

TotalEnergies E&P North Sea UK Ltd

Culzean – Floating Offshore Wind Turbine Safety Zone Application

GB-CZT-00-TOTA-000014



Safety Zone Application

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ACRONYMS, ABBREVIATIONS and DEFINITIONS

AHV	Anchor Handling Vessel
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
AtoN	Aid to Navigation
COLREGs	International Convention of the Prevention of Collisions at Sea
CMS	Construction Method Statement
CNS	Central North Sea
CPA	Closest Point of Approach
CPF	Central Processing Facility
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ERRV	Emergency Response Rescue Vessel
FLO	Fisheries Liaison Officer
FSO	Floating Storage and Offloading
GT	Gross Tonnes
HSE	Health and Safety Executive
HVAC	High Voltage Alternating Current
kV	kilovolt
LMP	Lighting and Marking Plan
MCA	Maritime and Coastguard Agency
MD-LOT	Marine Directorate Licensing Operations Team
MGN	Marine Guidance Note
MRCC	Maritime Rescue Coordination Centre
MSL	Mean Sea Level
MW	Megawatts
MWL	Mean Water Level
NRA	Navigational Risk Assessment
NSVMP	Navigational Safety and Vessel Management Plan
OMP	Operation and Maintenance Programme
OREI	Offshore Renewable Energy Installation
RAM	Restricted Ability to Manoeuvre
SWFPA	Scottish White Fish Producers Association
TEPNSUK	TotalEnergies E&P North Sea UK Limited
UKCS	United Kingdom Continental Shelf
VHF	Very High Frequency
VMS	Vessel Monitoring System
ULQ	Living Quarters and Utility Platform
WHP	Wellhead Platform
WTG	Wind Turbine Generator

1. INTRODUCTION

TotalEnergies E&P North Sea UK Limited (hereafter referred to as TEPNSUK) is developing the Culzean Floating Offshore Wind Pilot Project (Culzean Floating Wind). A marine licence consent has been granted by Marine Directorate Licensing Operations Team (MD-LOT) under the Marine and Coastal Access Act (2009).

The Culzean Floating Wind Project is located in the central North Sea (CNS), approximately 222 kilometres (km) east of Aberdeen in the UK Continental Shelf (UKCS) Block 22/25a. The Culzean Floating Wind Project will deploy one floating wind turbine generator (WTG) with a capacity of 3 MW with test floater and mooring system technologies for offshore floating wind. This is a pilot Project which aims to;

- i. Test and qualify the floater technology designed by Ocergy; and
- ii. Perform a hybridisation showcase for TotalEnergies to demonstrate the feasibility of platform electrification in an offshore environment.

The Culzean Floating Wind Project will be installed approximately 2 km west of the Culzean oil and gas platform, linked via an export cable to the Culzean Central Processing Facility (CPF) (Figure 2-1). The wind turbine will be connected to the plant power management system to allow the export of the produced electricity to the site. The Culzean facility is a stand-alone development involving three bridge linked platforms including a Wellhead Platform (WHP), Central Processing Facility (CPF) with flare tower, and separate Utility Living and Quarters Platform (ULQ).

The Project does not require a grid connection to shore and will be entirely within the offshore region between 12 nautical miles (nm) and the Exclusive Economic Zone (EEZ) boundary.

The Floating WTG will be connected to the Culzean facilities via an existing J-tube on the platform.

The design life for the WTG is 10 years.

Further information on the Culzean Floating Wind project is set out in the accompanying Environmental Impact Assessment (EIA) Report, in Chapter 4: Project Description.

1.1 Objectives

This safety zone application presents TEPNSUK's justification for implementing a safety zone around the Culzean Floating Wind Project offshore renewable energy installation (OREI). This document sets out the following:

- The safety zone that will be applied for;
- The requirement (justification) for safety zones; and
- The scope of the application.

The following safety zone is being applied for to cover construction, operation and maintenance phases:

- A single permanent 500 m safety zone around the Floating WTG structure, to be in place from the commencement of construction (as defined by the marine licence) and throughout the operational life, including periods of maintenance and decommissioning.

1.2 Legislative Context

Section 95 and Schedule 16 of the Energy Act 2004 sets out the requirements for applying for a safety zone around an Offshore Renewable Energy Installation (OREI). The provisions apply to territorial waters (0-12 nm) in or adjacent to England, Scotland and Wales and to waters in the UK Renewable Energy Zone (12-200 nm). The Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007 clarify the requirements for application, publication, advertising, consultation and control of safety zones

Marine Directorate – Licensing Operations Team (MD-LOT) administers applications for the declaration of safety zones around OREIs in Scottish waters.

Table 1-1 Compliance with Energy Act 2004

Item	Requirement	Where Addressed Within this Document
3(1) An application for a safety zone notice must describe, by way of a map	(a) The place where the relevant renewable energy installation is to be, or is being, constructed, extended, operated, or decommissioned. (b) The waters in relation to which any declaration applied for will establish a safety zone.	Section 2.1 provides the location of the Culzean Floating Wind Project.
3(2) The application must also –	(a) Describe the other provisions the application asks to be included in the notice applied for; and (b) Include such other information as may be prescribed by regulations made by the appropriate minister ¹ .	Requirements under the Electricity Regulations 2007 are outlined in Table 1-2. As detailed in relation to Table 2.2, Marine Directorate requirements are based on the Electricity Regulations 2007.
3(3)	An application is not allowed to be made orally.	This document constitutes a written application to Marine Directorate.

¹ It should be noted that the application is being made to Marine Directorate as the relevant authority for the safety zone process for offshore renewables in Scottish waters.

Table 1-2 Compliance with Electricity Regulations 2007

Item	Requirement	Where Addressed Within this Document
<p>3. An application for the declaration under section 95(2) of a safety zone must include the following information (in addition to that required by paragraph 3(1) and 3(2)(a) of Schedule 16)— (a) In relation to any proposed or existing relevant renewable energy installation –</p>	<p>(i) A description of the installation and its proposed or existing location and dimensions (including an explanation of how much of it is (or is expected to be) visible above the water line and how much below it), supported by drawings. (ii) A description of how the installation operates (or is to operate). (iii) A description of the location (or proposed location) of: (aa) Any electric line used (or proposed to be used) for the conveyance of electricity to or from the installation; and (bb) Any connection to such an electric line (iv) A description of the location (or proposed location) of any offshore sub-station housing connection equipment. (v) Where the zone is sought in respect of more than one relevant renewable energy installation, the proposed or existing distances between such installations. (vi) Details of any navigational marking that has been specified for use with an installation of the description in question by a general lighthouse authority.</p>	<p>The location of the installation is provided in Section 2.1. A description of the various components required is provided in Section 3 and includes key properties for each infrastructure type. Overviews of processes during the construction phase and operation and maintenance phase are provided in Sections 4 and Section 5 respectively</p> <p>A description of the cable for the Culzean Floating Wind Project is provided in Section 3.3.</p> <p>Details of navigational lighting and marking to be implemented during the construction and operation and maintenance phases are outlined in Section 6.</p>
<p>3(c) In relation to the proposed safety zone –</p>	<p>(i) Whether the zone relates to the construction, extension, operation or decommissioning of the relevant renewable energy installation. (ii) Whether the applicant seeks the declaration of a standard safety zone, or if not, what dimensions are sought for that zone. (iii) A description of those works or operations in respect of which the zone is being applied for and their estimated date and duration. (iv) Whether the applicant proposes that the area of the zone will vary and any factors or determinations by reference to which the applicant proposes that such variation may take place (v) Whether the zone relates to major maintenance works in respect of a relevant renewable energy installation which has become operational.</p>	<p>(i) The safety zone to be applied for (including the relevant phases) is stated in Section 1.1. (ii) TEPNSUK are not applying for a standard safety zone as set out in the regulations, as a 500m safety zone is requested throughout the lifetime of the project. The safety zone to be applied for (including the dimensions) are stated in Section 1.1. (iii) The safety zone to be applied for is stated in Section 1.1. The scheduled dates for construction processes are provided in Section 2.2. (iv) Not applicable to the Development. (v) The safety zone applied for is a permanent safety zone which includes for major maintenance</p>

Item	Requirement	Where Addressed Within this Document
	<p>(vi) A statement setting out what steps, if any, the applicant proposes to take to monitor vessels and activities within the zone.</p> <p>(vii) Except where the Secretary of State has notified the applicant that it is not required, an up-to-date shipping traffic survey for the waters comprising the zone</p>	<p>activities as stated in Section 1.1 and 8.</p> <p>(vi) Planned monitoring is outlined in Section 11.</p> <p>(vii) A review of up to date Automatic Identification System (AIS) data for the area has been undertaken and is discussed in Section 9.</p>
3(d)	<p>An assessment of the extent to which navigation might be possible or should be restricted might be possible or should be restricted, and whether restrictions would cause navigational problems, within or near waters where the relevant renewable energy installation is to be, or is being, constructed, extended, operated or decommissioned, as the case may be.</p>	<p>A risk assessment for safety zone is provided in Section 10 and potential impacts due to the presence of the safety zone are identified and assessed in Section 10.</p>
4(1) The applicant shall publish notice of an application—	<p>(a) In two successive weeks in one or more local newspapers which are likely to come to the attention of those likely to be affected by the safety zone</p> <p>(b) In Lloyd’s List and in one or more national newspapers.</p> <p>(c) If there are in circulation one or more appropriate fishing trade journals which are published at intervals not exceeding one month, in at least one such trade journal.</p> <p>(e)² In the case of an application relating to a safety zone proposed or located wholly or partly in an area of Scottish waters or an area of waters in the Scottish part of the Renewable Energy Zone (1), the Edinburgh Gazette.</p>	<p>Notice of the application shall be published in the following publications</p> <ul style="list-style-type: none"> • Press and Journal (local newspaper); • Lloyd’s List; • The Herald (national newspaper); • Fishing News (trade journal); • Kingfisher; and • Edinburgh Gazette
4(2) The applicant shall, at the same time as publishing the notice under paragraph (1)(a), send a copy of the notice to—requesting that the notice be displayed for a period of not less than 14 days at an address accessible during normal office hours to members of the public	<p>(a) The harbour masters of ports whose users are in the opinion of the applicant likely to be affected by the application</p> <p>(b) The sector office of the Maritime and Coastguard Agency which is responsible for operations in the waters in which the safety zone is proposed or located.</p>	<p>Aberdeen Maritime Rescue Coordination Centre under the remit of the Offshore Renewable Energy Liaison Officer will also be provided with the notice.</p>

² Points (d) and (f) relate to safety zones located in non-Scottish waters and therefore are not applicable.

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Item	Requirement	Where Addressed Within this Document
likely to be affected by the application.		

2. DEVELOPMENT OVERVIEW

This section provides a brief overview of the Project including aspects deemed relevant to this Safety Zone Application. Further information will be provided in the Development Specification and Layout Plan (GB-CZT-00-TOTA-000006).

2.1 Overview and Layout

Once completed, the Culzean Floating Wind Project will consist of the following main components;

- One floating WTG (with a maximum generating capacity of 3 MW);
- One floating substructure;
- Three mooring lines
- Three drag anchors;
- One approximately 2.5 km long export cable, buried (or protected if burying is not possible); and
- Associated scour and cable protection (if required).

The Project is located approximately 222 km east of Aberdeen, there is no connection to shore. The location of the Project is shown in Figure 2-1. The coordinates are provided in Table 2-1.

A second mooring system may potentially be installed at a later date as part of the Culzean Floating Wind scientific programme. This would test a new low impact moorings design. If this goes ahead, an update will be made at the appropriate time.

Table 2-1 WTG infrastructure coordinates

Latitude (WGS84)		Longitude (WGS84)	
Degrees, minutes, seconds	Decimal degrees	Degrees, minutes, seconds	Decimal degrees
57° 11' 29.3" N	57.1914 N	1° 52' 35.3" E	1.8764 E

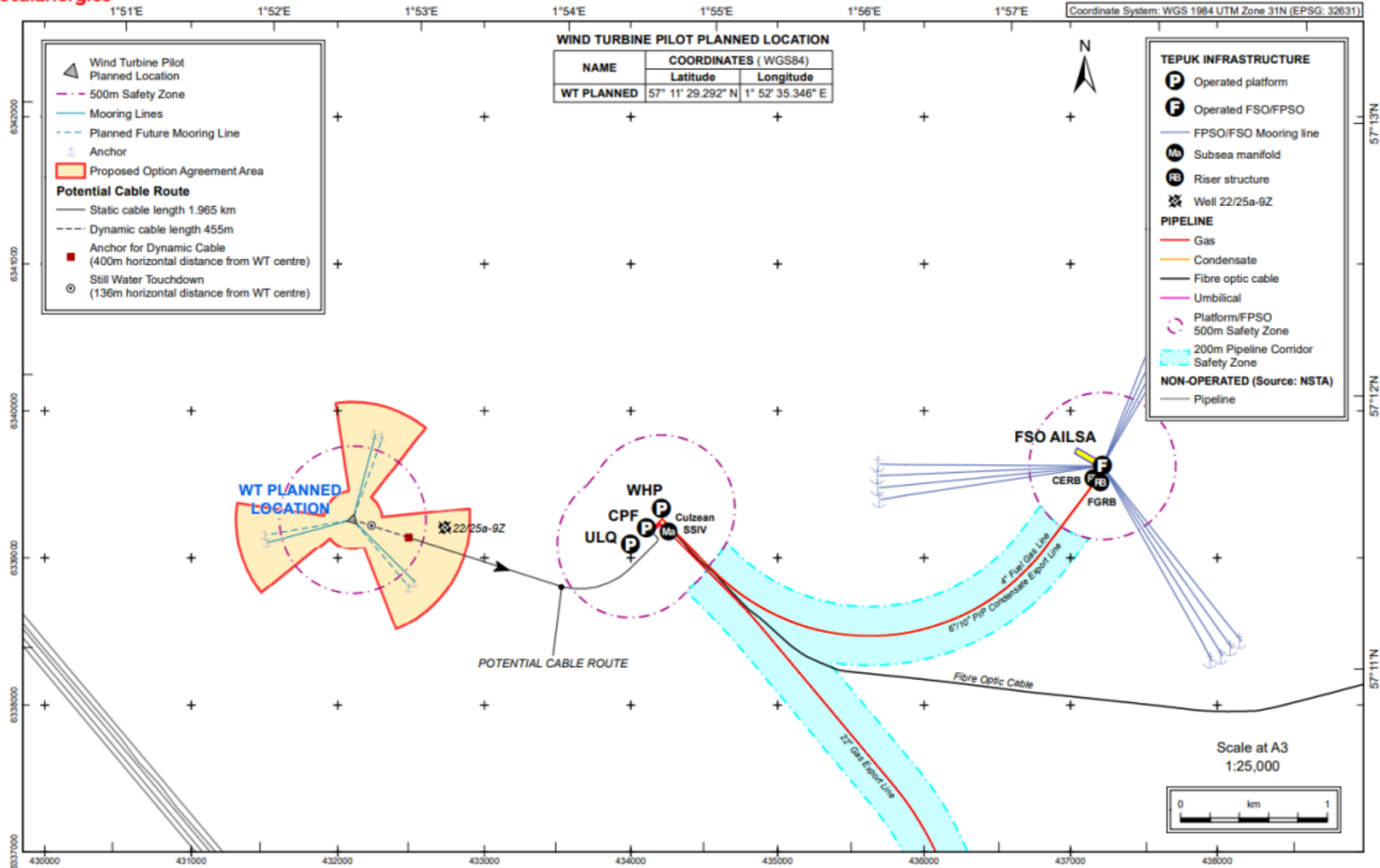


Figure 2-1 Culzean Floating Wind planned layout

2.2 Development Schedule

The current construction programme is presented in Figure 2-2. It is noted that the construction programme shown is valid as of the date of submission of this application (November 2024) and may be subject to change due to a number of factors including weather delays, vessel availability, and minor operational refinements. For the latest construction programme, please refer to the Culzean Floating Offshore Wind Construction Method Statement (GB-CZT-00-TOTA-000005) which will be available from the Marine Directorate website³. The current construction schedule is presented in Figure 2-2.

Project milestone	2025						
	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Station Keeping System Installation							
Cable Installation							
FOWT Tow & Mooring Hook-up							
Cable Pull-in, Connection & Commissioning							
Handover to Culzean Field Operations							

Figure 2-2 Indicative Construction Programme

First power is expected in Q3 2025.

³ <https://marine.gov.scot/ml/culzean-floating-offshore-wind-turbine-pilot-project>

3. PROJECT COMPONENTS

This section provides an overview, and relevant parameters of the key offshore components associated with the Project.

3.1 Floating WTG

A single WTG will be installed, supported by a floating (semi-submersible) substructure, a buoyancy stabilised platform which floats semi-submerged on the surface of the ocean whilst anchored to the seabed.

Tables 3-1 and 3-2 summarises the key properties of the deemed of relevance to this Safety Zone Application.

Table 3.1: WTG Properties and key dimensions

Manufacturer	Vestas
Number of WTGs	1
Generating Capacity (per WTG)	3 MW
Rotor diameter	112 m
Number of Blades	3
Maximum Blade Width	4 m
Hub Height above Lowest Astronomical Tide (LAT)	78 m
Tip Height above Mean Sea Level (MSL)	134 m
Clearance Blade Tip to Sea Surface above LAT	22 m

Table 3.2: Floating Substructure Properties and key dimensions

Manufacturer	Ocergy OCG-WIND design
Type	Semi-Submersible
Number	1
Floating substructure height	23 m (maximum height of outer columns)
Floating substructure area	~2,500 m ²
Maximum height above Mean Water Level (MWL)	Maximum 9.4 m freeboard above MWL Idling draft of 13.6 m
Extent of excursion	34 m

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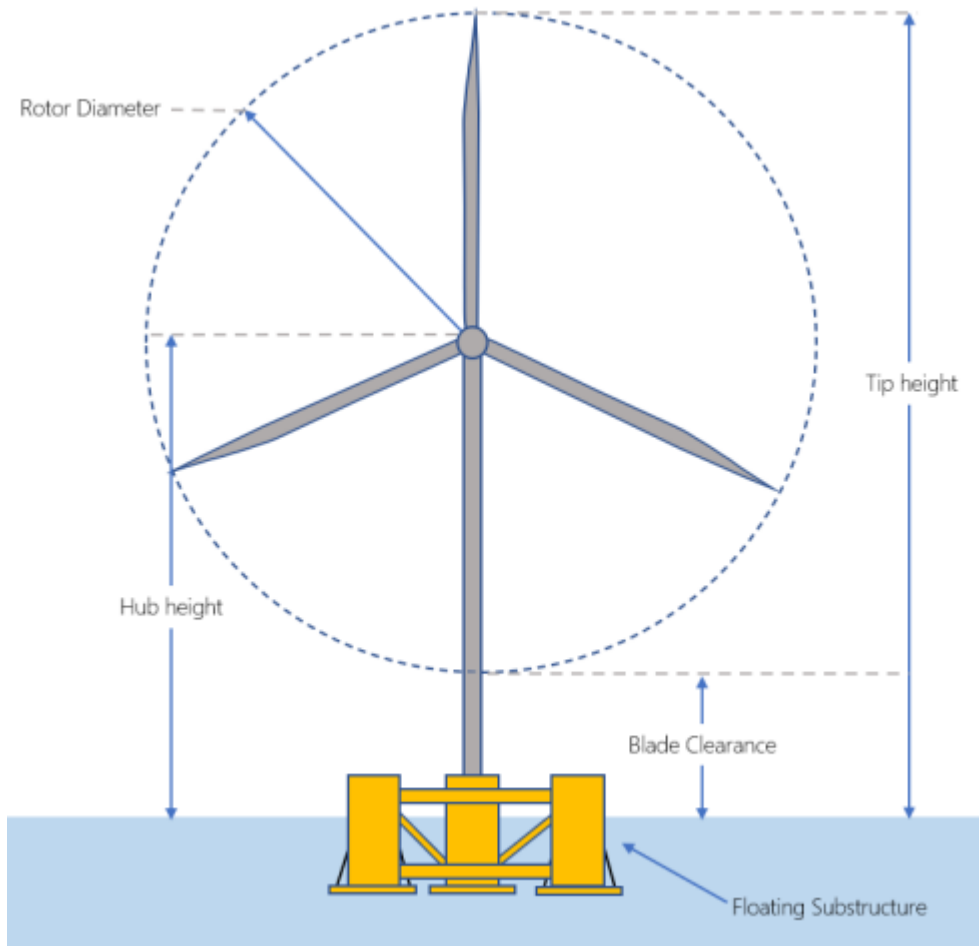


Figure 3-1 Illustration of the design parameter definition for a WTG (not to scale)

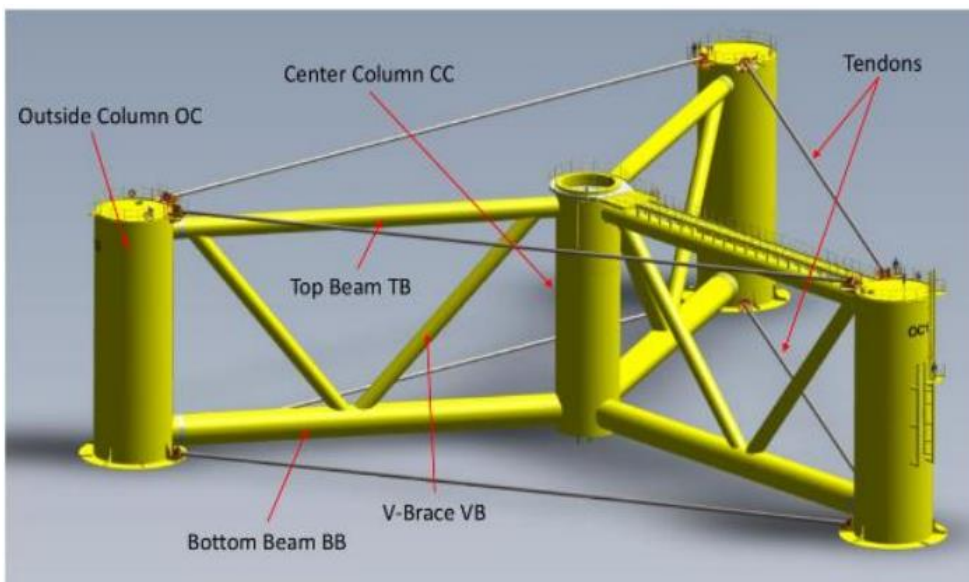


Figure 3-2 OCG-WIND substructure design

3.2 Mooring System

The mooring and anchoring systems are responsible for the station-keeping of the floating structure. The connection point for all mooring lines will be located at the base of the floating substructure.

Table 3-3 summarises the key catenary line properties deemed of relevance to this Safety Zone Application.

Table 3-3 Catenary Mooring System Properties and Key Dimensions

Number of catenary mooring line(s)	3
Length of each catenary mooring line	600 m
Length of each mooring line on the seabed	490 m
Length of clump weights on seabed (per mooring line)	100 m
Material of mooring lines	Steel chains / polyester rope

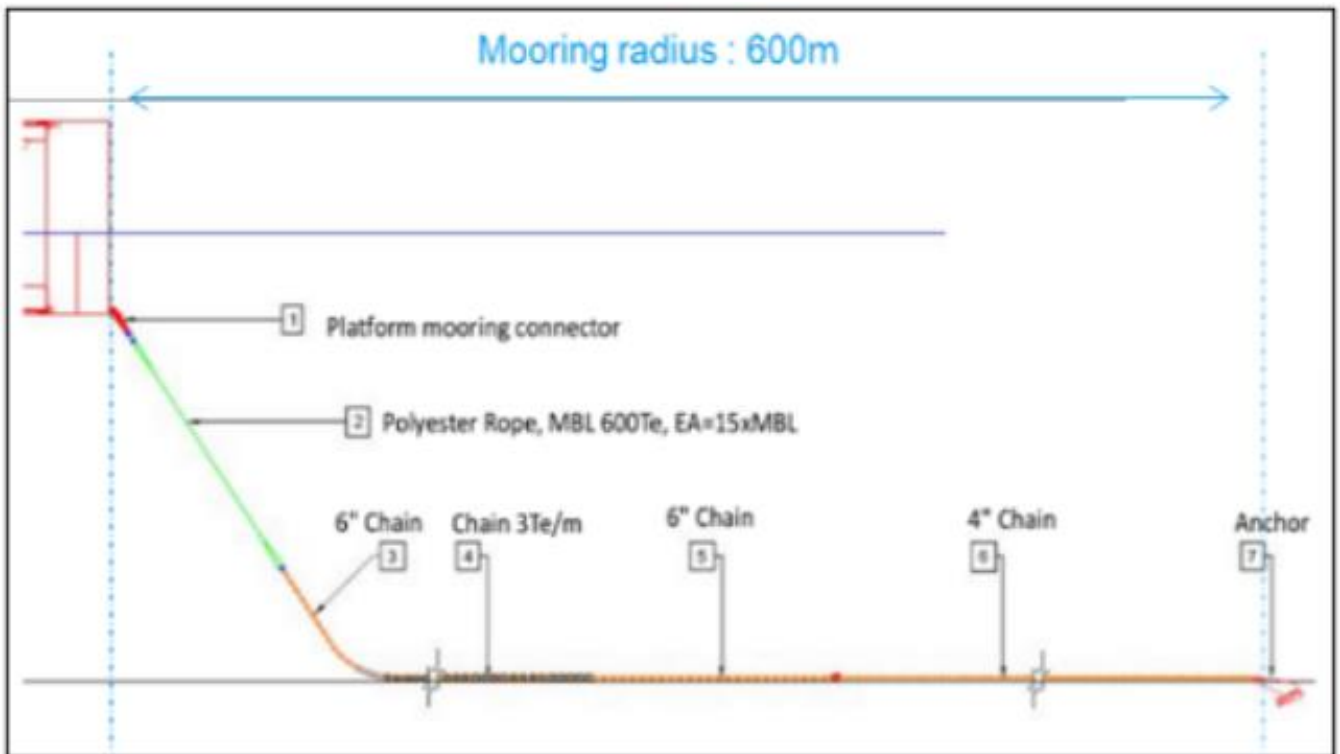


Figure 3-3 Catenary mooring system overview

Table 3-4 Mooring System Anchor Properties and Key Dimensions

Number of anchors	3
Anchor type	Drag
Anchor dimensions	11.2 m long by 11.2 m wide by 6 m high

There may also be a requirement to install scour protection for the drag anchors (most likely rock) post-installation to prevent the anchors from being undermined by seabed erosion. The requirement for scour protection may be included in reaction to the identification of an issue as part of a post-installation survey or following periodic inspections undertaken during operation and maintenance.

3.3 Export Cable

A single 11 kV High Voltage Alternating Current (HVAC) cable will be installed to export power from the Floating WTG to the Culzean platform (located ~2 km west). The cable will be connected to the Culzean CPF via an existing J-tube on the platform.

From the point where no movement in the cable is expected on the seabed (the static cable) the cable is trenched and buried to a minimum target depth of 0.6 m. The export cables shall be buried within the sea sediments along their length wherever possible. In locations where this is not possible, the cables will be mechanically protected.

4. CONSTRUCTION OVERVIEW

The following subsections briefly outline the methodology for construction of each offshore component of the Project (see Section 3).

4.1 Mooring System

The various components that make up the mooring system shall be shipped to the Culzean Floating Wind site by an anchor handling vessel (AHV) for installation. These will be pre-laid in advance of the Floating WTG arriving.

4.2 Floating WTG

Floating WTG installation will follow on from the installation of the mooring system. The WTG and floating substructure components that will form the Culzean Floating WTG shall be delivered from their manufacturing site to the marshalling yard for assembly and onshore commissioning before being transported to the Culzean site as required. The constructed Culzean Floating WTG will then be towed to the Culzean site for installation and mooring hook-up.

4.3 Inter Array Cable

The inter array cable (IAC) installation is expected to be undertaken by a cable lay vessel (CLV), which will have been pre-loaded with the subsea cable length and stored on the vessel's cable reel. The following offshore processes are expected to be undertaken as part of the installation:

- Pre-lay ROV survey;
- IAC installation;
- IAC pull-in, connection and commissioning
- IAC burial and any remedial works; and
- Post installation survey.

5. OPERATION AND MAINTENANCE OVERVIEW

Throughout the operation and maintenance phase it is anticipated that major maintenance shall be required in addition to the planned regular maintenance. Major maintenance requirements shall vary from year to year and therefore it is not currently possible to provide a comprehensive schedule for such activity. As required by Condition 3.2.9 respectively of the Marine License, an Operation and Maintenance Programme (OMP) will be submitted to Marine Directorate no later than three months prior to the commissioning of the WTG.

Examples of typical major maintenance activities are as follows, noting that this is not an exhaustive list:

- WTG blade repair/replacement; and
- WTG replacement;

As noted in Sections 1.1 and 8, a permanent 500 m safety zone is being applied for which would also include any periods of major maintenance. For major maintenance, the Floating WTG will be towed to shore. This will involve several vessels (e.g. AHV and support/back up vessel(s)). Major maintenance activities may involve large vessels which may be RAM (restricted ability to manoeuvre).

Information regarding periods of major maintenance, including details of any vessels on site, will be disseminated via local Notices to Mariners and radio warnings.

For regular maintenance, the O&M philosophy is for technicians to visit the Floating WTG every 2 weeks (~24 visits per year).

6. LIGHTING AND MARKING

This section outlines the lighting and marking implemented at the Culzean Floating Wind Project site during the construction phase. A summary of the lighting and marking during the operation and maintenance phase is also included. Further details will be made available in the Culzean Floating Wind Lighting and Marking Plan (LMP) (GB-CZT-00-TOTA-000002).

6.1 Construction Phase

No specific aviation lighting or marking is planned for implementation during the construction phase. As per the Culzean Floating Wind LMP (GB-CZT-00-TOTA-000002), TEPNSUK will undertake promulgation of information to the relevant stakeholders prior to, and during construction.

An emergency rescue and recovery vessel (ERRV) is permanently located around the Culzean platform (shared between the Culzean and the Ailsa FSO (floating storage and offloading)). The ERRV's role includes vessel monitoring. During construction phase, the area will be monitored as part of the ERRV's day-to-day role.

6.2 Operation and Maintenance Phase Lighting and Marking

6.2.1 Marine Navigation

The marine navigational lighting and marking to be installed during the operational phase is summarised in Table 6-2. This has been agreed with the NLB and includes the marking and lighting as per the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) G1162 (IALA, 2021), use of sound signals and the use of an AIS Aid to Navigation (AtoN). Full details can be found in the Lighting and Marking Plan (Culzean Floating Wind LMP (GB-CZT-00-TOTA-000002)).

Table 6-2 Operational Lighting and Marking

Lighting and Marking Aspect	Relevant Structures	Specifications
Sound signals	Floating substructure	<ul style="list-style-type: none"> One foghorn installed on top of one of the outer columns IALA Category 3 (availability of not less than 97.0%) A visibility meter will also be installed, sound signals will turn on when visibility is detected to be less than 2 nm.
Visibility meters	Floating substructure	<ul style="list-style-type: none"> Change in visibility will trigger all fog signals Signal to activate when visibility is less than 2 nm
AIS	Floating substructure	<ul style="list-style-type: none"> IALA Category 3 (availability of not less than 97.0%)

Foundations will be painted yellow (RAL 1004, Golden Yellow) all around from the waterline (HAT) to a height of 15m. Above this height structures will be painted grey (RAL 7035, Light Grey).

The WTG will display its unique ID marking via black letters and numbers on a yellow background, noting the ID will be visible through 360°. All ID marker boards will be lit via low-level baffled lighting.

6.2.2 Aviation

Aviation lighting and marking is not deemed as being directly relevant to this Safety Zone Application, however a summary is provided below for reference.

The WTG will be equipped with a medium intensity 2000 candela (cd) red aviation warning light, with IR capability flashing Morse 'W'. This light will be dimmable to 200 cd when visibility is greater than 5 km. Two of these obstruction lights shall be fitted for purposes of redundancy. Both lights will be lit at the same time, with each light will provide 360° visibility.

7. VESSEL TRAFFIC SURVEY DATA

Vessel traffic data collected as part of the Navigational Risk Assessment (NRA) (Anatec, 2024) to characterise the shipping and navigation baseline relative to the Culzean Floating Wind Project has been used for the purpose of this Safety Zone application. Automatic Identification System (AIS) data was collected via receivers located at the Culzean gas field over a 12-month period (recorded between July 2022 and June 2023). Data was collected within a study area comprising a 10nm buffer of the Culzean Floating Wind Project site.

As agreed in consultation with the MCA (July 2023), the MCA confirmed that there were no concerns with using AIS data and the requirement for a dedicated vessel traffic survey could be waived for the Project. The use of a 12-month AIS dataset (alongside other available data, the MCA also requested that Vessel Monitoring System (VMS) data) was sufficient in lieu of dedicated vessel traffic surveys.

A number of vessel tracks recorded were classified as temporary (non-routine), such as survey vessels, guard vessels, temporary structures such as jack-up platforms and their associated vessels, and offshore daughter craft. These have been excluded from the characterisation of the vessel traffic baseline.

7.1 AIS Carriage

It should be noted that not all vessels are required to carry an AIS transceiver, and therefore certain vessel types may be underrepresented. This is discussed for the relevant vessel types in Sections 7.2.6 (fishing) and 7.2.7 (recreation). AIS carriage is mandatory for all vessels of 300 Gross Tonnes (GT) and upwards on international voyages, cargo vessels of 500GT and upwards not engaged on international voyages and all passenger vessels irrespective of size. In addition, fishing vessels with length overall (LOA) 15 m and greater must carry AIS. Smaller fishing vessels, recreational vessels and military vessels are not required to broadcast on AIS but may do so voluntarily.

Additionally, the carriage of VMS is required on board all fishing vessels of greater than 12 m overall length, the vessel's position is reported at a minimum of every two hours only. Therefore, some fishing vessels and especially those under 12 m may be underrepresented in the data, although again Scottish White Fish Producers Association (SWFPA) confirmed during a Hazard Workshop for the Project that there were no concerns with the extent of data collected and given the distance offshore smaller fishing vessels are less likely to be present (Anatec, 2024).

7.2 Vessel Data Overview

This section presents an overview of vessel traffic movements over the Culzean Floating Wind Project area, recorded via AIS over 12-months (July 2022 and June 2023).

The vessels recorded during the 12-month period AIS data are presented in Figure 7-1, colour-coded by vessel type.

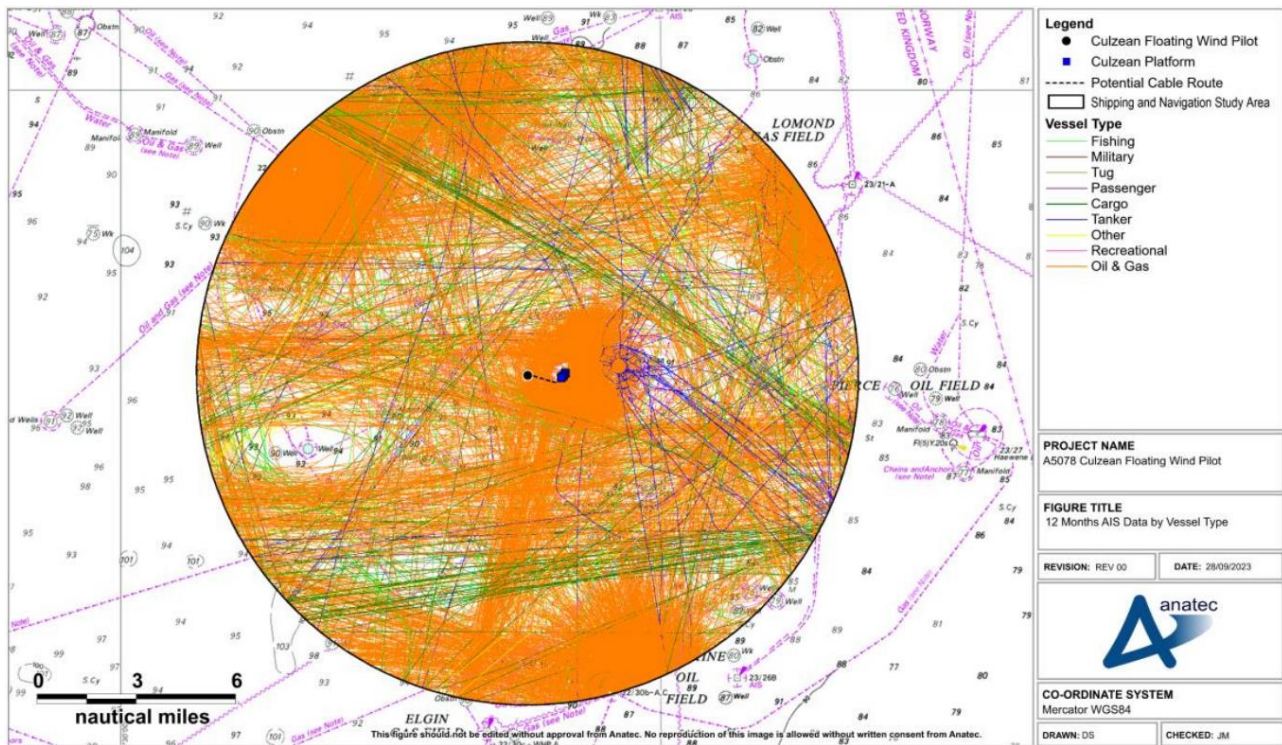


Figure 7-1 Twelve Months AIS Data by Vessel Type (Anatec, 2024)

The majority of the vessel traffic recorded over the 12 month period was associated with oil and gas activities, discussed further in Section 7.2.3. Commercial traffic (tankers and cargo) routing was recorded in the study area (see Sections 7.2.4 and 7.2.5), and fishing vessel activity was recorded in the study area (see Section 7.2.6).

7.2.1 Vessel Count

The average number of unique vessels per day for each month of the data period within the Culzean Floating Wind site area is presented in Figure 7-2.

Overall, an average of eight unique vessels per day was recorded in the study area, with limited variance across the 12-month period.

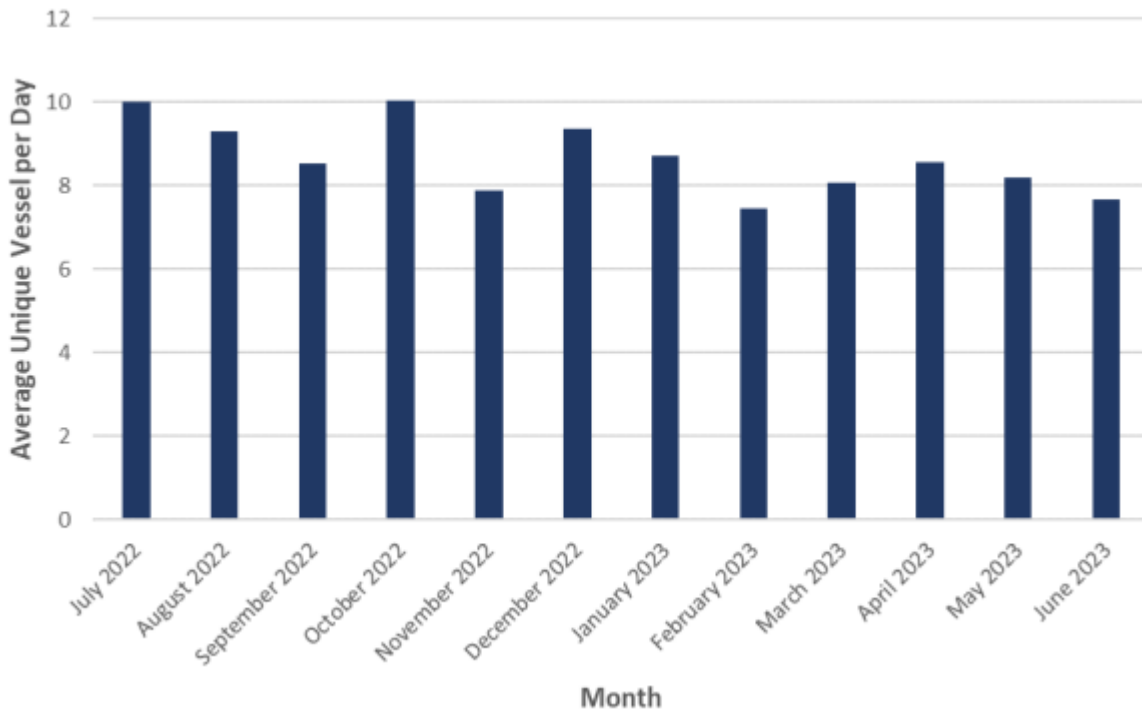


Figure 7-2 Average Unique Vessels per Day per Month (Anatec, 2024)

7.2.2 Vessel Type

The percentage distribution of the main vessel types recorded in the study area and the Culzean Floating Wind site during the 12- month study period. Detailed assessment per key vessel type is then provided in Section 7.2.3 to 7.2.8.

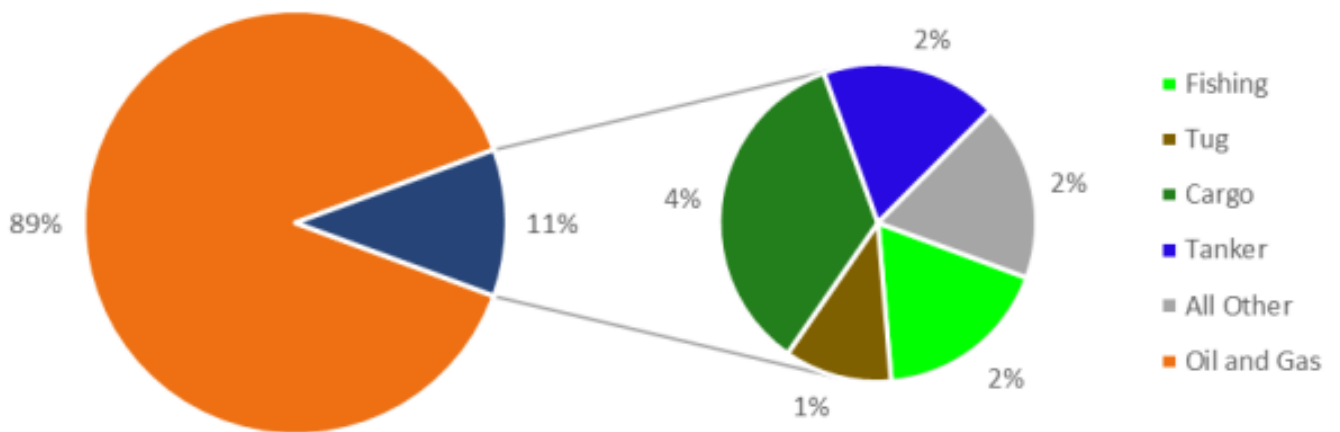


Figure 7-3 Vessel Type Distribution (Anatec, 2024)

The main vessel type recorded throughout the study area was oil and gas (89%). No other vessel type accounted for more than 5% of vessel traffic, with the next highest contributors being cargo vessels (4%), tankers (2%) and fishing vessels (2%). Vessel types recorded contributing less than 1% of traffic have been incorporated into the ‘All Other’ category. This category includes military vessels, passenger vessels, recreational vessels and other vessels.

7.2.3 Oil and Gas Vessels

Oil and gas vessels accounted for 89% of total vessel traffic throughout the study period, with an average of eight unique oil and gas vessels recorded per day.

The majority of oil and gas support vessels were recorded visiting the oil and gas installations within or close to the study area. The Culzean installation and the nearby by ETAP / Marnock and Shearwater installations were among the most common destinations broadcast by oil and gas vessels on AIS. It is noted that this includes oil and gas vessels operating at the fields and not only passing traffic.

The oil and gas vessels recorded within the study area during the study period are shown in Figure 7-4, colour-coded by vessel destination.

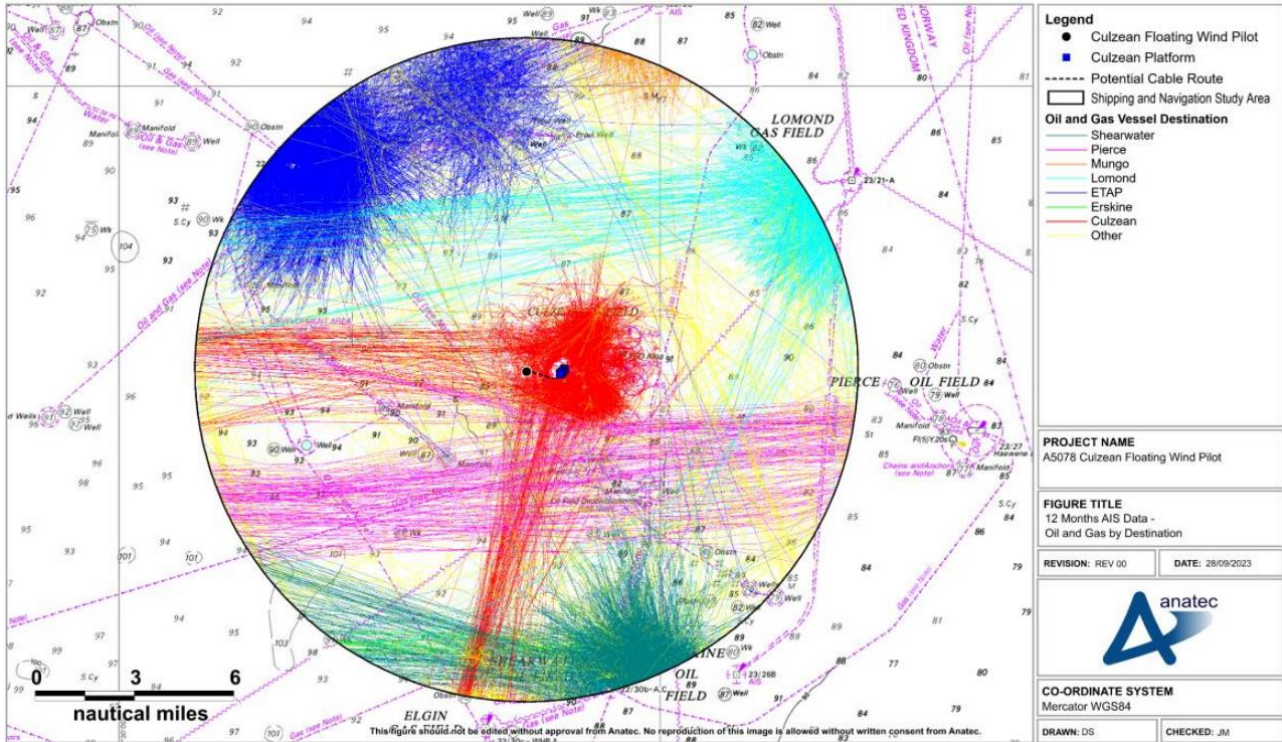


Figure 7-4 Twelve Months AIS Data - Oil and Gas Vessels by Destination (Anatec, 2024)

7.2.4 Cargo Vessels

Cargo vessels accounted for 4% of total vessel traffic throughout the study period, with an average of two to three unique oil and cargo vessels recorded per week.

Common destinations of cargo vessels broadcast on AIS included Esbjerg (Denmark), Aberdeen and Montrose (UK), in addition to a number of Danish, Swedish and Norwegian ports. Key routes are located to the south of the Culzean Floating Wind site (heading east-west from Montrose to various Scandinavian ports), and a route to the north (heading north-west to south-east, with Esbjerg being the most common destination on this route).

The cargo vessels recorded within the study area during the study period are shown in Figure 7-5.

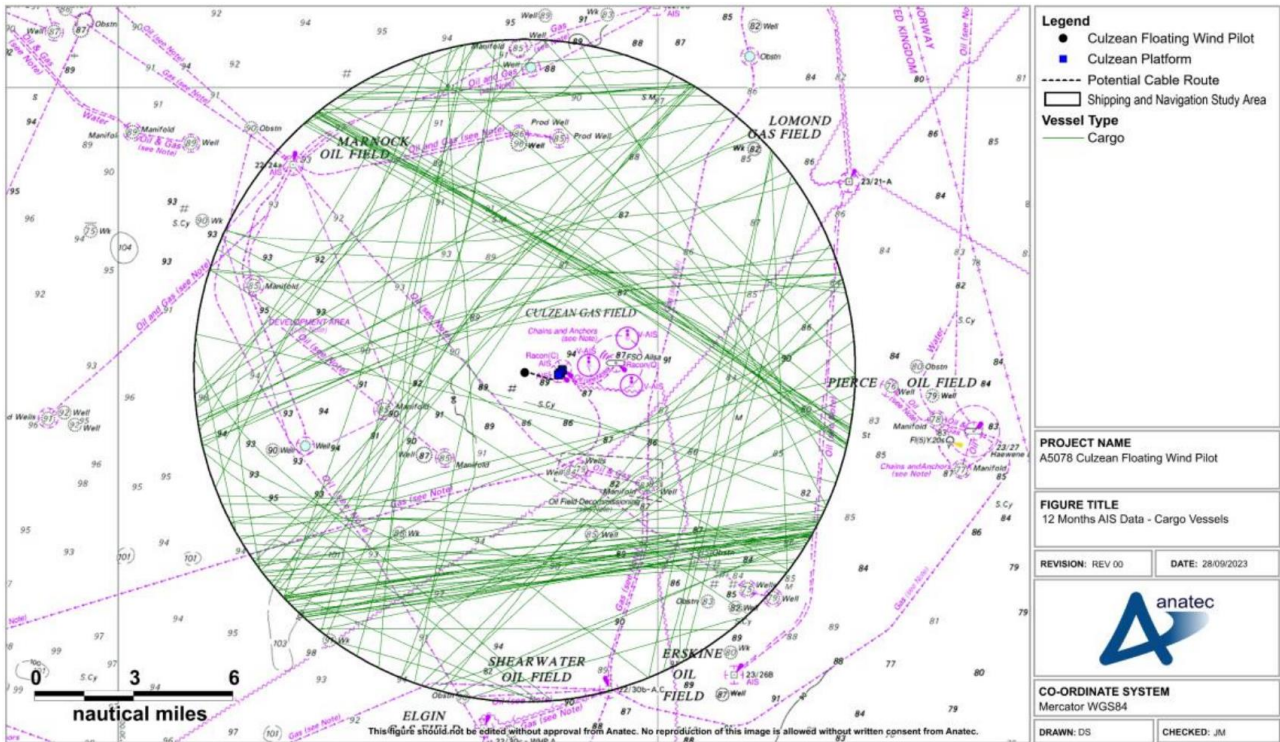


Figure 7-5 Twelve Months AIS Data - Cargo Vessels by Destination (Anatec, 2024)

7.2.5 Tankers

Tankers accounted for 2% of total vessel traffic throughout the study period, with an average of one to two unique tankers recorded per week. The majority of tankers recorded were associated with the Ailsa FSO (part of the TEPNSUK operated Culzean field). Tankers were also recorded visiting a number of other installations including Pierce, Triton and Mungo. Tankers were also recorded on passage featuring varied destinations such as France, Germany and UK. The tankers recorded within the study area during the study period are shown in Figure 7-6.

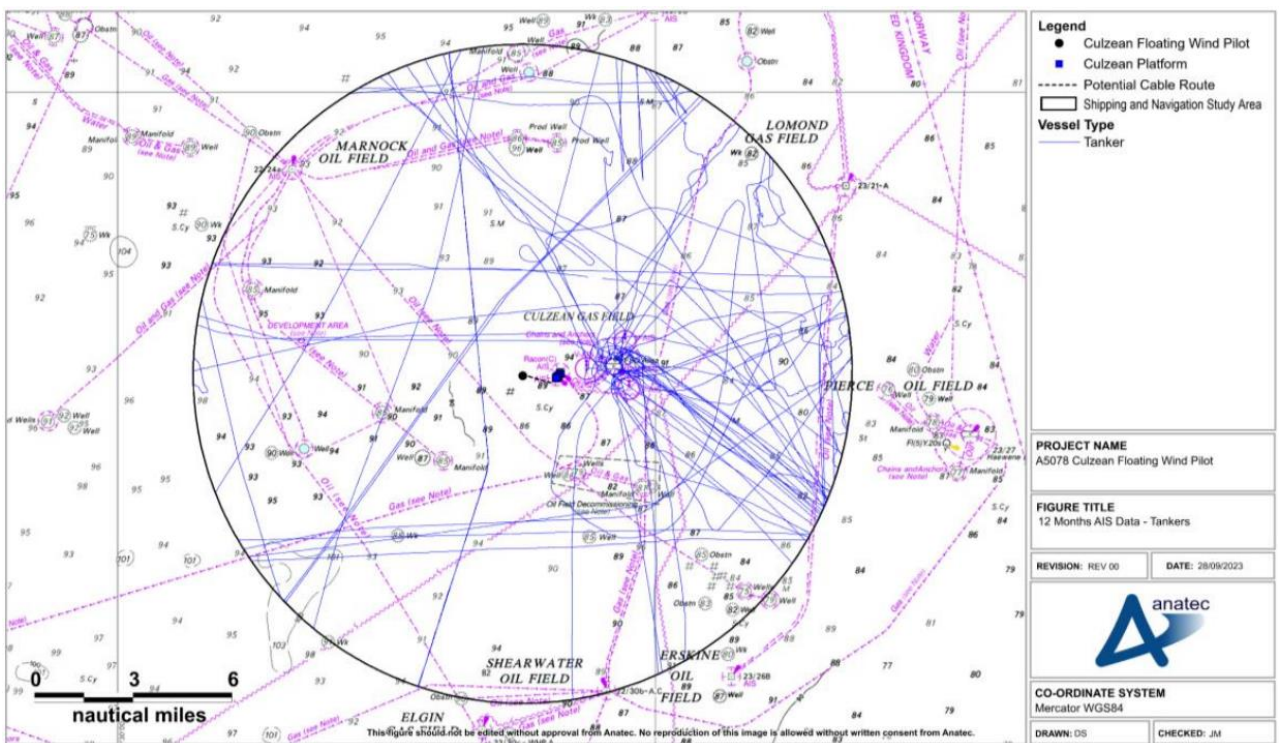


Figure 7-6 Twelve Months AIS Data – Tankers by Destination (Anatec, 2024)

7.2.6 Commercial Fishing Vessels

Commercial Fishing Vessels accounted for 2% of total vessel traffic throughout the study period, with an average of one to two unique tankers recorded per week. It should be noted that as per Section 7.1, smaller fishing vessels may be underrepresented, however given the distance offshore smaller fishing vessels are less likely to be present.

Based on track behaviour and average speeds recorded, the commercial fishing vessel activity recorded in the study area was generally characteristic of transiting, rather than active fishing. A small number of tracks to the south-west were recorded at average speeds below 4 knots (kt), which may be indicative of active fishing. The commercial fishing vessels recorded within the study area during the study period are shown in Figure 7-7, colour-coded by average speed.

In addition to the AIS data, VMS data is available for the study area. VMS is a satellite tracking system for fishing vessels and its use is required for fishing vessels over 12 m length. The VMS data was used for validation of fishing vessel movements. A plot of VMS data covering 2022 is presented in Figure 7-8. The VMS data recorded focuses on specific areas but on all sides of the Culzean Floating Wind site. Data points were not typically recorded in close proximity to the proposed WTG location.

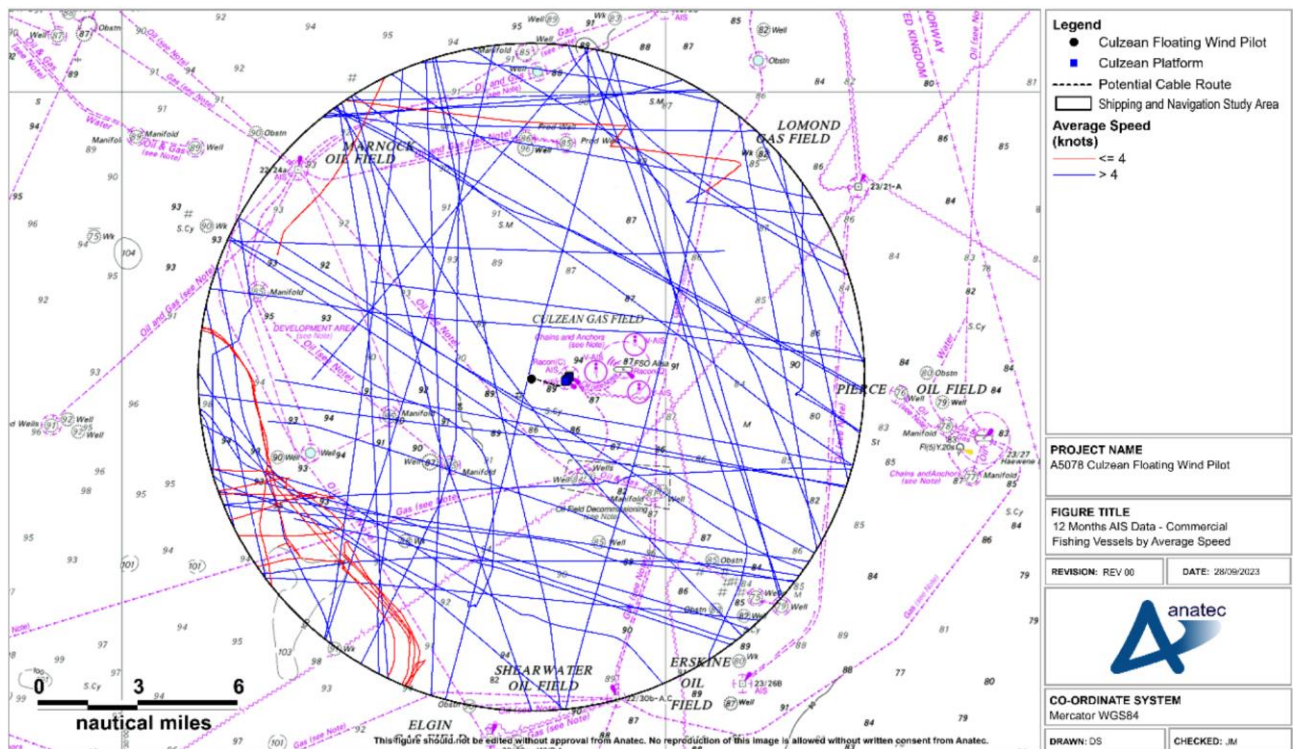


Figure 7-7 Twelve Months AIS Data – Commercial Fishing Vessels by Average Speed (Anatec, 2024)

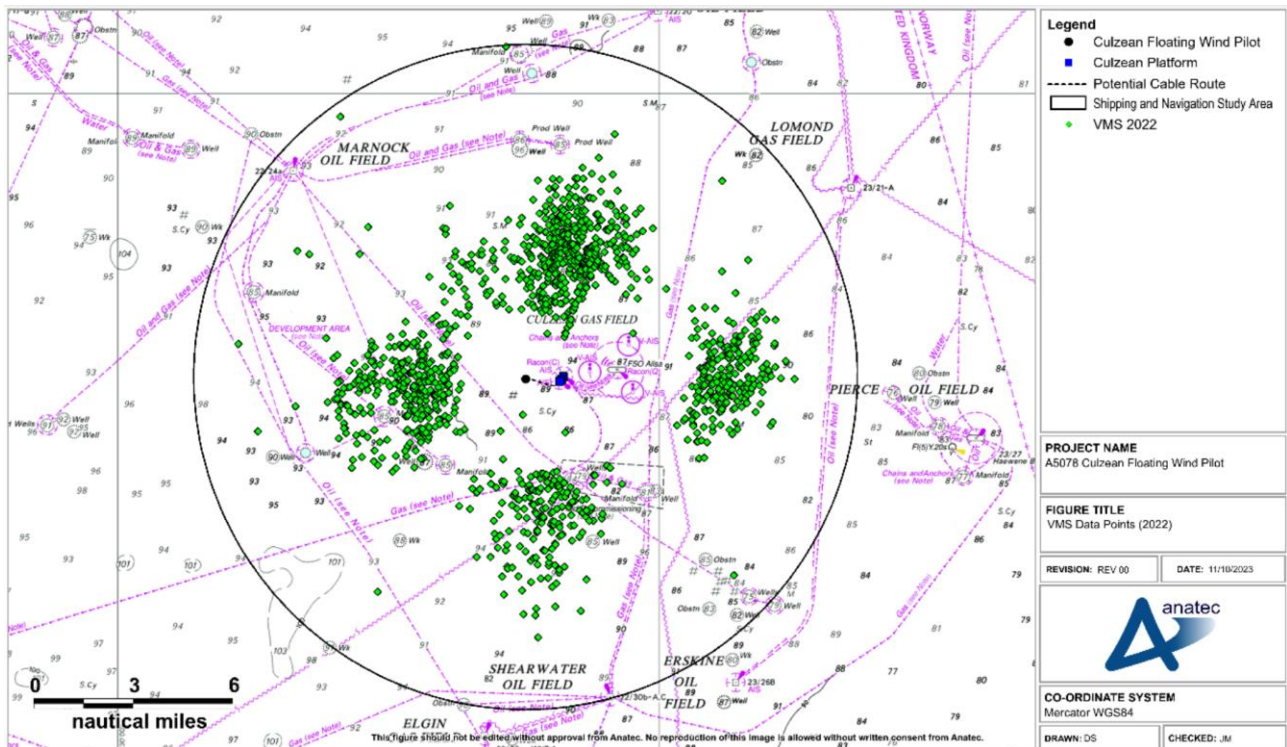


Figure 7-8 VMS Data Points (2022) (Anatec, 2024)

7.2.7 Recreational Vessels

Recreational vessels accounted for <2% (falling within the ‘All Other’ category) of total vessel traffic throughout the study period, with an average of one unique recreational vessels recorded per month. Recreational vessels were typically recorded during the summer months, with the sparse volumes overall indicative of the distance offshore.

Recreational vessels recorded within the study area during the study period are shown in Figure 7-9.

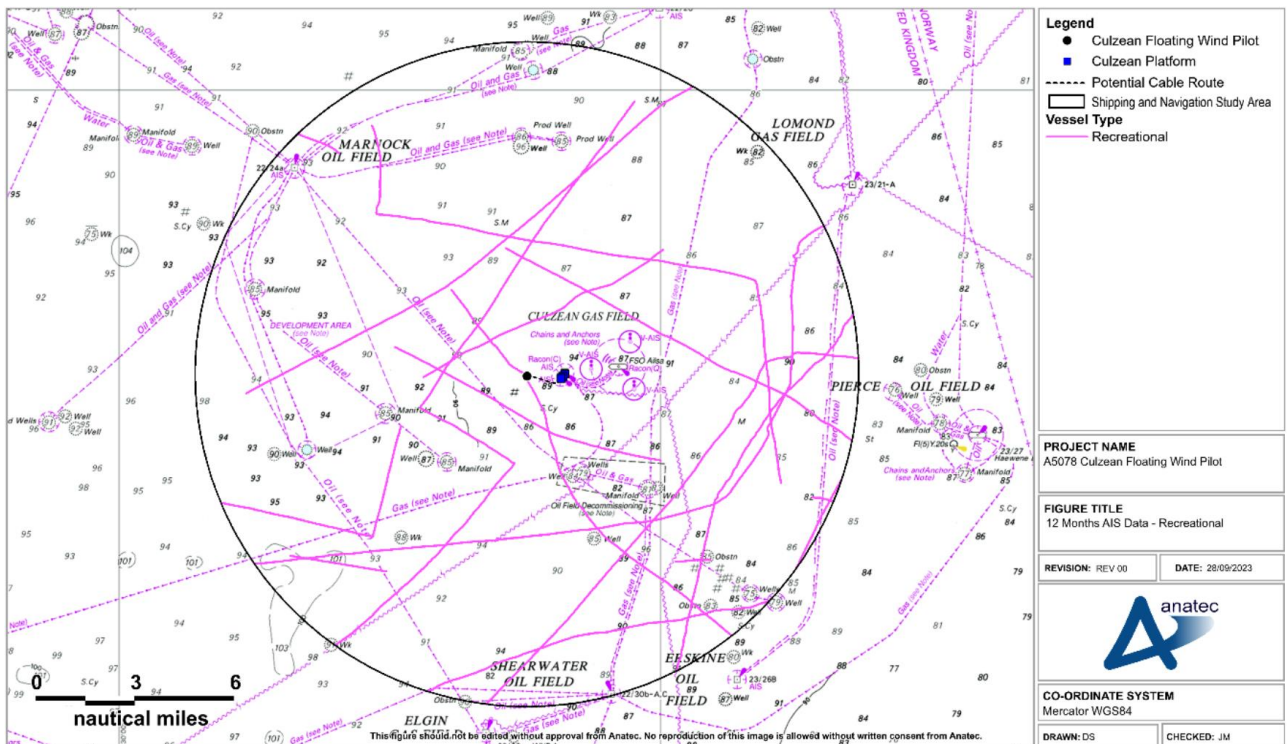


Figure 7-9 Twelve Months AIS Data – Recreational Vessels (Anatec, 2024)

7.2.8 Anchored Vessels

Vessels which travelled at an average speed of less than 1 kt for more than 30 minutes are assumed to possibly be at anchor. Such cases have therefore been identified and checked for likely anchoring activity along with vessel track behaviour and navigational status information broadcast via AIS. After applying the criteria no vessels were deemed to be at anchor during the 12-month period within the study area.

8. SAFETY ZONE OVERVIEW

8.1 Summary

TEPNSUK is applying for a permanent 500 m safety zone around the Culzean Floating WTG structures.

As previously stated, the Culzean Floating Wind Project will provide power to the existing Culzean platform (an oil and gas installation). As such it has been classified as supplementary unit by the Health and Safety Executive (HSE) under the Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995 (MAR Regulations).

This has been identified on the basis of the following criteria:

- The activities are considered as being allowed safety zones under the relevant guidance and legislation (see Section 1); and
- Risk assessment has identified that where safety zones are able to be deployed under the existing legislative framework, such safety zones are a relevant mitigation measure to bring relevant risks (as per Section 9) to within As Low As Reasonably Practicable (ALARP) parameters.
- During consultations with the HSE regarding safety zones, as the Culzean Floating Wind turbine generator WTG is being classified by the HSE as a supplementary unit to an oil and gas installation. Consequently, the HSE expects the safety zone in place to be adequate for managing the safety risks associated with the proposed operations and to be in alignment with HSE safety zone standards. The primary safety risks identified by the HSE that the safety zone should address include managing major accident hazards such as ship collision, structural integrity, moorings failures and the escape, evacuation and rescue plan.

This application is for a single permanent 500 m safety zone to be in place for the construction, and operation and maintenance phase, and remain in place until the Culzean Floating WTG is removed following decommissioning.

The 500 m safety zone would be associated with the Culzean Floating WTG location and not with an individual vessel. The type of construction activities to be undertaken within the 500m safety zone mean that the vessel involved may be displaying Restricted Ability to Manoeuvre (RAM) status such as:

- stationed at a structure
- has any kind of attachment to a structure (other than Walk to Work); or
- is anchored next to a structure for the purposes of construction activity.

Noting that as the safety zone applies to the OREI structure rather than to the vessel, this by definition excludes any vessel undertaking construction activity further than 500m from a structure from triggering a safety zone.

The activities that may be undertaken when the safety zone is in place may include:

- Mooring system pre-lay and installation;
- Floating WTG installation;
- Export cable hook-up to WTG (e.g. during cable pull-in at the WTG); and
- Any commissioning works involving a vessel displaying RAM status stationed at a structure, having any kind of attachment to a structure (other than Walk to Work), or anchored next to a structure for the purposes of commissioning activity.

This list is not intended to be comprehensive and is provided for indication only of the types of activities which would be covered by the 500 m safety zone.

As stated above, this is an application for a permanent 500 safety zone which would remain in place during the operation and maintenance phase (which for the purposes of this application is defined as the period beginning on the date of final commissioning of the Culzean Floating Wind project as described above, and ending on the date of expiry of the Culzean Floating Wind Marine Licence (or any variations or replacements of this Marine License), whichever is later).

9. RISK ASSESSMENT REQUIRED FOR SAFETY ZONES

This section considers the potential risks to shipping and navigation identified for the construction, and operation and maintenance phases of the Culzean Floating Wind Project. This section forms the safety case-based element of the application and summarises the relevant potential risks that provide justification for the safety zone being applied for.

9.1 Reduction in Collision Risk

During the construction phase of the Project, construction vessels will be working at the Floating WTG location carrying out the installation of mooring system, the Floating WTG and the cable. This will include utilisation of a variety of vessels potentially including AHV, CLV, and tugs. The multi-activity nature of the construction phase may result in several of these vessels being on-site simultaneously, including vessels which are displaying RAM status.

During the operation and maintenance phase, it is anticipated that a SOV will be visiting the Floating WTG regularly to carry out planned maintenance activities. During periods of major maintenance, the Floating WTG will be towed to shore, there may be multiple vessels on-site simultaneously during periods of major maintenance. This is likely to involve only one vessel supported by several smaller vessels. However, the total number of vessel movements associated with major maintenance activities is anticipated to be significantly lower than that of the construction activities.

As noted in Sections 7.2.4 and 7.2.5, commercial vessel (tankers and cargo vessels) activity around the Culzean Floating Wind site is low due in part to the presence of the Culzean oil and gas platform. The majority of tankers that were recorded are associated with the Ailsa FSO (part of the TEPNSUK operated Culzean field, located approximately 5 km to the east of the Floating WTG Location). It is anticipated that commercial vessels will alter their passage plans to pass clear of activities being undertaken, particularly given that the vessels in the area are likely already aware of the 500 m safety exclusion zones for the Culzean platform and Ailsa FSO (both TEPNSUK operated).

During the operation and maintenance phase, commercial vessels would continue to use the routing patterns established by the presence of the 500 m safety zone in place during the construction phase.

Smaller vessels (e.g., fishing and recreational) may choose to transit in the Culzean Floating Wind vicinity during the construction, and operation and maintenance phase. Based on the vessel traffic data assessed (see Sections 7.2.6 and 7.2.7), fishing and recreational activity is limited within the Culzean Floating Wind Project site. On this basis, fishing and recreational vessels may still be present within the vicinity to construction or maintenance activities.

The presence of vessels during construction and maintenance should encourage mariners to pass at a safe distance from the activities. However, the use of mandatory 500 m safety zones around the Culzean Floating Wind site will provide an additional level of protection against a collision incident by ensuring that the immediate sea area around where the works are being undertaken is clear. Should a vessel approach or infringe a safety zone they shall be alerted using the standard procedures outlined in Section 11.

9.2 Reduction in Allision Risk

During the construction phase of the Culzean Floating Wind Project, any partially completed or completed structure could pose an allision risk to passing traffic, particularly earlier in the construction phase when mariners may be less aware of the Project. It is also noted that operational mitigations (e.g., operational lighting and marking) will not yet be active.

As discussed in Section 9.1, commercial vessels are likely to already avoid the construction area, however smaller vessels (e.g., fishing and recreation) may still be present in the vicinity and hence may come in proximity to structures. The presence of construction vessels including the Culzean and Ailsa ERRV or support vessel(s) may discourage third party vessels from approaching the Culzean Floating Wind site, however the use of mandatory 500 m safety zones around partially completed structures where construction is ongoing will make it clear the areas which should be avoided to minimise allision risk.

Details of the safety zones would be promulgated in addition to general information about the Project, which will increase overall awareness of third party traffic and hence reduce collision risk further.

Should a vessel approach or infringe a safety zone they shall be alerted using the standard procedures outlined in Section 11.

9.3 Reduction in Risk of Interaction with Mooring System

Once installed and the Floating WTG is moored and operational, the presence of the mooring lines may lead to the risk of a passing vessel interaction, which could have severe consequences both for passing traffic and the Floating WTG.

The implementation of mandatory 500 m safety zones around the structure would ensure that passing traffic stays clear of locations where the risk of interaction with the mooring lines is highest, therefore reducing the risk of such interaction occurring.

Culzean Floating Wind is being regulated as a supplementary unit to Culzean (an oil and gas installation) by the HSE, consultation with the HSE was therefore undertaken. Consequently, the HSE expects the safety zone in place to be adequate for managing the safety risks associated with the proposed operations and to be in alignment with HSE safety zone standards. The primary safety risks identified by the HSE that the safety zone should address include managing major accident hazards such as ship collision, structural integrity, moorings failures and the escape, evacuation and rescue plan.

Other mitigation measures would also be required to minimise the level of risk, including lighting and marking, the promulgation of information on the Project and charting of the Floating WTG location. As per Section 11, approaching vessels would be notified of the safety zone.

9.4 Protecting TEPNSUK Personnel

During the construction phase and periods of maintenance, there will be a number of personnel working in the Culzean Floating Wind site, the surrounding area and on the Floating WTG. Given the collision and collision risk (see Sections 9.1 and 9.2 respectively) there is a risk, albeit a low level and infrequent risk, of loss of life or injury to both TEPNSUK personnel and the crews of passing third party vessels.

The implementation of permanent 500 m safety zones in conjunction with other mitigation measures would ensure that vessels are able to passage plan effectively in order to pass the Culzean Floating WTG at a safe distance, thus minimising the risk to the crew and personnel. Consultation with HSE as described in Section 9.3 reiterates that a 500m safety zone would assist to mitigate the risks

9.5 Reduction in Fishing Gear Snagging Risk

As per Sections 7.2.6 and 9.1, although low there is the potential that fishing vessels may enter into the Culzean Floating Wind site vicinity to engage in active fishing. The mooring lines used to anchor the Floating WTG once installed and operational (see Section 9.3) may pose a snagging risk to fishing gear, which could have severe consequences including as a worst case the capsize of the fishing vessel.

The implementation of a permanent 500 m safety zone around the Floating WTG in conjunction with other mitigation measures such as the Culzean and Aisla ERRV within the Culzean field and charting of the infrastructure would increase awareness and allow fishermen to passage plan effectively to avoid the Floating WTG site, therefore reducing the likelihood of a gear snagging incident.

As per Section 11, approaching fishing vessels would be notified of the safety zone and ongoing works, including any deployed anchor spreads thus decreasing the risk of a snagging incident.

9.6 Accounting for Inexperienced Mariners

As per Sections 7.2.7 and 9.1, although the likelihood is low there is the potential that recreational vessels may enter the Culzean Floating Wind vicinity. Recreational users may not be experienced mariners or may not hold many formal marine qualifications. Furthermore, recreational craft generally do not carry as high a standard of navigational equipment as commercial vessels since given there is no requirement for them to do so.

Therefore, there is a need to mitigate against the potential lack of marine experience and reduced navigational equipment on board recreational vessels.

The implementation of mandatory 500 m safety zone around the Floating WTG in conjunction with other mitigation measures such as charting of the structure and promulgation of information would increase awareness of the Project location. This is particularly important for recreational users since inexperienced mariners may not be equipped to effectively assess their distance from a safety zone.

As per Section 11, approaching recreational vessels would be notified of the safety zone and ongoing works to identify any areas which may pose a risk to the vessel.

9.7 Accounting for Unforeseen Risk

During the construction phase and periods of maintenance, there is potential for a number of events to occur which may result in previously unforeseen risk. Examples of such events could include:

- Fire/explosion on board a construction or maintenance vessel;
- Machinery failure on board a construction or maintenance vessel;
- Cargo shifting on board a construction or maintenance vessel;
- Dropped object;
- Structure failure of the Floating WTG component;
- Unanticipated adverse weather; and
- Accidental interaction with unexploded ordnance or a wreck.

Any of these events could lead to severe consequences to both people and the environment. A safety zone would not necessarily mitigate or prevent such incidents from occurring, however would ensure the probability of a third party vessel being in proximity was reduced and therefore reducing the risk that a third party vessel be exposed to an unforeseen incident associated with the Culzean Floating Wind Project. This in turn would reduce the overall severity of consequence for any potential incident.

10. POTENTIAL IMPACTS

This section assesses potential impacts to users of the area to demonstrate that a safety zone are a proportionate mitigation when considered against the risk assessment undertaken in Section 9.

10.1 Commercial Vessels

As shown in Sections 7.2.4 and 7.2.5 commercial traffic within and in proximity to the Culzean Floating Wind site is limited, with the majority of vessels already avoiding the area, due to the existing presence of the Culzean platform and Ailsa FSO, the majority of tankers recorded were associated with the Ailsa FSO (part of the TEPNSUK operated Culzean field).

Regardless, as discussed in Section 9.1, it is likely that commercial vessels are already avoiding this area due to the presence of oil and gas infrastructure. On this basis, it is not considered to be an additional impact from the safety zones than would already be present from the installed structures.

Therefore, assuming effective promulgation of information including in relation to the safety zone to facilitate passing planning, there is not considered to be any significant impacts to passing commercial traffic from the implementation of a safety zone.

10.2 Fishing Vessels

As detailed in Section 7.2.6 and discussed in Section 9.1, fishing vessels may choose to enter the Culzean Floating Wind site during the construction, and operation and maintenance phases, and hence may come in proximity to an active safety zone.

The implementation of a permanent 500 m safety zone may lead to a reduction in accessible area for any fishing vessels accessing the site. However, any impact would be spatially limited, with the loss of access localised around the Floating WTG site. It is acknowledged that the decision to fish near the floating WTG will be at the discretion of each skipper, however, due to the highly localised impact of a single floating WTG, it is assumed that fishing near the floating WTG is possible for all different types of vessels.

It should also be noted that TEPNSUK already employs a Fisheries Liaison Officer (FLO) who will continue to facilitate on-going engagement with the fishing industry as deemed necessary. A permanent 500 m zone would be charted to ensure that fisheries are aware throughout the Project life. Additionally, the following measures would be in place to ensure awareness:

- Notice to Mariners;
- Ad-hoc liaison with the fishing industry through the FLO; and
- ERRV.

Therefore, taking into account the low levels of utilisation, the localised nature of the area that the safety zone would occupy, in addition to the other mitigations as detailed above, it is not anticipated that the safety zone will have any significant impact upon fishing vessels.

10.3 Recreational Vessels

As detailed in Section 7.2.7 and discussed in Section 9.1, recreational vessels may choose to enter into the Culzean Floating Wind site during the construction and operational phases, and hence may come into proximity of an active safety zone.

Therefore, taking into account the low levels of utilisation, the localised nature of the area that the safety zone would occupy, in addition to the other mitigations as detailed above, it is not anticipated that the safety zone will have any significant impact upon fishing vessels.

11. PROMULGATION, MONITORING AND POLICING

11.1 Promulgation of Information

The expected future deployment of the 500m safety zone shall be promulgated including via the Notice to Mariners and the Kingfisher bulletin. This would be based on commencement of the construction activities as defined by the Marine Licence. TEPNSUK will also have contact as required with fishing stakeholders through the FLO.

Further, monitoring of the safety zone and notice of such will be communicated via Very High Frequency (VHF) to passing traffic by the Culzean and Ailsa ERRV (see Section 11.2).

Further details will be made available in the Navigation Safety and Vessel Management Plan (NSVMP) (GB-CZT-00-TOTA-000008).

11.2 Monitoring

When the 500 m safety zone is in place, the vessel will be assigned guard duties, including the responsibility to monitor the safety zones (and the surrounding area) via Radar, AIS, VHF communications and visual observations. An emergency rescue and recovery vessel (ERRV) is permanently located around the Culzean installation (shared between the Culzean and the Ailsa FSO). The ERRV's role includes vessel monitoring, the area will be monitored as part of the ERRV's day-to-day role.

When an unauthorised vessel is detected to have a CPA (closest point of approach) within 0.5nm of the 500m zone, the designated on-site ERRV will make contact using standard marine procedures to inform the vessel it has, or is close to, infringing the safety zone. The vessel will be warned to increase their passing distance and instructed against entering in the future.

11.3 Policing

Where feasible, details and actions of any vessels which consistently ignore the warnings issued by the Culzean Floating Wind Project or are considered to be causing a potential danger to vessels, personnel or assets within the safety zone area will be monitored and action (including steps taken) recorded. Any infringements of the safety zone will be reported to the relevant authorities.

12. SUMMARY

This document provides the necessary information to support the following safety zone application for the construction, and operations and maintenance phase for the Culzean Floating Wind Project:

- A single permanent 500 m safety zone around the Floating WTG structure, to be in place from the commencement of construction (as defined by the marine licence).

Based on assessment of recent vessel traffic data and consideration of the NRA (Anatec, 2024) findings, any impacts from the implementation of a safety zone is anticipated to be minimal. However, the safety zone will reduce risks to both third party traffic and vessels associated with the Culzean Floating Wind Project, including in relation to:

- Reduction in the likelihood of a collision incident between a construction / maintenance vessel and a third party vessel;
- Reduction in the likelihood of an allision incident between a third party vessel and the Floating WTG structure;
- Reduction in the risk of an interaction between the Floating WTG mooring lines and a third party vessel;
- Protecting TEPNSUK personnel and third party crews;
- Reduction in the likelihood of a fishing vessel gear snagging;
- Accounting for inexperienced mariners; and
- Accounting for unforeseen risks.

On this basis a permanent 500m safety zone is considered a proportionate mitigation measure.

The safety zone shall be implemented in addition to a range of other mitigation measures including charting of the Culzean Floating Wind site and infrastructure, lighting and marking when operational and promulgation of information. In combination these mitigations shall ensure that the risks associated with the Culzean Floating Wind Project are within ALARP parameters. The safety zone shall be monitored and policed, with infringing activity or unsafe navigational activity reported to the relevant authorities as required. Details of the safety zone will be promulgated in advance of implementation via the standard means (e.g., Notice to Mariners, Kingfisher bulletin).

13. REFERENCES

Anatec (2024). Navigational Risk Assessment – Culzean Floating Offshore Wind Turbine Pilot Project. Aberdeen: Anatec.

Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007. Available at <http://www.legislation.gov.uk/uksi/2007/1948/contents/made>

Energy Act 2004 (c.20). Available at: <https://www.legislation.gov.uk/ukpga/2004/20/contents>

IALA (2021). IALA Guideline G1162 The Marking of Offshore Man-made Structures. Edition 1.1.