region
FLO	Fisheries Liaison Officer
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
FMS	Fisheries Management and Mitigation Strategy
FPSO	Floating Production Storage and Offloading
FSO	Floating Storage and Offloading
GEL	Gardline Environmental Ltd
GHG	Greenhouse Gasses
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, Version 3
GNS	Greater North Sea
GPP	Guidance for Pollution Prevention
GT	Gross Tonnage
GW	Gigawatts
HERs	Historic Environment Records
HES	Historic Environment Scotland

ACRONYM AND ABBREVIATION	TERM
HMR	Helicopter Main Routes
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IAQM	Institute of Air Quality Management
IBTS	International Bottom Trawl Survey
ICCI	In Combination Climate-Change Impact
ICES	International Council for Exploration of the Sea
ICPC	International Cable Protection Committee
IHLS	International Herring Larvae Survey
IMO	International Maritime Organization
INTOG	Innovation and Targeted Oil and Gas
ISQGs	Interim Sediment Quality Guidelines
IUCN	International Union for Conservation of Nature
JNAPC	Joint Nautical Archaeology Policy Committee
JNCC	Joint Nature Conservation Committee
KHZ	Kilohertz
LMP	Lighting and Marking Plan
LPA	Local Planning Authorities
m	Metres
MAA	Military Aviation Authority
MAIB	Marine Accident Investigation Branch
MarLIN	Marine Life Information Network
MARPOL	Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zone
MDAC	Methane Derived Authigenic Carbonate
MDS	Maximum Design Scenarios
MGN	Marine Guidance Note
MMMP	Marine Mammal Mitigation Protocols
MMO	Marine Management Organisation
MoD	Ministry of Defence
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan

ACRONYM AND ABBREVIATION	TERM
MPS	Marine Policy Statement
MS-LOT	Marine Scotland-Licensing Operations Team
MU	Management Unit
MW	Megawatts
NAEI	National Atmospheric Emissions Inventory
NBN	National Biodiversity Network
NCMPA	Nature Conservation Marine Protected Area
NEDC	National Emission Demolition and Construction
NH_3	Ammonia
NLB	Northern Lighthouse Board
NMP	National Marine Plan
NMPI	National Marine Plan Interactive
NMVOC	Non-Methane Volatile Organic Compounds
NNS	Northern North Sea
NOTAM	Notice to Airmen
NO_x	Nitrous Oxides
NRA	Navigational Risk Assessment
NRHE	National Record of the Historic Environment
NS	NatureScot
NS	North Sea
NSP	Navigational Safety Plan
NSTA	North Sea Transition Authority
O & M	Operation and Maintenance
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OESEA4	Offshore Energy Strategic Environmental Assessment 4
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OREI	Offshore Renewable Energy Installations
OSPAR	Oslo and Paris Convention
PAD	Protocol for Archaeological Discoveries
PEL	Probable Effect Levels
PEXA	Military Practice and Exercise Areas
PM2.5	Particulate Matter

ACRONYM AND ABBREVIATION	TERM
PMF	Priority Marine Features
pre-FEED	Preliminary-Front End Engineering Design
RBMP	River Basin Management Plans
REZ	Renewable Energy Zone
RIAA	Report to Inform the Appropriate Assessment
RIDG	Renewable Infrastructure Development Group
RLOS	Radar Line of Sight
RNLI	Royal National Lifeboat Institution
ROV	Remotely Operated Vehicles
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and Rescue
SCANS	Small Cetaceans in the European Atlantic and North Sea
SD	Standard Deviation
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen's Federation
SLVIA	Seascape and Landscape Visual Impact Assessment
SMP	Sectoral Marine Plan
SNCB	Statutory Nature Conservation Bodies
SNH	Scottish Natural Heritage
SO_2	Sulfur Dioxide
SOLAS	International Regulations for the Safety of Life at Sea
SO_x	Sulfur Oxides
SPA	Special Protection Areas
SSC	Suspended Sediment Concentrations
SWFPA	Scottish Whitefish Producers Association
TAC	Total Allowable Catch
TCE	The Crown Estate
TEL	Threshold Effect Levels
TEPUK	TotalEnergies E&P UK Limited
THC	Total Hydrocarbons
TOM	Total Organic Matter

ACRONYM AND ABBREVIATION	TERM
TRUK	TotalEnergies Renewables UK Limited
UK	UK Kingdom
UK IAIP	UK Integrated Aeronautical Information Package
UK Mil AIP	UK Military Aeronautical Information Publication
UKCS	United Kingdom Continental Shelf
UKHO	UK Hydrodynamic Office
ULQ	Utilities and Living Quarter Platform
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UXO	Unexploded Ordnance
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VMP	Vessel Management Plan
VMS	Vessel Monitoring System
WCA	Wildlife and Countryside Act
WHO	World Health Organization's
WHP	Well Head Platform
WTG	Wind Turbine Generator
ZTV	Zone of Theoretical Visibility