TotalEnergies

Culzean Floating Wind

A semi-submersible pilot project

Lighting and Marking Plan (LMP)
GB-CZT-00-TOTA-000002

Rev.	Date	Issued by	Checked by	Approved by
00A	30.01.2024		Klaus Lisberg	Charles Howorth

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

TABLE OF REVISIONS

Revision	Modification
00A	Draft for review.

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

DETAILED CHANGE LOG

Date	Rev. Status	References	Description of changes

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

DISTRIBUTION

Stakeholder No.	Document Recipient	Date Issued

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

Contents

1. INTRODUCTION 8

1.1 PURPOSE OF THE DOCUMENT 8
1.2 DOCUMENT STRUCTURE 8
1.3 SCOPE AND OBJECTIVES OF THE LMP 8
1.4 CONSENT COMPLIANCE 8
1.5 LINKAGES WITH OTHER CONSENT PLANS 9
1.6 PLAN AUDIENCE 10
1.7 UPDATES AND AMENDMENTS 10

2. INTRODUCTION 10

2.1 PROJECT DESCRIPTION 10

3. AVIATION LIGHTING AND MARKING 13

3.1 INTRODUCTION 13
3.2 PROMULGATION OF INFORMATION 13
3.3 CONSTRUCTION PHASE 14
3.4 OPERATIONAL PHASE 14
3.4.1 Lighting / Obstruction Marks 14
3.4.2 Blade Marking 14
3.4.3 ID Marking 15
3.5 FAILURE OF AVIATION LIGHTING 15

4. MARINE LIGHTING AND MARKING 17

4.1 INTRODUCTION 17
4.2 PROMULGATION OF INFORMATION 17
4.3 CONSTRUCTION PHASE 17
4.4 OPERATIONAL PHASE 17
4.4.1 Lighting and Sound Signals 17
4.4.2 Automatic Identification System (AIS) 18
4.4.3 ID Marking 18
4.4.4 WTG Paint 18
4.5 FAILURE OF MARINE LIGHTING 18

5. REFERENCES 21

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

ACRONYMS, ABBREVIATIONS and DEFINITIONS

ACOMS	Airspace Coordination and Obstacle Management Service
AIS	Aeronautical Information Service
ANO	Air Navigation Order
AtoN	Aid to Navigation
BEIS	Department for Business, Energy and Industrial Strategy
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
cd	candela
CNS	Central North Sea Asset
CPF	Central Processing Facility
DESNZ	Department for Energy Security and Net Zero
DGC	Defence Geographic Centre
EEZ	Exclusive Economic Zone
KM	Kilometres
IMO	International Maritime Organisation
LMP	Lighting and Marking Plan
MCA	Maritime and Coastguard Agency
MD-LOT	Marine Directorate Licensing Operations Team
MoD	Ministry of Defence
MW	Megawatt
NLB	Northern Lighthouse Board
NM	Nautical miles

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

NOTAM	Notice to Airmen
Ntm	Notice to Mariners
OREIs	Offshore Renewable Energy Installations
SAR	Search and Rescue
TEPNSUK	TotalEnergies E&P North Sea UK
UKCS	UK Continental Shelf
ULQ	Utility and Living Quarters Platform
UKHO	United Kingdom Hydrographic Office
WHP	Wellhead Platform
WTG	Wind Turbine Generator

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

1. INTRODUCTION

1.1 Purpose of the Document

This Lighting and Marking Plan (LMP) is submitted by TotalEnergies E&P North Sea UK, hereafter referred to as TEPNSUK, to satisfy conditions of the marine licence.

1.2 Document Structure

The LMP is structured as follows:

Section 1 & 2 Provides an overview of the Project and the consent requirements that underpin the content of this LMP. It also sets out the purpose, objectives and scope of the LMP and sets out the process for making updates and amendments.

Section 3 Details the aviation lighting and marking during the construction and operational phases.

Section 4 Details the marine lighting and marking during the construction and operational phases.

Section 5 Lists the references made within this plan.

1.3 Scope and Objectives of the LMP

The overall objective of the LMP is to set out the lighting and marking scheme that will be implemented for the Culzean Floating Offshore Wind Turbine Pilot Project (Culzean Floating Wind). This includes both marine and aviation lighting and marking.

The LMP is anticipated to be required through the Marine Licence as consent conditions and therefore will be submitted to Marine Directorate Licensing Operations Team (MD-LOT) for approval. This plan will be developed in accordance with relevant guidelines and the best practice.

The LMP will be finalised in the post-consent stage, ahead of construction, and in agreement with the relevant authorities and stakeholders including the Northern Lighthouse Board (NLB), Maritime and Coastguard Agency (MCA), Civil Aviation Authority (CAA) and Ministry of Defence (MoD).

1.4 Consent Compliance

Table 1.1 includes reference to how and where the condition clauses have been addressed within the LMP.

It is noted that in addition to consideration and compliance with the relevant guidance, the preparation of this LMP has also been informed by consultation undertaken to date with the NLB, MCA and CAA as key stakeholders of relevance to lighting and marking. The associated lighting and marking proposals were updated following feedback received. Following submission to MD-LOT, consultation will be carried out by MD-LOT with stakeholders.

Details of any further consultation held to inform the LMP will be described post-consent.

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

Table 1.1 Consent conditions to be discharged by this LMP

Condition reference	Condition	Relevant section
3.2.12 Lighting and Marking Plan	The Licensee must, no later than six months prior to the Commencement of the Licensed Activity, submit a LMP, in writing, to the Licensing Authority for its written approval. Commencement of the Licensed Activity cannot take place until such approval is granted.	This document sets out the LMP for approval by the Licensing Authority.
	Such approval may only be granted following consultation by the Licensing Authority with NatureScot, MCA, NLB, Civil Aviation Authority ("CAA"), MOD and any such other advisors or organisations as may be required at the discretion of the Licensing Authority.	To be undertaken by the Licensing Authority.
	The LMP must provide that the Works be lit and marked in accordance with the current CAA aviation lighting policy, the current MOD aviation lighting requirements and guidance, the current NLB aids to navigation requirements and guidance, and the MCA navigation and Search And Rescue guidance that is in place as at the start of the Licensing Authority approval of the LMP, or any such other documents that may supersede this guidance prior to the approval of the LMP. The LMP must include lighting and marking requirements for the construction phase and operational phase of the Works.	Section 3 & 4
	The LMP must detail the military aviation safety requirements as defined by the MOD, and the navigational lighting requirements detailed in the International Association of Marine Aids to Navigation and Lighthouse Authorities ("IALA") G1162 or any other documents that may supersede this legislation or guidance prior to approval of the LMP.	Section 3 & 4
	The Licensee must display all lighting and marking and aids to navigation as set out in the approved LMP for the duration of the presence of the Works in the sea.	Section 3 & 4

1.5 Linkages with other Consent Plans

Table 1.2 lists the Consent Plans with linkages to this LMP.

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

Table 1.2 Consent Plans with linkages to this LMP

Other Consent Plans and Documents	Linkage with LMP
Design Specification and Layout Plan (DSLP)	The DSLP provides the final design and layout parameters associated with the Culzean Floating Wind Project.

1.6 Plan Audience

All personnel and contractors involved in the Culzean Floating Wind project must comply, as a minimum, with this LMP. The LMP must be implemented in full, at all times, by TEPNSUK personnel and their contractors.

The LMP is intended to be referred to by personnel involved in the construction and operation of the Culzean Floating Wind project, including TEPNSUK personnel and contractors. Compliance with the LMP will be monitored by the Culzean Floating Wind project team.

The latest version of this LMP can be obtained from TEPNSUK document management system (CMS) and from the Marine Directorate website[1]. Copies are also to be held in the following locations:

- TotalEnergies Aberdeen office; and
- All construction, operation, and maintenance vessels.

1.7 Updates and Amendments

It is acknowledged that there may be a requirement for the LMP to be revised and updated on occasion as the project progresses to ensure the information is kept up to date. Any revisions will be submitted to MD-LOT.

2. INTRODUCTION

2.1 Project Description

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

[1] Weblink https://marine.gov.scot/ml/culzean-floating-offshore-wind-turbine-pilot-project

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

Wellhead Platform (WHP), Central Processing Facility (CPF) with flare tower, and separate Utility and Living 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 key components include:

- One WTG;
- One floating substructure;
- Up to six mooring lines
- Up to six drag anchors;
- One 2.5 km long export cable; and
- Associated scour and cable protection (if required).

The design life for the WTG is 10 years.

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

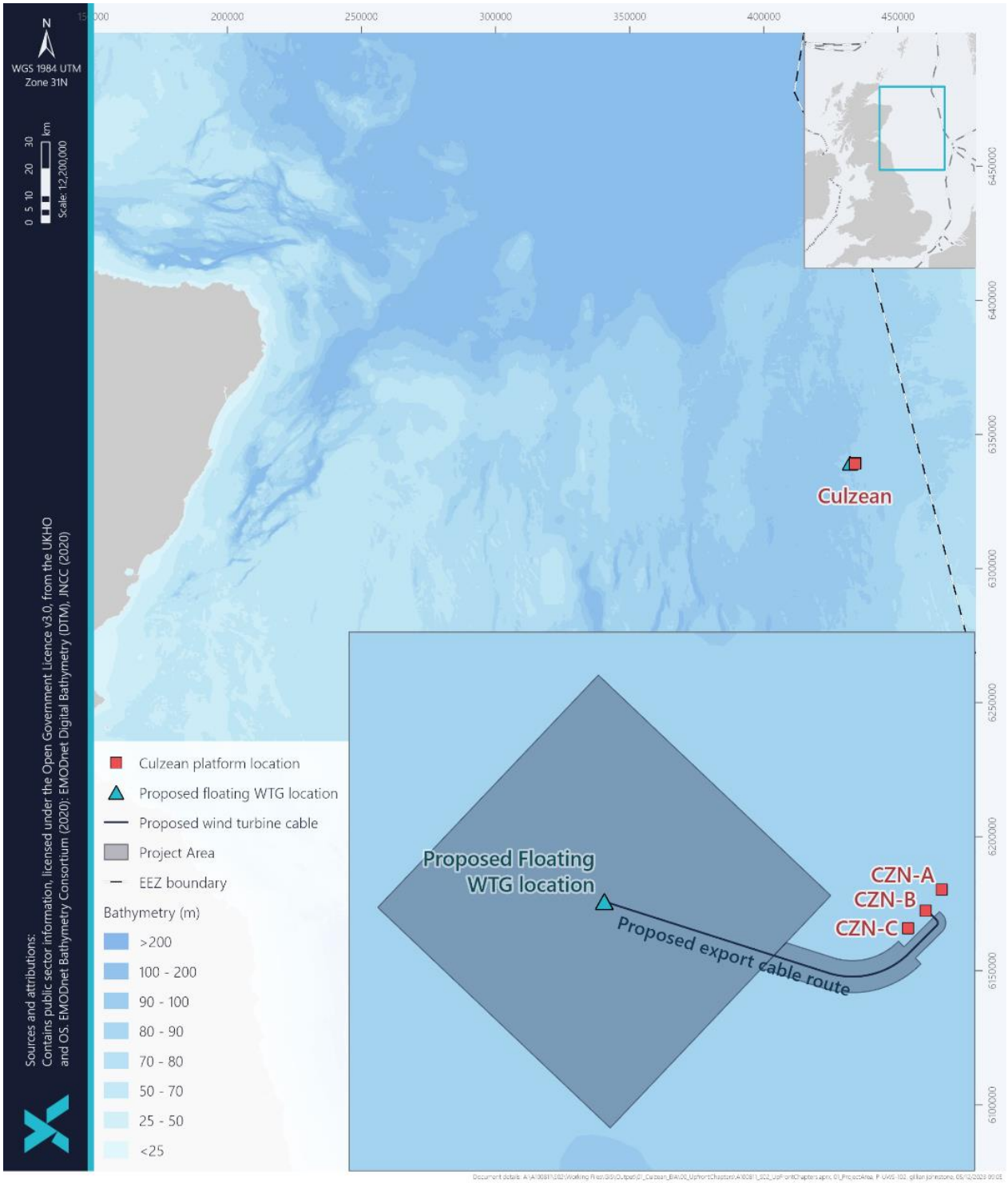

Figure 2-1 Culzean Floating Wind Project Area

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

3. AVIATION LIGHTING AND MARKING

3.1 Introduction

The aviation lighting and marking detailed in Section 3 abides by the requirements set out on the following guidance documents:

- The Air Navigation Order (ANO) 2016 (CAA, 2016a).
- CAA CAP 393 – Regulations made under powers in the Civil Aviation Act 1982 and the Air Navigation Order 2016 (CAA, 2021a).
- CAA CAP – 764 Policy and Guidelines on Wind Turbines (CAA, 2016b).
- MCA MGN 654 and Annexes – Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021).
- MOD Obstruction Lighting Guidance (MOD, 2020).

This section sets out how the Culzean Floating Wind project will be marked and lit from an aviation (including Search and Rescue (SAR)) perspective. The aviation lighting and marking scheme has been agreed with the CAA and MCA in principle and has been designed to be compliant with the relevant guidance.

3.2 Promulgation of Information

TEPNSUK will ensure effective promulgation of information to the appropriate aviation authorities and stakeholders throughout the construction and operational phases of the project.

As required under Article 225a of the ANO 2016 (CAA, 2016a), TEPNSUK will provide details of the Culzean Floating Wind project to the CAA Airspace Coordination and Obstacle Management Service (ACOMS) portal at least eight weeks in advance of the planned works for any temporary or permanent structures or erections associated with the project over 100m in height. The following shall be provided:

- Description of the obstacle;
- Locations (degrees, minutes, seconds);
- Elevation above mean sea level and height above ground level to the nearest metre or foot prior to and upon completion of the works;
- Type and colour of any lighting to be fitted to it, or to be removed from it; and
- Scheduled dates of commencement and completion of the works.

If there is insufficient time to give eight weeks' notice or there is an urgent need to commence the planned works, the CAA will be notified as soon as is practicable. The CAA will also be notified in writing of the completion of the planned works and whether there has been any change to the information provided above no later than 30 days after the completion of the works.

There is an international civil aviation requirement for all structures (temporary or otherwise) of 300 feet (91.4 m) or more to be charted on aeronautical charts. The appropriate location will therefore be reported to the Defence Geographic Centre (DGC) which maintains the UK's data base of tall structures (the Digital Vertical Obstruction File) at least 10 weeks prior to the construction of any such structure. The point of contact for the DGC is: 0208 818 2702, mail to dvof@mod.uk.

As per the CAA requirements, TEPNSUK will provide the DGC the following:

- accurate location of the turbine;
- accurate maximum height;
- the lighting status of the turbines, and the estimated start / end dates for construction; and
- the estimate of when the turbine is scheduled to be removed.

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

In addition, the developer should also provide the maximum height of any construction equipment required to build the turbine. In order to ensure that aviation stakeholders are aware of the development while aviation charts are in the process of being updated, developments should be notified through the means of a Notice to Airmen (NOTAM). To arrange an associated NOTAM, TEPNSUK will contact the CAA's Airspace Regulation (0207 453 6599, mail to AROps@caa.co.uk) providing the same information as required by the DGC at least 14 days prior to the start of construction.

Promulgation of information in relation to aviation lighting failures are detailed in Section 3.5.

3.3 Construction Phase

No specific aviation lighting or marking will be implemented during the construction phase. As per Section 3.2, TEPNSUK will undertake promulgation of information to the relevant aviation authorities and stakeholders prior to, and during construction.

3.4 Operational Phase

3.4.1 Lighting / Obstruction Marks

During the operational phase, the Culzean wind turbine will be fitted with 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.

Visibility meters will be fitted to the WTG and floater package to detect when visibility is greater than 5 km, in which case the light intensity of the aviation warning light will be automatically reduced from 100% to 10%. If meters detect that visibility is less than 5 km, all aviation hazard lights will increase intensity to 2,000 cd. A second visibility meter shall be installed on the turbine itself as a redundancy measure.

All lights and the Culzean WTG will be under the control of the Culzean platform so that they can be switched on / off via a central control system should this be required during an emergency situation and at the request of the MCA.

Due to the nature of the Vestas V112, it cannot be configured to a heli-hoist mode, therefore no green heli-hoist status light will be fitted. There will be no winching / heli-deck areas.

The operational aviation lighting and marking specifications are set out in Table 3.1.

3.4.2 Blade Marking

During consultation with the MCA, it was determined that the blade hover reference marks should remain to allow the MCA to assess SAR capability should it be required.

Blade hover reference marks will be provided on the WTG blades to provide SAR helicopter pilots with a reference mark when hovering over a WTG nacelle during a rescue. Three marks will be added, one each at the 10, 20 and 30 m interval (measured from the hub) and placed on the trailing edge of the blades so that the marks lie upwards in view of the helicopter pilot when the blades are parked in the 'Y' position or offset 'Y' (i.e. one blade angled forward into the wind).

The diameter of the marks will be at least 600 millimetres (mm). Each mark will be painted traffic red (RAL 3020), to ensure they are clear against the WTG blades.

The blade tip is marked with three red bands as follows:

- three stripes each 370 cm with 370 cm distance between each stripe, the total marking accounts for 18.5 m (the blades are 55 m in length).

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

- the tip itself is painted 370 cm. This design has been communicated to, and agreed in principle with, the MCA.

The operational aviation lighting and marking specifications are set out in Table 3.1.

3.4.3 ID Marking

An individual identification (ID) number will be marked on the WTG nacelle roof so that SAR helicopters and/or other low flying aircraft can locate and/or reference a particular WTG visually. The ID number proposed is "CW01".

ID numbers will be recognisable from an aircraft flying 500 feet (150 m) above the highest part of the fixed structure. The ID number will be as large as practicable but not less than 1.5 m in height and of proportionate width.

The operational aviation lighting and marking specifications are set out in Table 3.1.

3.5 Failure of Aviation Lighting

Article 223 (7) of the ANO (CAA, 2016) states 'In the event of the failure of any light which is required by this article to be displayed by night the person in charge must repair or replace the light as soon as reasonably practicable."

It is accepted that there may be occasions when meteorological or sea conditions prohibit the safe transport of personnel for repair tasks. Furthermore, there may be fault conditions that are wider ranging and would take longer to diagnose or repair. In such cases, international standards and recommended practices require the issue of a Notice to Airmen (NOTAM).

The CAA considers the operator of an offshore wind farm as an appropriate person for the request of a NOTAM relating to the lighting of their wind farm. Should the anticipated outage be greater than 36 hours, the operator shall request a NOTAM to be issued by informing the NOTAM section (operating 24 hours) of the UK Aeronautical Information Service (AIS) as soon as possible by telephoning +44 (0) 20 8750 3773/3774. AIS will copy the details of the NOTAM to the operator and to the CAA.

The following information will be provided when requesting a NOTAM:

- Name of wind farm (as already recorded in the Aeronautical Information Publication (AIP);
- Identifiers of affected lights (as listed in the AIP);
- Expected date of reinstatement; and
- Contact telephone number.

In order to expedite the dissemination of information during active aviation operations the wind farm operator may also consider establishing a direct communication method with local helicopter operators in the area.

Upon completion of the remedial works, the Aeronautical Information Service shall be notified as soon as possible to enable a cancellation to be issued. If an outage is expected to last longer than 14 days, then the CAA shall also be notified directly at Windfarms@caa.co.uk (normal working hours) to discuss any issues that may arise and longer-term strategies.

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

Table 3.1 Operational Aviation Lighting and Marking Specifications

Lighting/Marking Aspect	Relevant Structure	Specifications	Relevant Guidance
Aviation Warning Light	WTG	• 2000 candela (cd) medium intensity steady red aviation warning light (two to be installed for purposed of redundancy). • 2000 cd when visibility is less than 5 km. • Dimmable to 200 cd when visibility greater than 5 km. • Capable of being switched off at MCA request during SAR operations. • 360° visibility.	CAP 764 ANO 2016 MGN 654 SAR Annex 5
Aviation Warning Lighting Visibility Meters	WTG	• Visibility meter shall be installed on WTG, but also give input to Aviation light CIP controller for dimming functions.	CAA standard requirement CAP 764
Blade Tip Marking	WTG	• The blade tip is marked with three red bands: three stripes each 370 cm with 370 cm space between each, the tip itself is painted 370 cm. • The total marking accounts for 18.5 m (the blades are 55 m in length). • Marked in Traffic Red (RAL 3020).	MGN 654 SAR Annex 5
Blade Hover Reference	WTG	• Three markings on both faces 10 m, 20 m and 30 m from hub end. • Markings should be at least 600 mm. • Marked in Traffic Red (RAL 3020).	MGN 654 SAR Annex 5
ID Marking	WTG	• ID numbers will be marked on the WTG nacelle roofs. • Not less than 1.5 m in height, with proportional width.	CAP 764 MGN 654 SAR Annex 5
Green Heli-hoist Light	N/A to Culzean – no helicopter operations are planned to be undertaken from the Culzean floating WTG.		
Hoist Area Marking	N/A to Culzean – no helicopter operations are planned to be undertaken from the Culzean floating WTG.		

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

4. MARINE LIGHTING AND MARKING

4.1 Introduction

The marine navigation lighting and marking detailed in Section 4 has been discussed during consultation with the NLB and MCA, and abides by the requirements in the following guidance documents:

- G1162 Guidance on the Marking of Man-made Offshore Structures (IALA, 2021)
- MCA MGN 654 and Annexes – Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021)

And with consideration of:

- The Department for Business, Energy and Industrial Strategy (BEIS now Department for Energy Security and Net Zero (DESNZ)). Standard Marking Schedule for Offshore Installations (BEIS, 2011).

This section sets out how the Culzean Floating Wind turbine will be marked and lit from a marine perspective. The marine lighting and marking scheme has been agreed with the NLB and MCA in principle, and has been designed to be in compliance with the relevant guidance.

As required by the NLB, prior to the deployment of any Aid to Navigation (AtoN) on the Culzean Floating Wind project, the Statutory Sanction of the Commissioners of Northern Lighthouses must also be sought.

A Notice to Mariners (NtM), shall be issued on establishment of any AtoN, the NLB should be included in the NtM distribution list: navigation@nlb.org.uk.

The operational marine lighting and marking specifications are set out in Table 4.1.

4.2 Promulgation of Information

Details of the Culzean Floating Wind project will be promulgated to relevant marine stakeholders in advance of, and during, construction, and also during the operational/maintenance phase where appropriate or as required under the relevant Marine Licence conditions (see Table 1.1). Stakeholders will also be informed when construction is complete. The relevant marine stakeholders to be informed include but are not limited to:

- United Kingdom Hydrographic Office (UKHO);
- HM Coastguard (via zone3@hmcg.gov.uk);
- Northern Lighthouse Board (NLB);
- Local fishing organisations; and
- Kingfisher Bulletin.

4.3 Construction Phase

No specific marine lighting will be implemented during the construction phase. As per Section 4.2, TEPNSUK will undertake promulgation of information to the relevant marine authorities and stakeholders prior to, and during construction.

All vessels associated with towage to site/manoeuvring of the WTG and the construction of the Culzean Floating Wind project will be marked and lit as per the International Convention of the Prevention of Collisions at Sea (COLREGs) (International Maritime Organization ((IMO), 1972).

4.4 Operational Phase

4.4.1 Lighting and Sound Signals

Specifications of the light and sound signals are detailed in Table 4.1.

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

As required by the MCA, all marine lights and sound signals (HWS) will be remotely operable via Culzean platform. In particular, they will be able to switched off remotely if requested by the MCA during SAR operations.

4.4.2 Automatic Identification System (AIS)

To provide additional mitigation to passing traffic, the Culzean WTG floater will be fitted with an AIS transmitter.

The AIS transmitters will be required to have an availability of not less than 97.0% (IALA Category 3). TEPNSUK or an appointed contractor will procure the relevant AIS licences via applications to the Office of Communications as required.

4.4.3 ID Marking

The Culzean turbine structure will display ID panels with black letters / numbers on a yellow background visible in all directions. ID panels will be located on each of the three outer columns.

The ID characters will be illuminated (either by a low-intensity light or via retro reflective material visible from a vessel) thus enabling the structure to be detected at a suitable distance. For offshore wind turbines, the size of the ID characters in combination with the lighting will be such that, under normal conditions of visibility and all known tidal conditions, they are clearly readable by an observer stationed 3 m above sea level, and at a distance of not less than 150 m from the structure. This lighting will be hooded or baffled to avoid confusion with the navigational lighting and marking.

The ID number proposed is “CW01”.

4.4.4 WTG Paint

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).

4.5 Failure of Marine Lighting

A requirement of the management of Aids to Navigation (AtoN) within UK waters is to report navigation failures to NLB (noting this does not include temporary lighting). This is done through an Aid to Navigation Availability Reporting database (LATONs)[2]. The system is administered by NLB in order to assist wind farm operators to fulfil their responsibility to maintain records of AtoN availability and to provide summaries of these to NLB. This should be undertaken in the event of any failure or loss of availability and should be carried out during both the construction and operational phases as per the required availability standards.

In the event of a significant loss of an AtoN such that a significant risk to navigation is considered likely to occur, consultation would be undertaken with the NLB and MCA to determine the need for any additional mitigation.

TEPNSUK will have overall responsibility to provide records of AtoNs and details of failure or losses to NLB. The Navigational Safety Plan provides specific details on other reporting requirements and notifications to local mariners.

[2] https://nlbhq.nlb.org.uk/latonsonline/

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

Table 4.1 Marine Lighting and Marking Specifications

Lighting/Marking Aspect	Relevant Structure	Specifications	Relevant Guidance
Marine Light	Floating substructure	Two lights placed on top of two outer columns (one per column) so as to provide 360 ° visibility • 10 NM Main Lanterns, white flashing. • Mo (U) < 15 sec. • Located not less than 6 m and not more than 30 m above Highest Astronomical Tide (HAT). • IALA Category 1 availability of not less than 99.8%. • Uninterruptible Power Supply (UPS) of 96 hour / Adequate backup system to maintain the function and availability of AtoN (typically 96 hours).	G1162 and standard requirement
Visibility meters	Floating substructure	• Change in visibility will trigger fog signals. • Signal to activate when visibility is less than 2 nm. • Visibility meters should be installed as per manufacturers requirements.	G1162 and standard requirement
Sound signals (hazard warning signals (HSW))	Floating substructure	One foghorn installed on top of one of the outer columns: • Located not less than 6 m and not more than 30 m above HAT. • Have a minimum range of 2 nm. • Have the character Mo (U) 30s with a minimum duration for the short blast of 0.75 seconds. • Operated when the meteorological visibility is 2 nm or less. • Visibility meter on top of central column; • At least IALA Category 3 (> 97.0% availability).	G1162 and standard requirement
AIS	Floating substructure	• Availability of not less than 97.0% (IALA Category 3).	Regulator Requirement
ID Panel	Floating substructure	• Black letters/numbers one meter high on yellow background. • Visible in all directions.	G1162 and standard requirement

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

		• Illuminated (lighting will be hooded or baffled to avoid confusion with the navigational lighting and marking). • One located on each of three outer columns. • Clearly readable by an observer stationed 3 m above sea level, and at a distance of not less than 150 m from the structure.	
Paint	WTG Tower Floating substructure	• Golden yellow (RAL 1004) from the waterline (HAT) to a height of approximately 15m. • Light grey (RAL 7035) upwards of located approximately 15 m above HAT.	G1162 and standard requirement

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.

5. REFERENCES

Anatec (2023). Culzean Floating Offshore Wind Pilot Navigational Risk Assessment

BEIS (2011). Standard Marking Schedule for Offshore Installations.

CAA (2016 (a)). The Air Navigation Order 2016.

CAA (2016 (b)). CAP 764 – Policy and Guidelines on Wind Turbines.

CAA (2021). CAP 393 - Regulations made under powers in the Civil Aviation Act 1982 and the Air Navigation Order 2016.

IALA (2021). G1162 Guidance on the Marking of Man-made Offshore Structures.

MCA (2021). MGN 654 (M+F). Offshore Renewable Energy Installations (OREIs) Safety Response. Available at: MGN 654 (M+F) Offshore Renewable Energy Installations (OREI) safety response.

MCA (2024). Marine Guidance Note 654 Annexe 5 – Offshore Renewable Energy Installations (OREIs) – Requirements, guidance and operational considerations for SAR and Emergency Response.

MOD (2020). Obstruction Lighting Guidance.

This document is the property of TotalEnergies. It must not be stored, reproduced, or disclosed to others without written authorisation from the Company.