Environmental Impact Assessment Report
Volume 4: Outline Lighting and Marking Plan

MarramWind Offshore Wind Farm

December 2025

MarramWind

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Contents

1. Introduction

1.1 Overview

1.1.1.1 This Outline Lighting and Marking Plan (LMP) has been produced along with the Environmental Impact Assessment (EIA) Report and aims to discharge the offshore consent conditions in the marine licences that require the submission of an LMP.

1.1.1.2 The LMP will be applicable to elements of the MarramWind Offshore Wind Farm (hereafter referred to as 'the Project') seaward of Mean High Water Springs (MHWS).

1.1.1.3 This Outline LMP relates to M-038 of **Volume 3, Appendix 5.2: Commitments Register**.

1.2 Project background

1.2.1.1 The Project is wholly owned by Scottish Power Renewables UK Limited (SPR). MarramWind Limited, a subsidiary of SPR, is the Applicant for the Project.

1.2.1.2 The Project is a proposed floating wind farm located in the North Sea, with a grid connection capacity of up to 3 gigawatts (GW). The location of the Project is determined by the Option Area Agreement (OAA), which is the spatial boundary of the Northeast 7 (NE7) Plan Option within which the electricity generating infrastructure will be located. The NE7 Plan Option is located north-east of Rattray Head on the Aberdeenshire coast in north-east Scotland, approximately 75 kilometres (km) at its nearest point to shore and 110km at its furthest point. An option to lease agreement for the Project within the NE7 Plan Option was signed in April 2022.

1.2.1.3 A summary of the Project is provided in **Volume 1, Chapter 1: Introduction** and a comprehensive description of the Project is provided in **Volume 1, Chapter 4: Project Description.**

1.2.1.4 The Project's offshore infrastructure, located seaward of MHWS, includes the following:

- wind turbine generators (WTGs), including WTG floating units (platforms and station keeping system);
- array cables;
- subsea distribution centres (SDC);
- subsea substations;
- offshore substations;
- reactive compensation platform(s) (RCP) (if required); and
- offshore export cables to connect the offshore infrastructure to the landfall(s).

1.2.1.5 The EIA Report accompanies applications for offshore consents, licences and permissions for the Project to (MD-LOT under Section 36 (s.36) of the Electricity Act 1989, the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009, for the offshore infrastructure seaward of MHWS.

1.2.1.6 The EIA Report also accompanies an application to Aberdeenshire Council for planning permission in principle consent under The Town and Country Planning (Scotland) Act 1997, for the onshore infrastructure landward Mean Low Water Springs (MLWS).

1.2.1.7 There are four sets of EIA regulations applicable to the Project: the Electricity Works (EIA) (Scotland) Regulations 2017 for offshore generating stations requiring s.36 consent; the Marine Works (EIA) (Scotland) Regulations 2017 and the Marine Works (EIA) Regulations 2007 for marine licence applications within Scottish territorial waters (0 to 12 nautical miles) and offshore waters (12 to 200 nautical miles) respectively; and the Town and Country Planning (EIA) (Scotland) Regulations 2017 for planning applications submitted to Aberdeenshire Council for onshore infrastructure located landward of MLWS.

1.3 Purpose of the Lighting and Marking Plan

1.3.1.1 The Outline LMP will form the basis of the Final LMP. The Final LMP will be finalised and approved post consent and approved as part of condition discharge prior to construction by Scottish Ministers in accordance with s.36 and associated marine licences.

1.3.1.2 The broad objectives of the LMP are as follows:

- Detail how the Project will be lit and marked in accordance with relevant legislation and guidance; and
- Detail how the lighting and marking scheme will be managed including maintaining the availability of the scheme throughout the relevant stages of the Project and emergency procedures in the event of a loss of Aid to Navigation (AtoN).

1.3.1.3 The Final LMP shall state the legislative requirements, current standards of practice and best practice measures that define the standard of construction and operation and maintenance (O&M) practice adhered to by the Contractors. However, adhering to the Final LMP does not absolve the Applicant, Contractors or Subcontractors from complying with legislation and bylaws relevant to their construction and O&M activities.

1.4 Legislation and guidance

1.4.1.1 The LMP has been developed with reference to key legislation and guidance that relates to the maritime and aviation sectors respectively, as outlined in the following sections.

1.4.2 Marine legislation and guidance

1.4.2.1 The marine navigation lighting and marking to be detailed in **Section 4.2** will be discussed during consultation with both the Northern Lighthouse Board (NLB) and Maritime and Coastguard Agency (MCA) post consent, and apply the following guidance documents:

- International Organization for Marine Aids to Navigation (IALA) Recommendation R0139 The Marking of Man-Made Structures (IALA, 2021a);
- IALA Guideline G1162 The Marking of Offshore Man-Made Structures (IALA, 2021b);
- IALA Recommendation R1001 The IALA Maritime Buoyage System (IALA, 2023);
- IALA Guideline G1185 Enhancing the Safety and Efficiency of Navigation Around Offshore Renewable Energy Installations (IALA, 2024);
- Marine Guidance Note (MGN) 654 Safety of Navigation: Offshore Renewable Energy Installations – Guidance on UK Navigational Practice, Safety and Emergency Response and its annexes (MCA, 2021);

1.4.2.2 Consideration has also been given to:

- Standard Marking Schedule for Offshore Installations (Department of Energy & Climate Change (DECC), 2011).

1.4.3 Aviation legislation and guidance

1.4.3.1 The aviation lighting and marking detailed in **Section 4.3** follows the requirements set out in the following guidance documents:

- CAP 437 – Standards for Offshore Helicopter Landing Areas (Civil Aviation Authority (CAA), 2023);
- Civil Aviation Policy (CAP) 393 Regulations made under powers in the Civil Aviation Act 1982 and the Air Navigation Order 2016 (CAA, 2021);
- CAP 764 – Policy and Guidelines on Wind Turbines (CAA, 2016);
- MGN 654 Safety of Navigation: Offshore Renewable Energy Installations – Guidance on UK Navigational Practice, Safety and Emergency Response and its annexes (MCA, 2021);
- Ministry of Defence (MoD) Obstruction Lighting Guidance (MoD, 2020).

1.4.4 Consultation

1.4.4.1 The Outline LMP has been prepared given that lighting and marking of the Project is referenced in the MCA, NLB and MoD Scoping Opinion responses. It is noted that in addition to consideration and compliance with the relevant guidance, the preparation of this LMP will also be informed and updated based on continued consultation with the NLB, MCA, CAA, and MoD as key stakeholders of relevance to lighting and marking.

1.5 Implementation of the Lighting and Marking Plan

1.5.1.1 The LMP will be finalised and approved by Scottish Ministers post consent, as part of a condition discharge prior to construction, in accordance with consent conditions relevant to s.36 and associated marine licences. The LMP will address the lighting and marking scheme for marine and aviation across the entire Project inclusive of generation and transmission assets.

1.5.1.2 The LMP will be incorporated into the contracts for Principal Contractors responsible for the works. All parties involved including Principal Contractors, Subcontractors and their suppliers, must comply with the relevant provisions of the detailed LMP. They are obligated to provide documentation outlining how they will guarantee both the implementation and monitoring of the LMP requirements.

1.6 Scope of the Lighting and Marking Plan

1.6.1.1 The LMP details marine and aviation navigational lighting and marking of the Project during the construction and O&M stages. This will ensure the safe navigation of vessels and aircraft that operate within and in proximity to the Project, as well as satisfying regulatory requirements and guidance on the marking of offshore infrastructure.

1.6.1.2 The finalised LMP will be produced at the post consent stage, in advance of the construction of the Project, and will be agreed with the relevant authorities including the NLB, the MCA, CAA, and the MoD. This Outline LMP provides an overview of the information that will be included in the finalised LMP with specific details provided where available at the consent application stage. Where specifications are provided, they are indicative only and are subject to change following discussions with stakeholders for the finalised LMP.

1.6.1.3 The Applicant will also be required to submit a Decommissioning Programme in accordance with Section 105(2) of the Energy Act 2004 and the 'Decommissioning of Offshore

Renewable Energy Installations in Scottish waters or in the Scottish part of the Renewable Energy Zone under The Energy Act 2004: Guidance notes for Industry (in Scotland)' (Scottish Government, 2022). Decommissioning of the Project will require a separate marine licence and therefore consideration of the lighting and marking requirements will be undertaken at the time of the development of the s.36 marine licence application for decommissioning. Thus, the LMP does not consider the decommissioning stage of the Project. The LMP will be updated prior to decommissioning in line with the Decommissioning Programme.

1.7 Other related implementation plans

1.7.1.1 Other consent plans that are relevant to the LMP are listed in **Table 1.1**. These documents reflect the commitments made within the EIA Report and any associated conditions of consent or requirements agreed with relevant authorities.

Table 1.1 Other related implementation plans to the LMP

Implementation plan	Linkage with LMP
Vessel Management and Navigational Safety Plan (VMNSP)	Details the management and coordination of project vessels to mitigate the impact on third-party users. An Outline VMNSP is provided in the **Outline Vessel Management and Navigational Safety Plan** of the EIA Report.
Emergency Response Cooperation Plan	Details relevant information relating to the Project and appropriate actions in the event of an emergency situation.
Development Specification and Layout Plan	Details information relating to the final layout and the corresponding infrastructure.
Environmental Management Plan (EMP)	Details how environmental effects will be managed, which may include that arising from navigational safety risks. An **Outline EMP** is provided in **Volume 4**.

2. Project Description

2.1.1.1 The Project's offshore infrastructure located seaward of MHWS includes the following:

- up to 225 floating WTGs;
- up to four offshore substations;
- up to two RCPs (if required);
- up to 225 array cables with total length of 367 nautical miles (nm) (680 kilometre (km));
- up to 45 SDCs;
- up to four subsea substations; and
- up to five export cable trenches, each potentially containing multiple export cables and having a maximum length of 76nm (140km).

2.1.1.2 The layout to be utilised by the Project will be determined post consent in consultation with the MCA and NLB and presented in **Figure 1**. It is noted that the final layout of surface piercing infrastructure will be contained entirely within the OAA, with the exception of the RCPs (if required), which will be installed within the offshore export cable corridor as presented in **Figure 2**.

Figure 1 Overview of final layout

[Figure showing the final array layout including ID system to be added post consent].

Figure 2 Overview of final RCP locations

[Figure showing the final RCP locations to be added post consent].

3. Construction Stage

3.1 Marine lighting and marking

3.1.1.1 During the construction stage, temporary lighting and marking of the Project is required. Guidance documents and their general specifications relating to the lighting and marking of offshore structures are identified in **Section 1.4.2**.

3.1.1.2 This Section specifically highlights lighting and marking requirements to be implemented during the construction stage, which will be agreed and finalised post consent with the relevant stakeholders including the NLB.

3.1.1.3 Construction buoyage will be established at least four weeks prior to the commencement of construction of the Project and will remain in place until the operational lighting and marking requirements have been installed, inspected and approved by the NLB. Construction buoyage may be installed in relation to not only the OAA but also the RCPs.

3.1.1.4 **Table 3.1** presents the marine lighting and marking requirements as detailed by industry standards or applicable guidance documents, noting that the guidance provides the full technical specifications required by the relevant stakeholders.

3.1.1.5 **Table 3.2** presents the positions and specifications of the individual construction buoys, with **Figure 3** showing their positions relative to the final layout. The following describes the indicative specifications that all construction buoyage will adhere to:

- radar reflectors;
- focal plane 3 to 5 metres (m) above the waterline;
- range of 5nm (9km); and
- minimum 3m diameter at the waterline.

Table 3.1 Construction stage lighting and marking

Lighting and marking aspect	Relevant structures	Indicative specifications
Temporary construction lighting (WTG, offshore substation, and RCP)	All structures within the OAA and the RCPs.	• IALA special mark characteristics (Flashing (Fl) Yellow (Y) 2.5 seconds (s)); • 360° visibility; and • minimum 2nm (3.7km) range.
Construction buoyage – numbers and types	N/A	[Details of construction buoyage required to be added port consent – expected to be combination of cardinal and special marks].
Construction buoyage removal	N/A	• Construction buoyage removed once the NLB have provided written approval of the operational lighting and marking on the structures.

Table 3.2 Construction buoyage positions and specifications

Buoy	Identification (ID)	Location		Light and top mark specification
		Latitude (Degrees Decimal Minutes (DDMM.mm)	Longitude (DDMM.mm)	
[Details to be added post consent]	[Details to be added post consent].	[Details to be added post consent].	[Details to be added post consent].	[Details to be added post consent].

Figure 3 Construction buoyage

[Figure showing construction buoyage relative to the final array layout and RCPs (if applicable) to be added post consent].

3.2 Aviation lighting and marking

3.2.1.1 There will be no specific aviation lighting and marking implemented during the construction stage, however relevant information relating to the Project will be promulgated to aviation stakeholders as required under the relevant CAA guidance (see **Section 1.4.3**) throughout the construction and O&M stages of the Project.

4. Operation and Maintenance

4.1 Overview

4.1.1.1 This Section of the LMP presents the marine and aviation lighting and marking to be implemented during the O&M stage of the Project.

4.2 Marine lighting and marking

4.2.1.1 The marine operational lighting and making to be implemented for the WTGs, offshore substations and RCPs (if required) are summarised in **Table 4.1**, **Table 4.2**, and **Table 4.3**, respectively, and then illustrated in the case of OAA structures in **Figure 4**.

4.2.1.2 As per **Section 1.4.4**, NLB will be consulted on the marine lighting and marking scheme, including in relation to any requirements in potential scenarios where floating units become off-station.

4.2.2 Failure of marine lighting

4.2.2.1 A requirement of the management of AtoNs within United Kingdom (UK) waters is to report navigational failures to the NLB (noting this does not include temporary lighting). This is done through a Local Aid to Navigation Availability Reporting database. The system is administered by the 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 the 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 O&M stages as per the required availability standards.

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

Table 4.1 O&M stage marine lighting and marking – WTGs

Lighting and marking aspect	Relevant structures	Indicative specifications
Significant Peripheral Structure (SPS) lighting	[Relevant structures to be added post consent when final layout is agreed].	• synchronised flashing IALA special mark characteristics (Fl.Y.5s); • 360° visibility; • between 6m and 30m above Highest Astronomical Tide (HAT) and below arc of the rotor blades; • minimum 5nm (9km) range; • IALA Category 1 availability (greater than 99.8%); and • Uninterrupted Power Supply (UPS) of 96 hours.
Intermediate Peripheral Structure (IPS) lighting	[Relevant structures to be added post consent when final layout is agreed].	• synchronised flashing yellow lights (distinct characteristic from SPS); • 360° visibility; • between 6m and 30m above HAT and below arc of the rotor blades; • minimum 2nm range; • IALA Category 1 availability (greater than 99.8%); and • UPS of 96 hours.
Sound signals	[Relevant structures to be added post consent when final layout is agreed].	• located between 6m and 30m above HAT; • minimum range of 2nm (3.7km); • sound signal of the morse character ‘U’ every 30s; • minimum 0.75s short blast; • operational when visibility is 2nm or less; and • IALA Category 3 (at least 97.0% availability).
Visibility meters	[Relevant structures to be added post consent when final layout is agreed].	• signal activation when visibility is less than 2nm (3.7km).
Automatic Identification System (AIS)	[Relevant structures to be added post consent when final layout is agreed].	• IALA Category 3 (at least 97.0% availability).
ID marker	[Relevant structures to be added post consent when final layout is agreed].	• lit via low-level baffled lighting which can be remotely controlled;

Lighting and marking aspect	Relevant structures	Indicative specifications
		• black letters on yellow background; • 360° visibility via multiple markers; and • readable by an observer stationed 3m above sea level at 150m from WTG.
WTG paint	[Relevant structures to be added post consent when final layout is agreed].	• painted traffic yellow (RAL 1023) between HAT and a minimum of 15m above HAT; and • painted light grey (RAL 7035) upwards of the point where traffic yellow ends.

Table 4.2 O&M stage marine lighting and marking – offshore substations

Lighting and marking aspect	Relevant structures	Specification
Main light	[Relevant structures to be added post consent when final layout is agreed].	• TBC
Sound signals	[Relevant structures to be added post consent when final layout is agreed].	• located between 6m and 30m above HAT; • minimum range of 2nm (3.7km); • sound signal of the morse character 'U' every 30s; • minimum 0.75s short blast; • operational when visibility is 2nm (3.7km) or less; and • IALA Category 3 (at least 97.0% availability).
Visibility meters	[Relevant structures to be added post consent when final layout is agreed].	• signal activation when visibility is less than 2nm (3.7km).
Automatic Identification System (AIS)	[Relevant structures to be added post consent when final layout is agreed].	• IALA Category 3 (at least 97.0% availability).
ID marker	Offshore substations.	• lit via low-level baffled lighting which can be remotely controlled; • black letters on yellow background; • 360° visibility via multiple markers; and • readable by an observer stationed 3m above sea level at 150m from WTG.
Offshore substation paint	Offshore substations.	• painted traffic yellow (RAL 1023) from HAT and for entire structure foundation; and • painted light grey (RAL 7035) for topside, excluding topside structures such as work cabins, cranes, ladders and other working areas.

Table 4.3 O&M stage marine lighting and marking – RCPs

Lighting and marking aspect	Relevant structures	Indicative specifications
Main light	RCPs	• synchronised White Morse 'U' 15s; • 360° visibility; • between 6m and 30m above HAT and below arc of the rotor blades; • minimum 10nm range; • IALA Category 1 availability (greater than 99.8%); and • UPS of 96 hours.
Subsidiary light	RCPs including bridge link.	• synchronised Red Morse 'U' 15s; • minimum 3nm (5.6km) range; • IALA Category 2 availability (greater than 99.0%); and • UPS of 96 hours.
Sound signals	RCPs	• located between 6m and 30m above HAT; • minimum range of 2nm (3.7km); • sound signal of the morse character 'U' every 30s; • minimum 0.75s short blast; • operational when visibility is 2nm (3.7km) or less; and • IALA Category 3 (at least 97.0% availability).
Visibility meters	RCPs	• signal activation when visibility is less than 2nm (3.7km).
AIS	RCPs	• IALA Category 3 (at least 97.0% availability).
ID marker	RCPs	• lit via low-level baffled lighting which can be remotely controlled; • black letters on yellow background; • 360° visibility via multiple markers; and • readable by an observer stationed 3m above sea level at 150m from WTG.
RCP paint	RCPs	• painted traffic yellow (RAL 1023) between HAT and a minimum of 15m above HAT; and • painted light grey (RAL 7035) for topside, excluding topside structures such as work cabins, cranes, ladders and other working areas.

Figure 4 Marine operational lighting and marking

[Figure showing marine operational lighting and marking locations for the final array layout to be added post consent].

4.3 Aviation lighting and marking

4.3.1.1 The aviation operational lighting and marking to be implemented for the WTGs and offshore substations are summarised in **Table 4.4** and **Table 4.5**, respectively, and then illustrated in **Figure 5**.

4.3.1.2 For the RCPs, aviation lighting and marking will be as requested by CAA and MoD during consultation to be undertaken post consent.

Table 4.4 O&M stage aviation lighting and marking – WTGs

Lighting and marking aspect	Relevant structures	Indicative specifications
Aviation warning lighting (dual purpose for warning lights and Search and Rescue (SAR) lights)	Peripheral structures.	• red, medium intensity light displayed at night[1]; • 2,000 Candela (cd) when visibility is less than 5km; • 200cd when visibility is at least 5km in all directions; • located as close to the top of the nacelle as possible; • simultaneous flash the Morse character 'W'; • compatible with Night Vision Imaging System (NVIS); and • UPS of 8 hours.
Aviation warning lighting visibility meters	[Relevant structures to be added post consent when final layout is agreed].	• 2,000cd when visibility is less than 5km; and • 200cd when visibility at least 5km in all directions.
SAR lights	All WTGs.	• red 200cd light; • steady when in use at the MCA's request, switched off otherwise; • 360° visibility; and • compatible with NVIS.
Green heli-hoist light	All WTGs.	• green, low intensity light; • steady to indicate WTG is safe for a hoisting operation; • flashing to indicate WTG is preparing for a hoisting operation; • off when WTG is not safe for a hoisting operation; and • 360° visibility.
Blade markings	All WTG blades.	• marks placed on each blade side at 10m, 20m and 30m from the blade root, in a contrasting colour; • at least 600 millimetres (mm) with red dot referred; and • placed at trailing edge of the blade.
Blade tip markings	All WTG blades.	• approximately 2% of total blade length in contrast to rest of blade.

[1] Definition of day / night as per Air Navigation Order (CAA, 2016)

Lighting and marking aspect	Relevant structures	Indicative specifications
ID markings (nacelle)	All WTGs.	• WTG ID numbers displayed on roof of nacelles; and • ID numbers at least 1.5m height and proportional width.
Heli hoist markings	These are not covered within this plan but should meet the standards set out in the following guidance documents and in consultation with the appropriate authorities: • CAA CAP 764 – Policy and Guidelines on Wind Turbines (CAA, 2016); • CAA CAP 437 – Standards for Offshore Helicopter Landing Areas (CAA, 2021); and • Consultation with Helicopter Certification Agency (MCA and CAA).	

Table 4.5 O&M stage aviation lighting and marking – offshore substations

Lighting and marking aspect	Relevant structures	Specifications
SAR lights	Offshore substations.	• red 200cd light; • steady when in use at the MCA's request, switched off otherwise; • 360° visibility; and • compatible with NVIS.
Green heli-hoist light	Offshore substations.	• green, low intensity light; • steady to indicate offshore substation is safe for a hoisting operation; • flashing to indicate offshore substation is preparing for a hoisting operation; • off when offshore substation is not safe for a hoisting operation; and • 360° visibility.
ID markings	Offshore substations.	• offshore substation ID numbers displayed on topside; and • ID numbers at least 1.5m height and proportional width.
Hoist area markings	These are not covered within this plan but should meet the standards set out in the following guidance documents and in consultation with the appropriate authorities: • CAA CAP 764 – Policy and Guidelines on Wind Turbines (CAA, 2016); • CAA CAP 437 – Standards for Offshore Helicopter Landing Areas (CAA, 2021); • Consultation with Helicopter Certification Agency (MCA and CAA).	

Figure 5 Aviation operational lighting and marking

[Figure showing aviation operational lighting and marking locations for the final array layout to be added post consent].

5. Maintenance of Aids to Navigation

5.1 Overview

5.1.1.1 The following subsections summarise the maintenance associated with the AtoNs that will be installed at the Project.

5.2 Monitoring of aids to navigation on structures

5.2.1.1 Monitoring of AtoNs on structures for both the functionality and availability of AtoNs will be undertaken throughout the construction and O&M stages. Downtime will be monitored remotely during the O&M stage (via the Supervisory Control and Data Acquisition (SCADA) system) and visually during the construction stage (via a guard vessel). From this, the overall availability will be calculated. Monitoring will include general maintenance to ensure functionality of the infrastructure is maintained and optimised.

5.3 Monitoring of aids to navigation on buoyage

5.3.1.1 During construction, remote monitoring will alert the operative to failure of a marine AtoN. Upon discovery of an extinguished AtoN, the emergency procedures outlined in **Section 6** will be initiated.

5.4 Testing

5.4.1.1 Following the commissioning of all marine AtoNs, they will be tested at least once per annum. Sound signals will be equipped with functionality whereby they can be manually overridden in order to undertake annual testing.

5.5 Availability

5.5.1.1 To assist in meeting the required IALA availability standards of any given marine AtoN, remote monitoring will be used to ensure that any faults can be rectified as soon as possible.

5.5.1.2 The data collected through remote monitoring of AtoN will be used to calculate the overall availability of AtoN to ensure that IALA availability standards are being adhered to. Availabilities will be reported to NLB via their AtoN Reporting Online Portal.

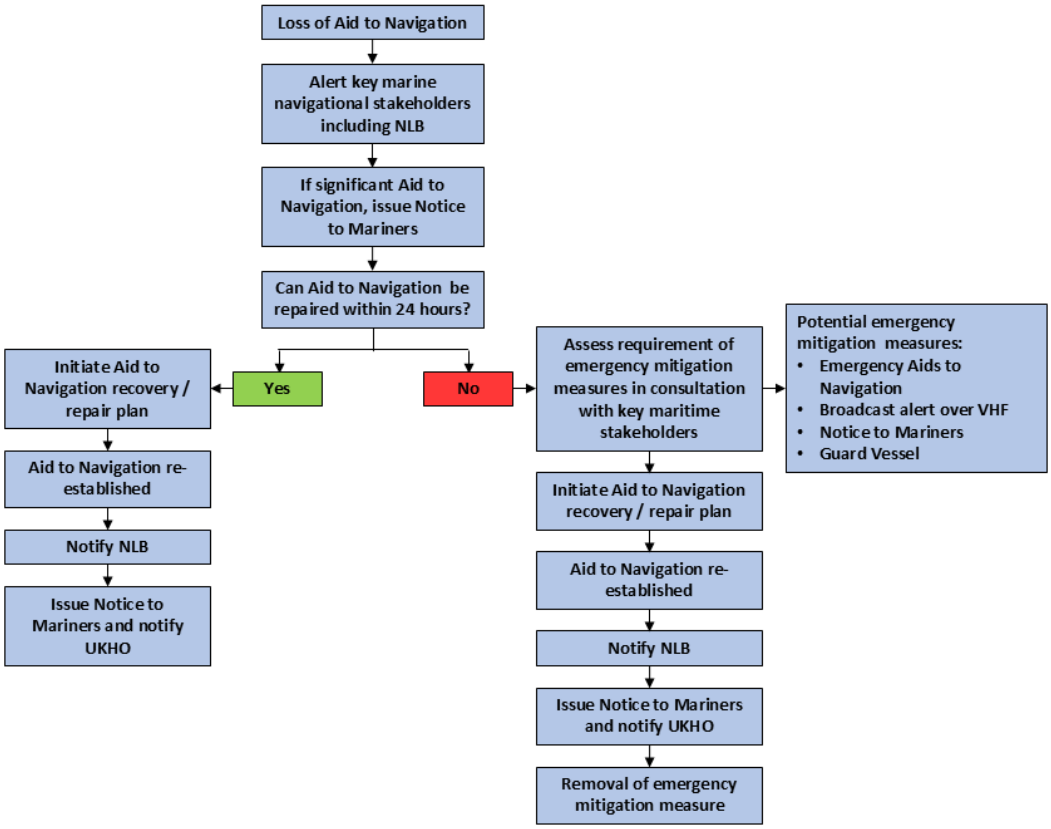
6. Emergency Procedures

6.1 Loss of aids to navigation

6.1.1 Marine aids to navigation

6.1.1.1 Upon discovery of the loss of an AtoN which included marine navigation lights, fog signals or buoys (or part thereof), the protocol illustrated in **Plate 6.1** will be initiated.

Plate 6.1 Protocol for the loss of an AtoN



6.1.1.2 As previously noted, a requirement of AtoN management within UK waters is to report navigational failures to NLB. This is done through the AtoN Reporting Online Portal (see **Section 5.5**). This is an online database administered by NLB in order to assist wind farm operators (as the local authority for the wind farm AtoN) to fulfil their responsibility to maintain records of AtoN availability and to provide summaries of these to NLB. This should be undertaken by the Applicant's marine coordination centre in the event of any failures or loss of availability. Additionally, the United Kingdom Hydrographic Office (UKHO) should be notified of remedial works through the Notice to Mariners process.

6.1.1.3 In the rare event of a significant loss of one or more AtoN, a guard vessel may be required to maintain navigational safety. **Section 6.2** provides an indicative list of trigger points that

would require the Applicant to liaise with NLB and potentially implement additional emergency mitigations which may also require informing the MCA.

6.2 Guard vessel trigger points

6.2.1.1 It is the responsibility of the operator to maintain the AtoN and provide any backup solutions in case of an AtoN failure. This will include repair of a broken AtoN, replacement of lost AtoN, and provision of a guard vessel. **Table 6.1** will summarise the emergency mitigation measure provision agreement in place, including the party that will be responsible for the repair or replacement of AtoN (including those on structures and navigational buoys).

Table 6.1 Summary of emergency mitigation measures

Emergency mitigation measure	Organisation responsible for provision	Relevant contact details			Service provision
		Address	Phone	Fax	
[Details to be added post consent]	[Details to be added post consent].	[Details to be added post consent].	[Details to be added post consent].	[Details to be added post consent].	[Details to be added post consent].

6.3 Aviation lighting

6.3.1.1 The Air Navigation Order 2016 states that "*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.*"[2]

6.3.1.2 It is accepted that there may be occasions when meteorological or sea conditions prohibit the safe transport of personnel for repair or maintenance 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).

6.3.1.3 The CAA's Directorate of Airspace Policy 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 Applicant will request a NOTAM to be issued by informing the NOTAM section of the UK Aeronautical Information Service as soon as possible via the CAA's Airspace Regulation (AROps@caa.co.uk / 0207 453 6599).

6.3.1.4 Upon completion of the remedial works, the Aeronautical Information Service will be notified as soon as possible to enable a cancellation to be issued.

6.3.1.5 If an outage is expected to last longer than 14 days, then the CAA will also be notified directly to discuss any issues that may arise and longer-term strategies.

6.3.1.6 In order to expedite the dissemination of information during active aviation operations, the Applicant may also establish a direct communication method with aviation operators in the area. The information provided will be the same as the information provided in the NOTAM and where possible include a NOTAM reference.

[2] Article 222(3)

7. References

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Civil Aviation Authority (CAA), (2021). *CAP 393 Regulations Made Under Powers in the Civil Aviation Act 1982 and the Air Navigation Order 2016*. London: CAA.

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8. Glossary of Terms and Abbreviations

8.1 Abbreviations

Acronym	Definition
AIS	Automatic Identification System
AtoN	Aids to Navigation
CAA	Civil Aviation Authority
CAP	Civil Aviation Policy
cd	Candela
DDMM.mm	Degrees Decimal Minutes
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
Fl	Flashing
GW	gigawatt
HAT	Highest Astronomical Tide
IALA	International Organization for Marine Aids to Navigation
IPS	Intermediate Peripheral Structure
ID	Identification
km	kilometre
LMP	Lighting and Marking Plan
m	metre
MCA	Maritime and Coastguard Agency

Acronym	Definition
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
mm	millimetre
MoD	Ministry of Defence
nm	nautical mile
NLB	Northern Lighthouse Board
NOTAM	Notice to Airmen
NVIS	Night Vision Imaging System
O&M	Operation and Maintenance
OA	Option Agreement
OAA	Option Agreement Area
RCP	Reactive Compensation Platform
s	Second
s.36	Section 36 of the Electricity Act 1989
SAR	Search and Rescue
SCADA	Supervisory Control and Data Acquisition
SDC	Subsea Distribution Centres
SPR	ScottishPower Renewables
SPS	Significant Peripheral Structure
UK	United Kingdom

Acronym	Definition
UKHO	United Kingdom Hydrographic Office
UPS	Uninterrupted Power Supply
VMNSP	Vessel Management and Navigational Safety Plan
WTG	Wind Turbine Generator
Y	Yellow

8.2 Glossary of terms

Term	Definition
Automatic Identification System	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status. Most commercial vessels and European Union fishing vessels over 15m in length are required to carry AIS.
Marine Guidance Note	A system of guidance notes issued by the MCA which provide significant advice relating to the improvement of the safety of shipping at sea, and to prevent or minimise pollution from shipping.

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