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# Seagreen Offshore Wind Farm Safety Zone Application Offshore Substation Platforms

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### Document Change Summary

Rev	Date	Detail of Change	Changed by
01	01/02/2021	Draft revision for MS-LOT review	
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## 1. Introduction

### 1.1 Background

Seagreen Wind Energy Limited (hereafter referred to as 'Seagreen') was awarded Section 36 Consents (S36 Consents) by Scottish Ministers in October 2014 for Seagreen Alpha and Seagreen Bravo Offshore Wind Farms (OWFs). The S36 consents were varied by the Scottish Ministers in August 2018. Marine Licences for Seagreen Alpha and Bravo OWF and the Offshore Transmission Asset (OTA) (together the 'Marine Licences') were also awarded by the Scottish Ministers in October 2014 and subsequently varied in 2018 and 2019 respectively. Together the wind farms Seagreen Alpha and Seagreen Bravo and the OTA collectively comprise 'the Seagreen Project'.

### 1.2 Objectives of this Document

As per Section 95 and Schedule 16 of the Energy Act 2004 and the Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007 (Electricity Regulations, 2007) respectively, a Safety Zone Application can be made to Marine Scotland requesting the formal implementation of safety zones around wind farm structures associated with an Offshore Renewable Energy Installation (OREI).

At the time of writing, positions of the Wind Turbine Generators (WTGs) within the Seagreen site are currently being finalised, and as such separate applications are being submitted for the WTGs and Offshore Substation Platforms (OSPs) to reflect the proposed project installation schedule, noting that the first OSP anticipated to be installed in June 2021. This approach was accepted by Marine Scotland in January 2021.

On this basis, this document presents Seagreen's safety case for the implementation of safety zones around the OSPs, and represents the primary supporting document of the application made to Marine Scotland. The proposed safety zones are designed to manage potential interactions between third party vessels and the construction and maintenance activities undertaken as part of the Seagreen Project, with a view to securing the safety of vessels and crews (both those associated with the Seagreen Project and those deemed as third party), and to protect the wind farm structures themselves.

#### 1.2.1 Construction Phase

Within this application, the following safety zones are applied for during the construction phase, noting that additional relevant information is provided in Section 8.1:

- Mandatory “rolling” 500 metres (m) safety zones established around each OSP and/or their foundations whilst construction works are in progress, as indicated by the presence of a construction vessel. The safety zones will be triggered whenever a vessel is on station<sup>1</sup> at an OSP and undertaking construction activities. Up to two of these safety zones could be concurrently active.
- Mandatory pre commissioning 50m safety zones established around each OSP and/or their foundations when construction works have been completed but prior to wind farm commissioning or where construction works have only been partially completed. These safety zones will be active at any structure during the construction phase where a construction vessel is not present at an OSP. Up to two of these safety zones could be concurrently active.
- Safety zones for WTGs during construction are being applied for separately.

No more than two safety zones can be simultaneously active at any one time under this application (as it only covers the OSPs). Further, between June 2021 and September 2021 prior to WTG installation, **there will be no more than one safety zone active at any given time** (as there will be only one structure in place, with that being the first OSP). The maximum number of safety zones that could be active following commencement of the WTG installation will be agreed as part of the WTG application process.

#### 1.2.2 Operations and Maintenance Phase

The following are applied for during the operations and maintenance phase, noting that additional relevant information is provided in Section 8.2:

- Mandatory 500m safety zones around any OSP where “major maintenance” work is being undertaken, where major maintenance is as per the definition given in the Electricity Regulations 2007 (see Section 8.2). The safety zones will be active whenever a “major maintenance” vessel is at the OSP during the operational phase. Up to two of these safety zones could be concurrently active.
- Safety zones for WTGs during the operational phase are being applied for separately, however no permanent operational safety zones will be applied for around any structure.

Under this application, Seagreen are applying for a maximum of two 500m major maintenance safety zones around the OSPs during the operational phase. The maximum number of 500m major maintenance safety zones that could be active at any given time assuming all structures are in place will be agreed as part of the WTG application process.

#### 1.2.3 Decommissioning Phase

Safety zones for the decommissioning phase of the Seagreen Project shall be applied for within a separate application, which will be submitted at a future date but prior to any decommissioning operations taking place.

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<sup>1</sup> Anchored next to, alongside whilst on Dynamic Positioning (DP), attached to, or displaying Restricted in Ability to Manoeuvre (RAM) status.

## 2. Legislation

Schedule 16 of the Energy Act 2004 requires certain specific information to be included within any application for safety zones submitted under Section 95. Table 2-1 summarises the requirements and provides reference to where each is addressed within this document.

Table 2-2 then summarises where the relevant requirements from the Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007, have been addressed within this document.

It is noted that Marine Scotland has responsibility for all applications received after 1st April 2017 (powers transferred from the Department for Business, Energy & Industrial Strategy (BEIS) under Section 62 of the Scotland Act 2016).

Table 2-1 Energy Act 2004 Schedule 16 Applications and proposals for notices under section 95

Item	Requirement	Where Addressed
<b>3(1) An application for a safety zone notice must describe, by way of a map –</b>	(a) The place where the relevant renewable energy installation is to be, or is being, constructed, extended, operated or decommissioned.	See Section 3.
	(b) The waters in relation to which any declaration applied for will establish a safety zone.	See Section 3.
<b>3(2) The application must also –</b>	(a) Describe the other provisions the application asks to be included in the notice applied for; and	The safety zones applied for are presented in Section 1.2, with additional details of relevance given in Section 8.
	(b) Include such other information as may be prescribed by regulations made by the appropriate minister <sup>2</sup> .	This application contains all information required.
3(3)	An application is not allowed to be made orally.	This document constitutes a written application to Marine Scotland.

<sup>2</sup> Application made to Marine Scotland as required.

Table 2-2 Compliance with the Electricity Regulations 2007

Item	Requirement	Where Addressed
<p><b>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 –</b></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.</p>	<p>The project description is presented in Section 3, which includes a schematic relative to the waterline.</p>
	<p>(ii) A description of how the installation operates (or is to operate).</p>	<p>An overview of the construction phase is provided in Section 5. An overview of the operational phase is then given in Section 8.2.</p>
	<p>(iii) A description of the location (or proposed location) of—</p> <p>(aa) Any electric line used (or proposed to be used) for the conveyance of electricity to or from the installation; and</p> <p>(bb) Any connection to such an electric line.</p>	<p>Subsea cables are presented in Section 4.3.</p>
	<p>(iv) A description of the location (or proposed location) of any offshore sub-station housing connection equipment.</p>	<p>The locations of the OSPs are provided in Section 3.2. Further details of relevance are then given in Section 4.1.</p>
	<p>(v) Where the zone is sought in respect of more than one relevant renewable energy installation, the proposed or existing distances between such installations.</p>	<p>Section 3.2 presents the locations of the OSPs relative to the Seagreen site.</p>
	<p>(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>A summary of lighting and marking is provided in Section 6.</p>
	<p>(i) Whether the zone relates to the construction, extension, operation</p>	<p>As per Section 1.2, this application covers the construction and</p>

Item	Requirement	Where Addressed
<p><b>3(c) In relation to the proposed safety zone –</b></p>	<p>or decommissioning of the relevant renewable energy installation.</p>	<p>operational phases of the Seagreen Project.</p>
	<p>(ii) Whether the applicant seeks the declaration of a standard safety zone, or if not, what dimensions are sought for that zone.</p>	<p>The safety zones applied for including details of dimensions are given in Section 1.2.</p>
	<p>(iii) a description of those works or operations in respect of which the zone is being applied for and their estimated date and duration.</p>	<p>Dates and durations of the 500m construction and major maintenance safety zones will vary depending on the associated activity, and as such the relevant details will be promulgated as required. An indicative construction schedule in relation to the OSPs is provided in Section 3.3.</p> <p>The works requiring a safety zone are described in Section 1.2, with additional details of relevance given in Section 8.</p>
	<p>(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.</p>	<p>Not applicable to the Seagreen Project. The safety zones applied for are presented in Section 1.2, with additional details of relevance given in Section 8.</p>
	<p>(v) Whether the zone relates to major maintenance works in respect of a relevant renewable energy installation which has become operational.</p>	<p>The safety zones to be applied for include those for major maintenance activities as stated in Section 1.2. Further details of relevance are provided in Section 8.2.</p>
	<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>Monitoring and policing procedures are set out in Section 11.</p>
	<p>(vii) Except where the Secretary of State has notified the applicant that it is not required, an up to date</p>	<p>Recent marine traffic data has been assessed as per Section 7.</p>

Item	Requirement	Where Addressed
	shipping traffic survey for the waters comprising the zone.	
<b>3(d)</b>	An assessment of the extent to which navigation 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.	The potential impact of the safety zones is assessed within Section 10.
<b>4(1) The applicant shall publish notice of an application—</b>	(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.	Notice of the application will be provided in a list of publications agreed with Marine Scotland and will comply with the requirements of Regulation 4(1).
	(b) In Lloyd’s List and in one or more national newspapers.	Notice of the application will be provided in a list of publications agreed with Marine Scotland and will comply with the requirements of Regulation 4(1).
	(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.	Notice of the application will be provided in a list of publications agreed with Marine Scotland and will comply with the requirements of Regulation 4(1).
	(e) <sup>3</sup> 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, the Edinburgh Gazette.	Notice of the application will be provided in a list of publications agreed with Marine Scotland and will comply with the requirements of Regulation 4(1).

<sup>3</sup> Points (d) and (f) relate to safety zones located in non-Scottish waters and therefore are not applicable to the Seagreen Project.

Item	Requirement	Where Addressed
<p><b>4(2) The applicant shall, at the same time as publishing the notice under paragraph (1)(a), send a copy of the notice to—</b></p> <p><b>—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 likely to be affected by the application.</b></p>	<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>Notice of the application has been sent to local ports, which have been agreed with Marine Scotland.</p>
	<p>(b) The sector office of the Maritime and Coastguard Agency (MCA) which is responsible for operations in the waters in which the safety zone is proposed or located.</p>	<p>Notice of the application has been sent to the MCA.</p>

### 3. Project Overview

#### 3.1 Site Location and Overview

As shown in Figure 3-1, the Seagreen Project is located in the North Sea, in the outer Firth of Forth and Firth of Tay region. The Seagreen Project comprises the OWFs (the WTGs, their foundations, and associated array cabling), together with the associated infrastructure of the OTA (OSPs, their foundations and the offshore export cable).

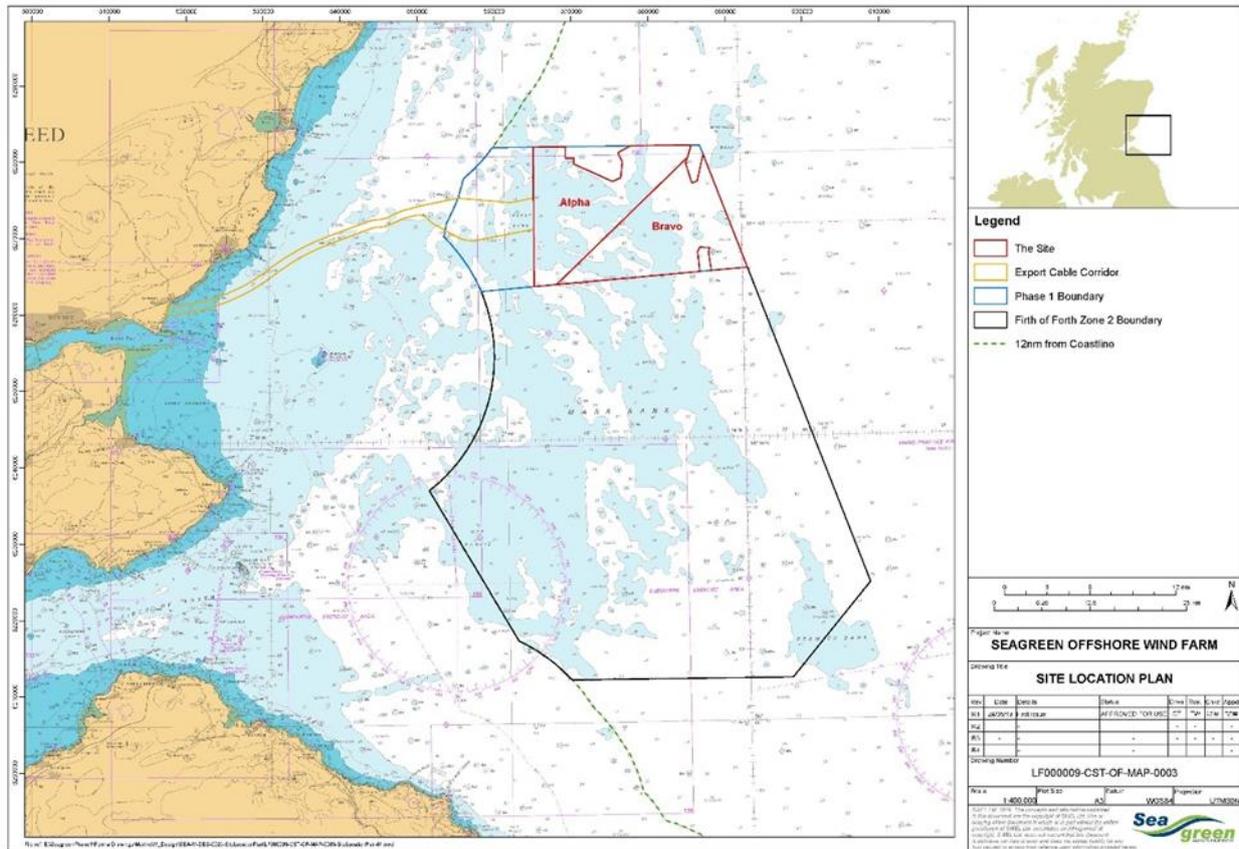


Figure 3-1 Seagreen Project Overview

#### 3.2 OSP Overview

The location of the OSPs within the Seagreen site is shown in Figure 3-2. The layout of WTGs is currently being finalised, however regardless of layout, the minimum spacing between structures will be 1,000m. The distance between the OSPs is 1.6nm.

Within this application, safety zones are applied for around the OSPs, and on this basis the coordinate positions of each are given in Table 3-1, noting that structures may be micrositied by up to 50m from the positions shown. The positions of the WTGs and any spare locations will be applied for separately once finalised.

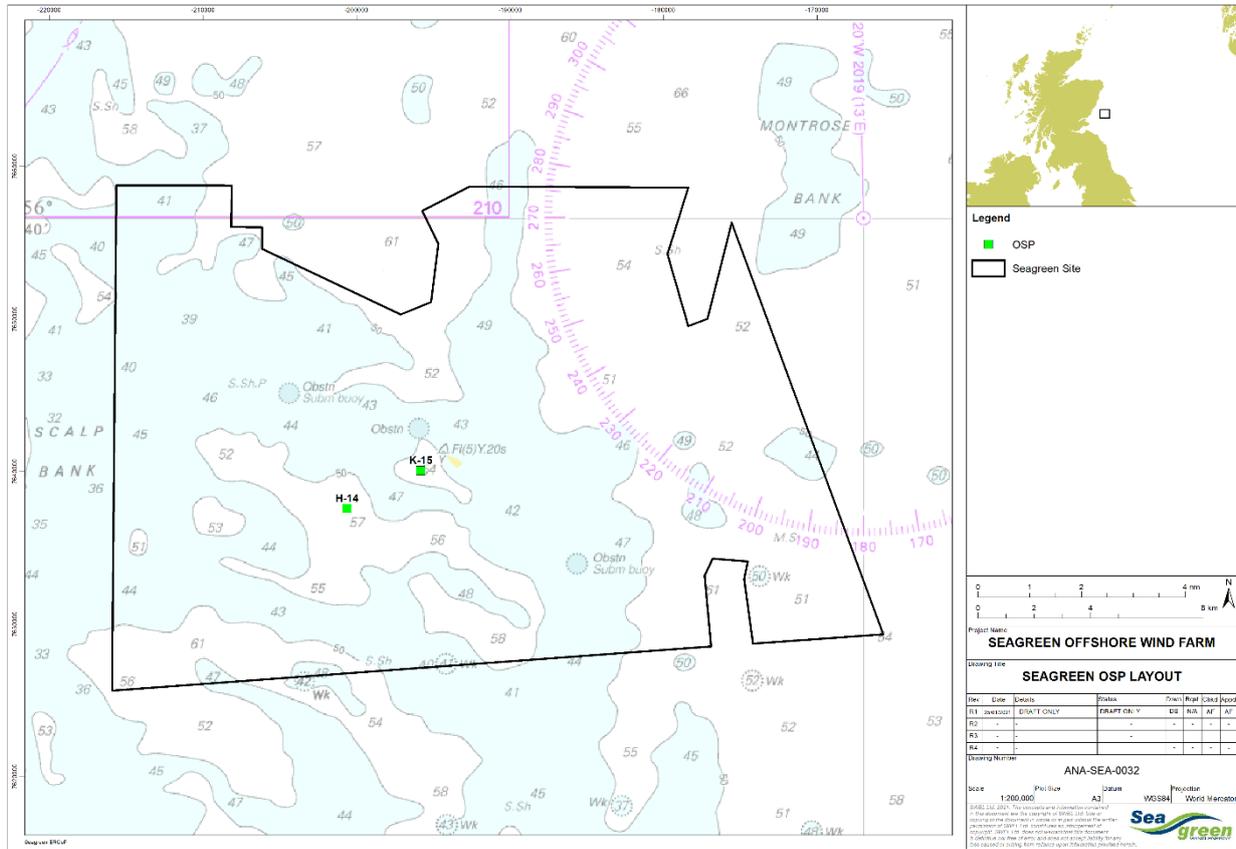


Figure 3-2 OSP Layout

Table 3-1 OSP Coordinates

ID Number	Structure Type	Longitude (DDD MM.MM)	Latitude (DD MM.MM)
SN-H14	OSP	001° 48.13' W	56° 34.35' N
SN-K15	OSP	001° 45.54' W	56° 35.09' N

### 3.3 Project Schedule

Key construction milestone dates deemed of relevance to this application are detailed in Table 3-2, noting that a full construction schedule is provided within the Construction Programme submitted to Marine Scotland (Ref: LF000009-CST-OF-PRG-0002).

Table 3-2 Key Construction Milestones - OSPs

Milestone	Anticipated Programme
Timing and sequencing of construction work <i>Stage 1</i>	1 <sup>st</sup> OSP Jacket Foundation Substructure installation <ul style="list-style-type: none"> <li>June 2021</li> </ul> 1 <sup>st</sup> OSP Topside installation

Milestone	Anticipated Programme
	<ul style="list-style-type: none"> <li>• Oct 2021</li> </ul> OSP Interconnector Cable installation <ul style="list-style-type: none"> <li>• May 2023</li> </ul>
Timing and sequencing of construction work <i>Stage 2</i>	2 <sup>nd</sup> OSP Jacket Foundation Substructure installation <ul style="list-style-type: none"> <li>• May 2023 – August 2023</li> </ul> 2 <sup>nd</sup> OSP Topside installation <ul style="list-style-type: none"> <li>• May 2023 – August 2023</li> </ul>
Final Commissioning of OTA	November 2023

## 4. Project Components

### 4.1 OSPs

As per Section 3.2, the layout includes two OSPs installed within the site, with each topside supported by a six leg steel jacket. Each leg will be secured using up to two piles (12 piles each, 24 piles in total), each with an outer diameter of up to 3m and a maximum penetration into the seabed of 45m.

Indicative dimensions of the OSPs are provided in Table 4-1, and an indicative schematic relative to the waterline is shown in Figure 4-1 OSP Schematic

Table 4-1 OSP Parameters

Component	Dimensions
OSP topside dimensions (Height x Width x Length)	Height: 20m Width: 35m Length: 52m
Height of OSP jacket above LAT	25m
Height of topside above LAT	Topside 45m above LAT

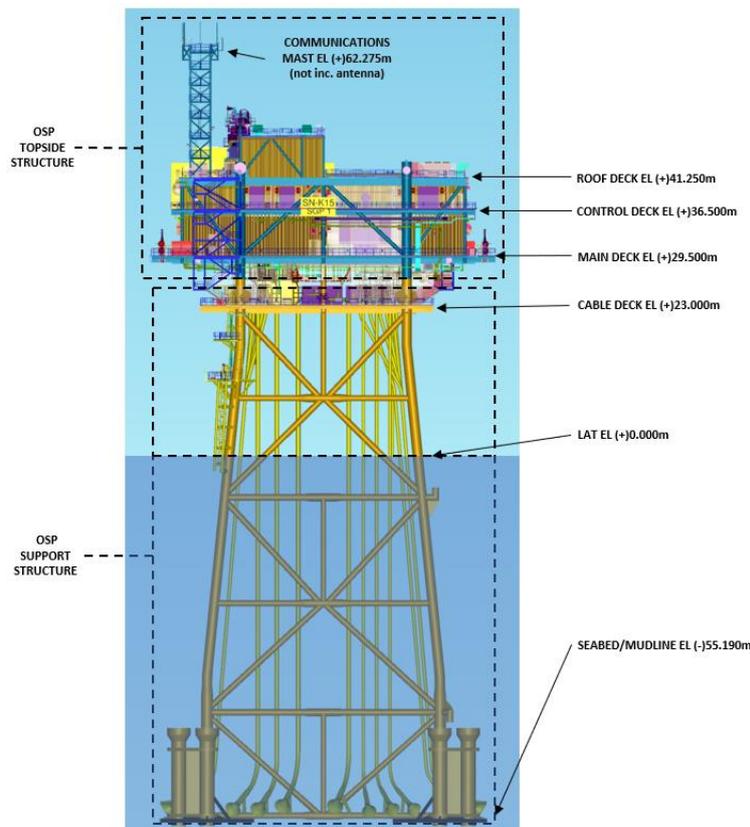


Figure 4-1 OSP Schematic

## 4.2 WTGs

There will be a maximum of 150 WTGs installed within the Seagreen site. It is noted that of the 150 WTGs, 114 will be installed on suction bucket foundations, with the remaining 36 utilising piled jacket foundations. Key parameters of the WTGs are available within the Offshore Wind Farm Development Specification and Layout Plan (LF000009-CST-OF-PLN-0004), and will also be detailed in the separate WTG application

## 4.3 Cables

The export cable corridor connects the OSPs to the landfall location at Carnoustie, and there are three export cables within this corridor, all approximately 63 kilometres (km) in length resulting in a total length of approximately 190km of export cable. The two OSPs are linked via an interconnector cable approximately 3km in length, and each of the WTGs is connected to one of the two OSPs via the inter-array cable strings which have a total length of approximately 355km.

Figure 4-2 presents the export cable corridor within which the export cables will be laid. Anticipated positions of the interconnector cable and the inter-array cables are also shown, noting that these are subject to refinement and indicative only at this stage given a WTG layout is yet to be finalised.

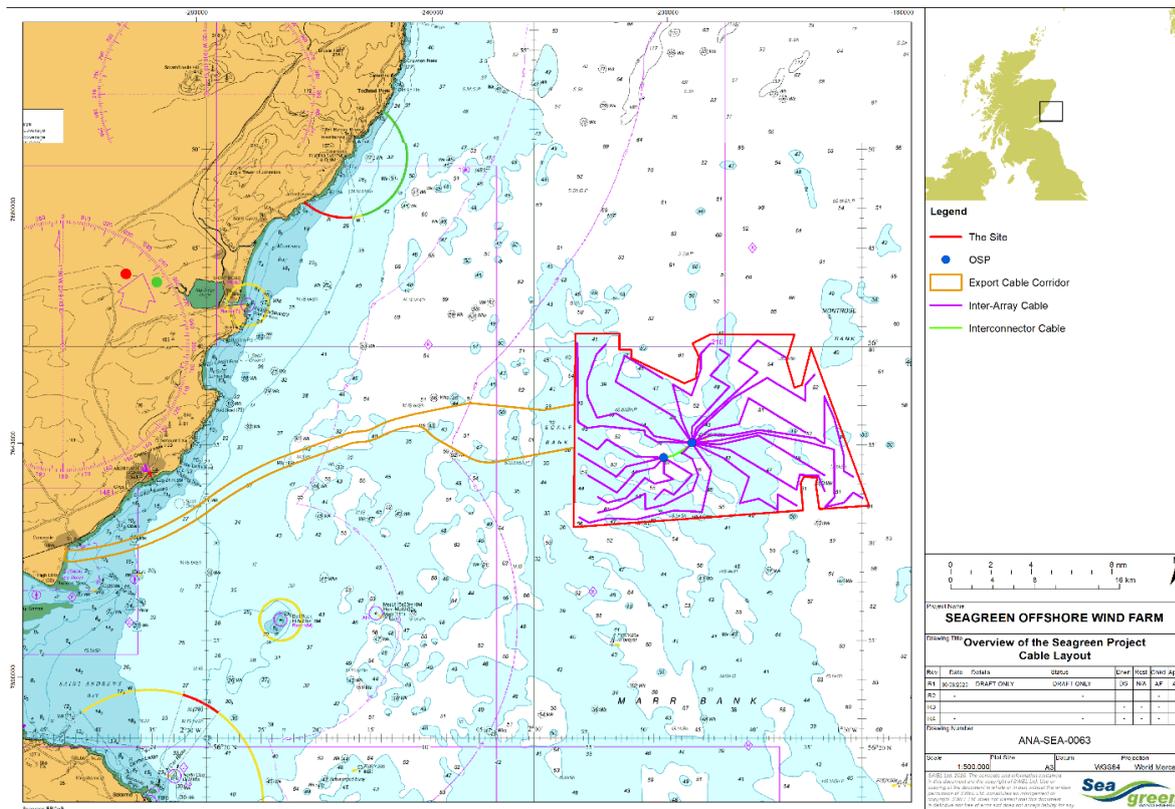


Figure 4-2 Subsea Cable Layout

## 5. Construction Overview

This section summarises the activities to be undertaken during the construction phase deemed of relevance to this application. Further details (including in relation to WTG installation) are provided in the Offshore Wind Farm Construction Method Statement (LF000009-CST-OF-MST-0001) and Offshore Transmission Asset Construction Method Statement (LF000009-CST-OF-MST-002).

### 5.1 Pre-Campaign Surveying and Subtidal Seabed Preparation

Seabed preparation activities will be required in advance of OSP foundation installation to remove any boulders or debris from the seabed. The sequence of events and indicative durations for seabed preparation is illustrated in Figure 5-1. Pre-campaign surveys and seabed preparation activities will take place between April 2021 and July 2021.

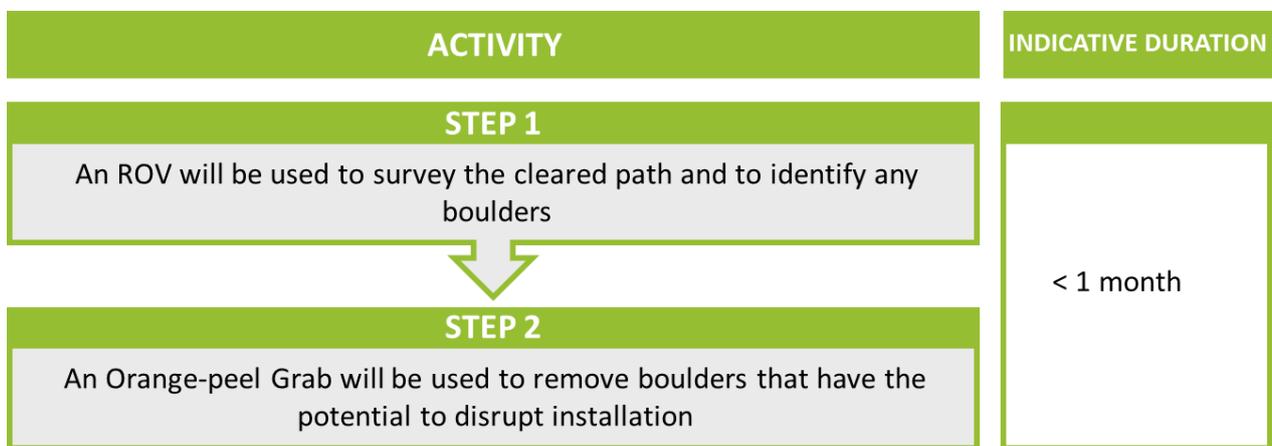


Figure 5-1 Overview seabed preparation activities.

### 5.2 OSPs

#### 5.2.1 Jacket Foundations

The jacket foundation substructures fabrication is ongoing with the first being installed in June 2021. The second OSP jacket foundation substructure will be installed over a four-month period between May 2023 and August 2023, coinciding with pile installation and jacket installation for the WTG jacket substructures.

The jackets will be lifted from the supply vessel via Heavy Lift Vessel (HLV), positioned and lowered to the seabed. The piles will then be lifted and inserted into pile sleeves attached to the foot of each jacket leg, and driven into the seabed.

An overview of the construction process detailing each key activity is provided in Figure 5-2, noting that indicative details of the vessels to be utilised during this process are given in Section 5.3.



Figure 5-2 Overview of OSP jacket foundation substructure assembly and installation

### 5.2.2 OSP Topsides

OSP topsides are anticipated to be fabricated and delivered to site between April 2020 and September 2021. The first OSP topside will be installed commencing in October 2021, and the second OSP topside will be installed between May 2023 and August 2023.

Following arrival on site, and once anchored in position, the HLV will lift the OSP topside onto the pre-installed jacket foundation structure. The topside legs will then be welded to the jacket.

An overview of the construction process detailing each key activity is provided in Figure 5-3, noting that indicative details of the vessels to be utilised during this process are given in Section 5.3.

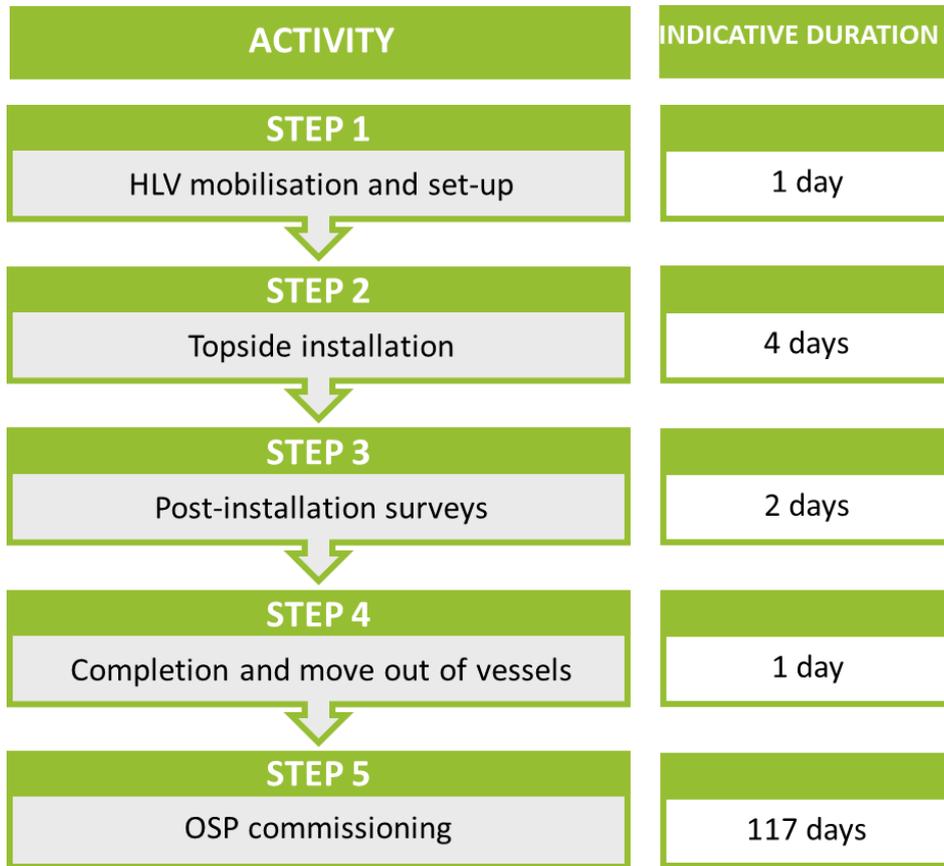


Figure 5-3 Overview of OSP topside installation activities

### 5.3 Key Construction Vessels

The key vessels anticipated to be utilised during the construction of the OSPs are detailed in Table 5-1. This includes details of the stages of construction that each will be involved in. It should be considered that this is an indicative list of key vessel types only, and is therefore subject to change.

Table 5-1 Key Vessels used during OSP Installation

Vessel	Details	Activities	
Saipem 7000	HLV 162 x 38m	<b>OSP Foundation Installation</b> • (See Figure 5.2)	<b>OSP Topside Installation</b> • (See Figure 5.3)
Blue Tern	Jack Up 151 x 50m	<b>OSP Foundation Installation</b> • n/a	<b>OSP Topside Installation</b> • OSP Commissioning

## 6. Lighting and Marking

This section outlines the marine lighting and marking to be implemented for the Seagreen Project during the construction, and operation and maintenance phases deemed of relevance to this application. Further details of the lighting and marking scheme (both marine and aviation) are available in the Lighting and Marking Plan (LMP) (Doc Ref LF000009-CST-OF-PLN-0010).

### 6.1 Construction Phase

Navigational marking for the construction phase has been directed by the Northern Lighthouse Board (NLB) to alert mariners of the navigational safety hazards associated with the construction activities. The cardinal marks do not require mariners to avoid the area but do require them to consider the presence of hazardous activities within their passage. The International Convention for the Safety of Life at Sea (SOLAS) Chapter V as implemented by the Merchant Shipping (Safety of Navigation) Regulation 2002 requires all vessels on all voyages (irrespective of their activity) to have a passage plan in place. This passage plan must anticipate all known navigational hazards.

Construction phase buoyage shall consist of five cardinal marks and eight special marks, as shown in Figure 6-1, which will be in place in advance of commencement of construction.

Further, during the construction phase, all structures (including the OSPs) will be marked with temporary Yellow 2.5 seconds (s) (FL. Y. 2.5s) lights (visible through 360°) with a 2 nautical miles (nm) range. It is likely that two lights per structure will be used to ensure 360° visibility. These lights will remain in place until the NLB are content that the operational lighting and marking is commissioned and active.

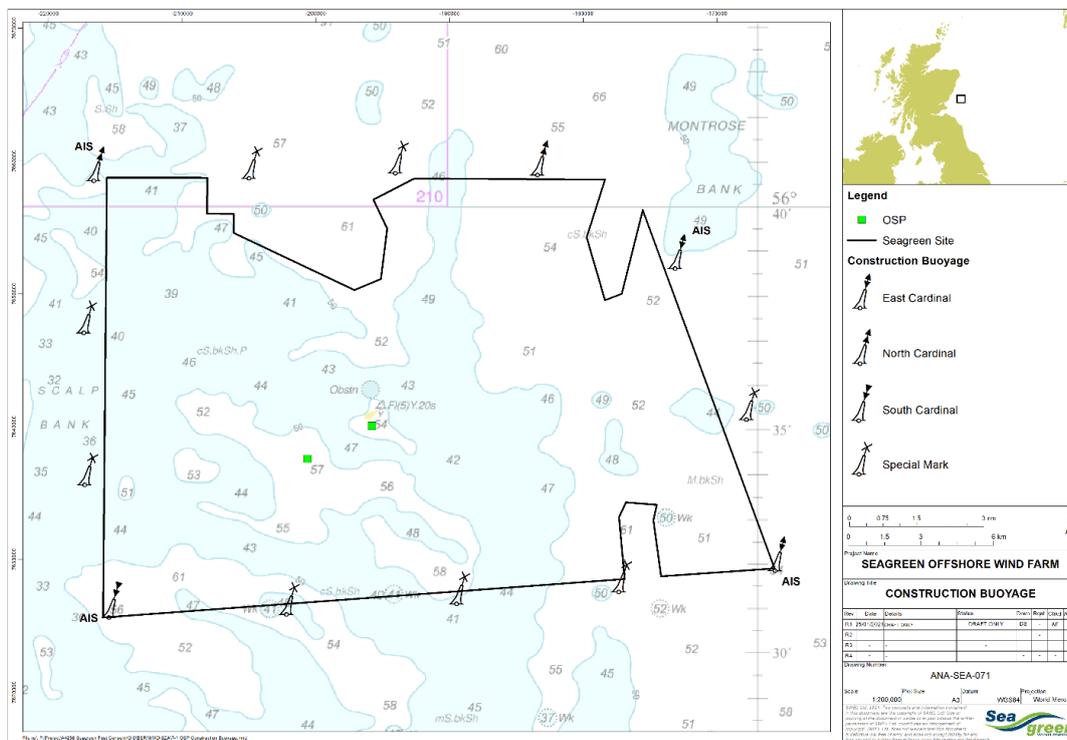


Figure 6-1 Construction Buoyage

## 6.2 Operational Phase

In line with the relevant International Association of Marine Aids to Navigation and Lighthouse Authority (IALA) O-139 guidance (IALA, 2013) and NLB requirements, certain periphery structures have been designated as Significant Peripheral Structures (SPS). Each SPS is to be fitted with a 5nm light (FL. Y. 5s), with 360° visibility. All SPS will flash in synchronisation and will satisfy IALA availability requirements for Category 1 Aid to Navigation (AtoN) (>99.8% availability). As directed by the NLB, an operational buoy displaying a special mark will also be installed to mark the northern periphery of the Seagreen site.

The majority of SPS will also be fitted with fog signals, which will sound when visibility in the area is less than 2nm (as determined by visibility metres fitted to the relevant turbines). Whilst active, the signals will sound every 30 seconds (s), and will be audible over 360°. All fog signals will satisfy IALA availability requirements for Category 3 AtoN (>97% availability). Four SPS will transmit via AIS, with the installed AIS transmitters satisfying IALA availability requirements for Category 3 AtoN (>97% availability). Seagreen or an appointed contractor will procure the relevant AIS licences via applications to Ofcom as required.

Each wind farm structure (including the OSP) will display Identification (ID) panels with black letters / on a yellow background visible in all directions. 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 farms, 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 3m above sea level, and at a distance of not less than 150m from the structure. This lighting will be hooded or baffled to avoid confusion with the navigational lighting and marking.

## 7. Marine Traffic Assessment

### 7.1 Data Sources

In agreement with Marine Scotland, the primary data source considered within this safety zone application is 28 days of Automatic Identification System (AIS) data collected during July 2019 and November 2019. Periods chosen to account for seasonal variation as follows:

- 14 days of AIS data collected via onshore receivers between 7<sup>th</sup> and 20<sup>th</sup> July 2019; and
- 14 days of AIS data collected via onshore receivers between 14<sup>th</sup> and 27<sup>th</sup> November 2019.

As agreed with Marine Scotland in August 2020, this data has been collected during 2019 to ensure the marine traffic assessment considered for the Safety Zone Application is representative, noting that the ongoing Covid-19 pandemic has been observed to have a tangible effect on traffic volumes and behaviours, meaning 2020 data would not necessarily represent typical traffic patterns.

Consideration has also been given to marine traffic data collected as part of the Navigation Risk Assessment (NRA) (Anatec, 2012), and a subsequent validation exercise undertaken in 2018 (Anatec, 2018).

- 40 days of AIS and Radar data collected during 2011 for the NRA (Anatec, 2012); and
- 28 days AIS data collected during 2017, collected for the purpose of validating the findings of the NRA via a validation exercise (Anatec, 2018).

Data has been collected within a study area comprising 10nm buffer of the Seagreen site to ensure passing traffic is captured, noting that the assessment has focused on transits through the site itself to ensure the analysis is site specific and relevant to the OSPs.

### 7.2 Vessel Count

The number of unique vessels recorded per day within the Seagreen site during the 28-day survey period is shown in Figure 7-1.

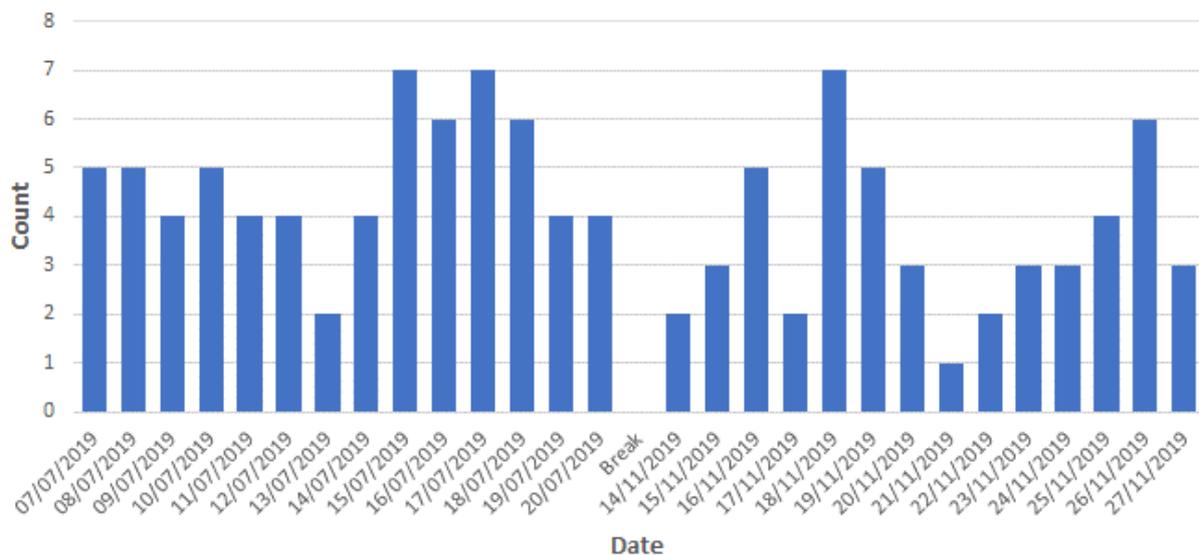


Figure 7-1 Daily Counts within Seagreen Site (2019)

An average of five unique vessels per day was recorded within the Seagreen site, compared to four per day in winter. The maximum number of vessels per day recorded within the Seagreen site was seven, a total which occurred in both summer and winter. It should be considered that these values are reflective of AIS traffic only. Consideration of non-AIS fishing vessel activity is given in Section 7.5.

### 7.2.1 Count Comparison

The vessel counts estimated from the data sources studied are shown in Table 7-1. Broadly speaking, there was considered to be good overall correlation between the data sets. It is noted that the November 2019 data showed the lowest overall count within the study area, and this was considered likely to be due to the November study period assessed, given lower volumes of recreational traffic when compared to the other periods studied.

Table 7-1 Daily Count Comparison

Dataset	Period	Average Unique Vessels per day*	
		Study area	Seagreen Site
Safety Zone Application Data	July 2019	16	5
	November 2019	12	4
2017 Validation	July/August 2017	16	4
	February/March 2017	16	6
NRA	June/July 2011	12	6
	March 2011	13	7

\* Values exclude vessels recorded via Radar to ensure as fair comparison as is practical.

### 7.3 Vessel Type

The vessel types recorded in the study area during the study period are shown in Figure 7-2. All data collected is shown to provide an overview of the area, noting that site specific assessment per key vessel type is then provided in Sections 7.4 to 7.8.

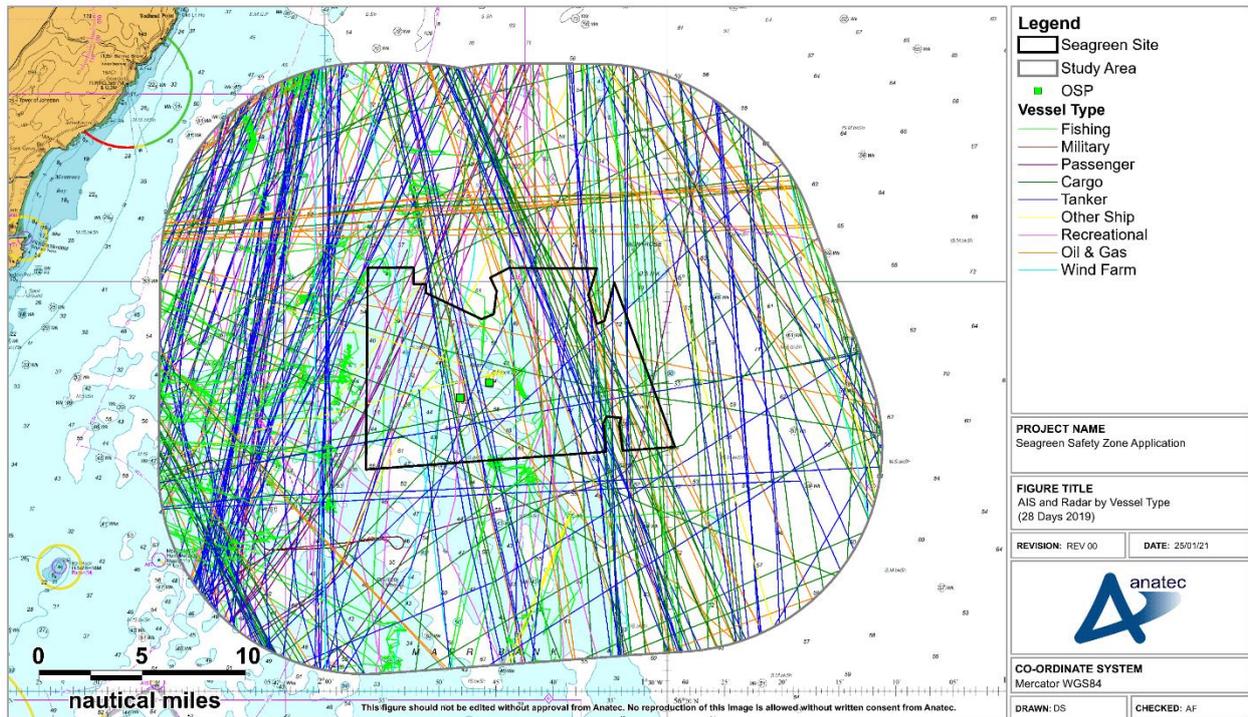


Figure 7-2 AIS by Vessel Type (28 Days 2019)

Commercial vessels (cargo and tanker) were the most common vessel type recorded during the survey period, accounting for over half of the total traffic within the study area. Fishing vessels were also recorded at notable levels during the survey period, accounting for 20% of total traffic. A higher count of fishing vessels, passenger vessels and recreational vessels were noted in the summer period, while a higher count of oil and gas vessel activity was noted during the winter period.

#### 7.4 Commercial Vessels

The commercial vessels (cargo and tanker) recorded within or in proximity to the Seagreen site during the study period are shown in Figure 7-3.

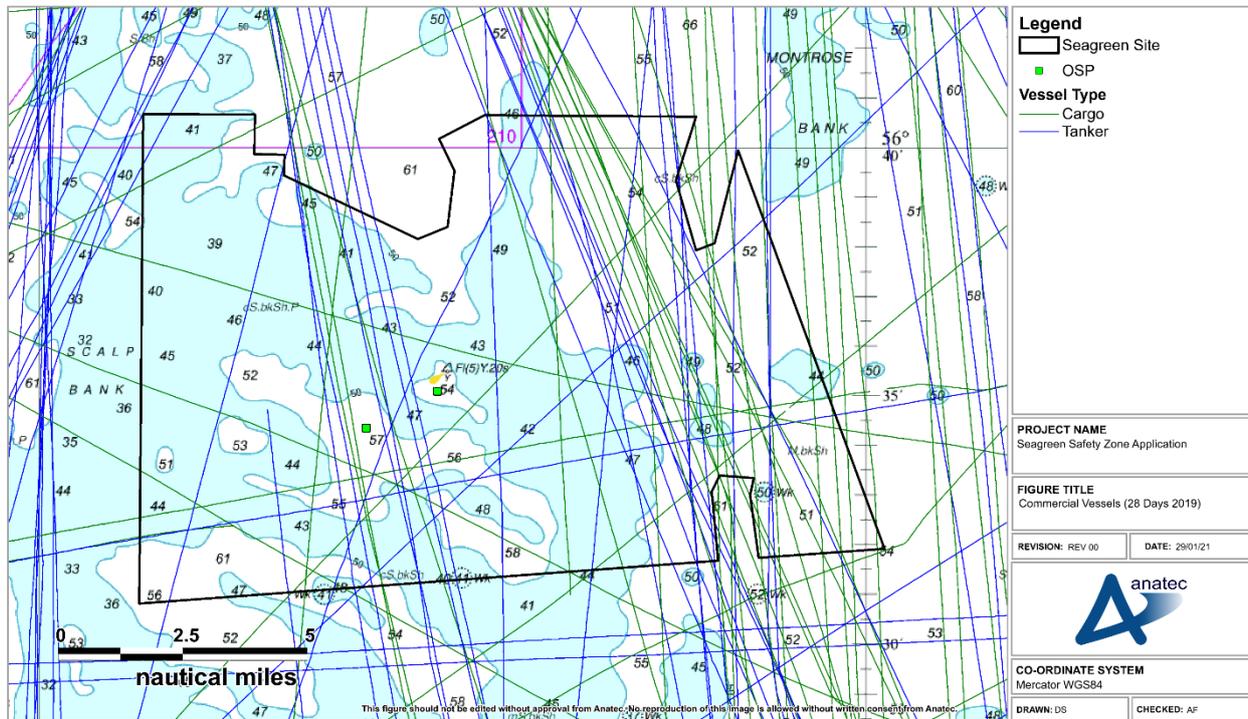


Figure 7-3 Commercial Vessels (28 Days 2019)

An average of one tanker and one cargo vessel per day (i.e., two commercial vessels in total) transited through the Seagreen Site. These values are broadly similar to the 2017 validation data, where two cargo vessels and one tanker per day were recorded as intersecting the Seagreen Site.

Commercial traffic intersecting the Seagreen Site was observed to be generally heading between Aberdeen and ports further south on the United Kingdom (UK) coast (most commonly Immingham). It is noted that this traffic includes vessels passing in proximity to the OSPs.

### 7.5 Fishing Vessels

The fishing vessels recorded within or in proximity to the Seagreen site during the study period are recorded in Figure 7-4, colour-coded by period (i.e., July 2019 or November 2019).

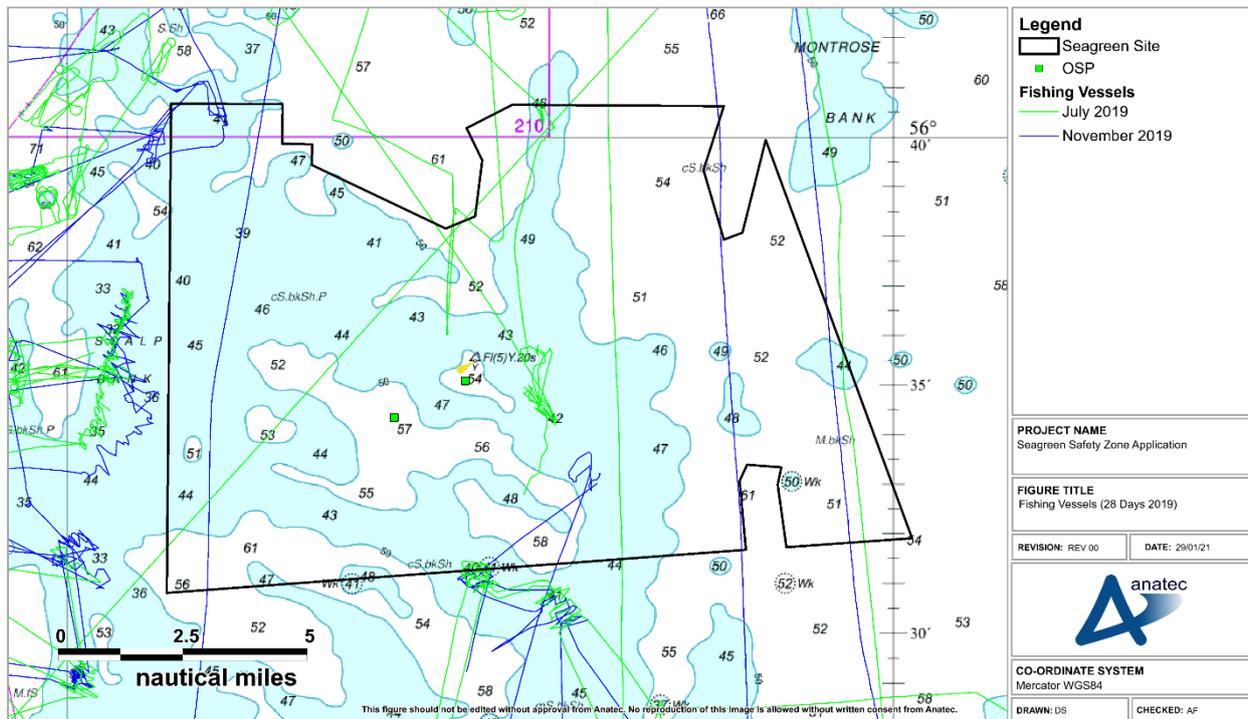


Figure 7-4 Fishing Vessels (28 Days 2019)

Fishing Activity within the Seagreen Site was limited (less than one vessel per day), which aligns with the 2017 validation data where approximately one vessel a day was also recorded. However, given that this only considers AIS traffic, it should be considered that fishing activity within the Seagreen Site may be underrepresented within the data.

In terms of non-AIS activity, input from Seagreen indicates that the majority of fishing vessels in the area are likely to use static gear types, such as creels, targeting crab and lobster. Vessels targeting nephrops or squid with mobile gear may also utilise the area, however, the current high levels of static fishing activity, particularly targeting the less deep waters in the area, make it difficult for mobile vessels to gain access to these locations. On this basis, it is likely that smaller non-AIS vessels will be present in the area.

### 7.6 Oil and Gas Vessels

The oil and gas support vessels recorded within or in proximity to the Seagreen site during the study period are shown in Figure 7-5.

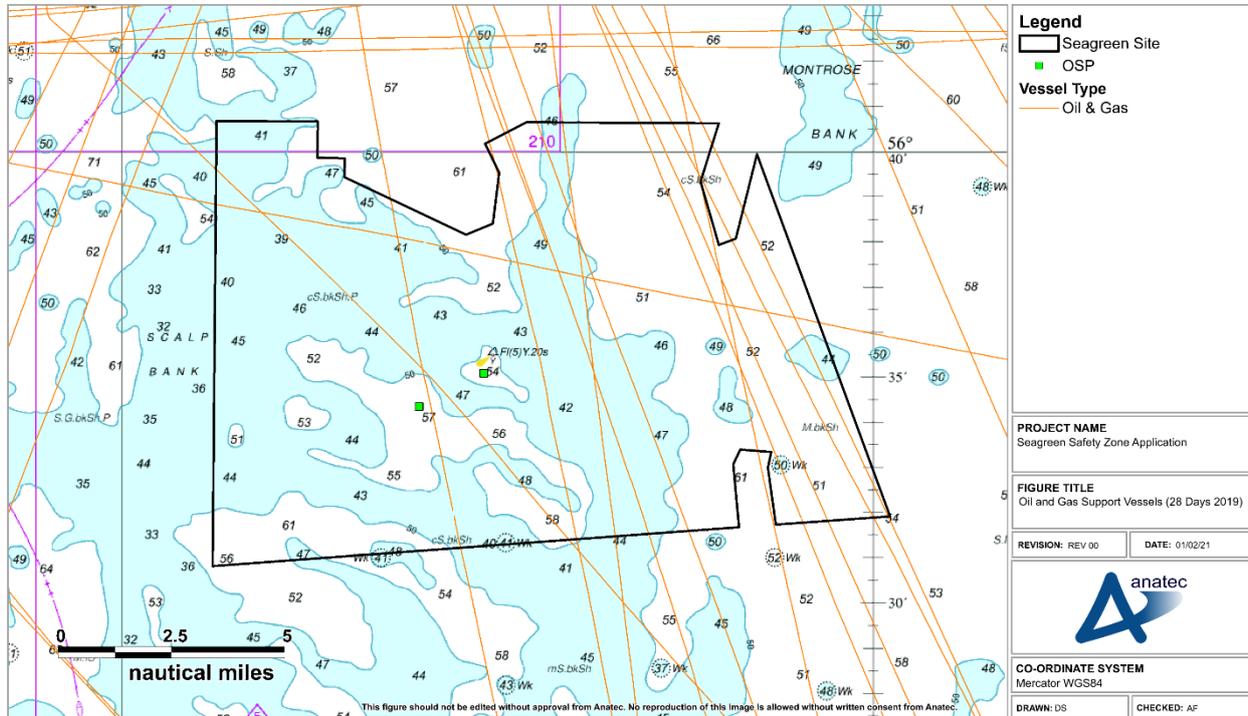


Figure 7-5 Oil and Gas Support Vessels (28 Days 2019)

Less than one oil and gas support vessel per day was recorded transiting through the Seagreen site, which aligns with the 2017 validation data. All oil and gas support vessels within the study area were observed to be in transit, with the most common destinations transmitted via AIS being Aberdeen and Montrose.

### 7.7 Recreational Vessels

The recreational vessels recorded within or in proximity to the Seagreen site during the study period are shown in Figure 7-6.

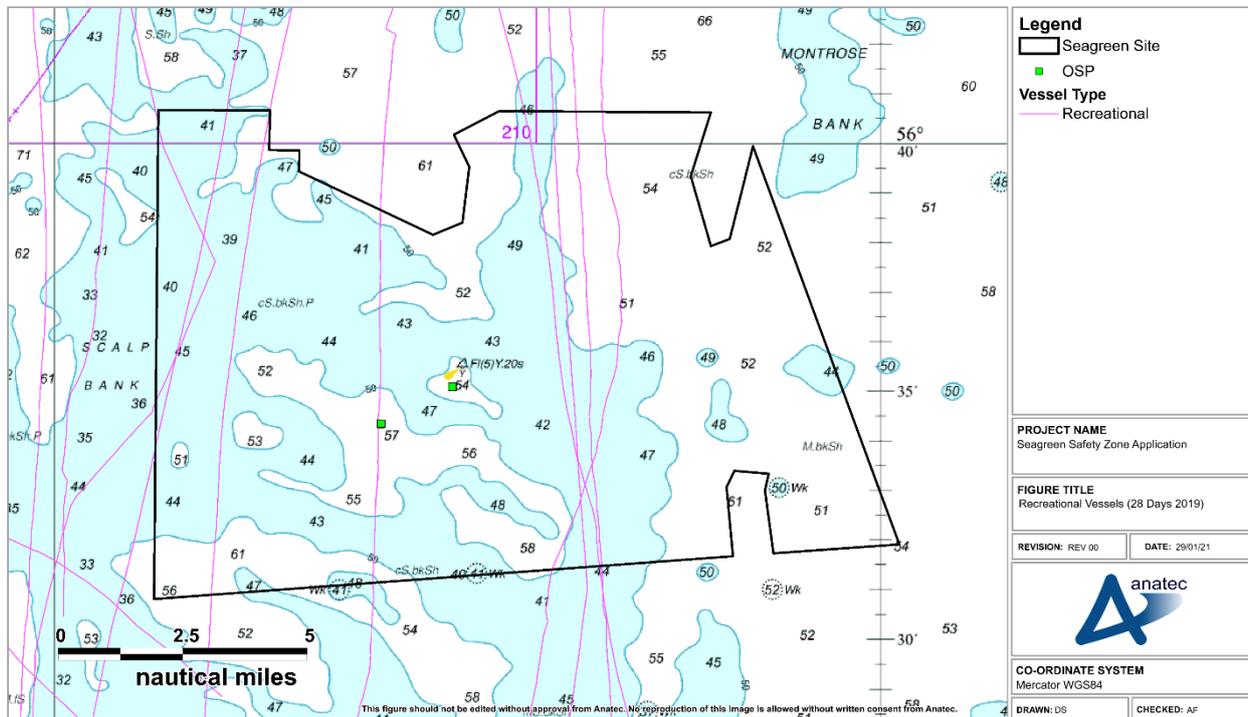


Figure 7-6 Recreational Vessels (28 Days 2019)

The majority of recreational activity was observed to be coastal, however transits further offshore were also recorded, including eight transits through the Seagreen Site itself. All eight of these were identified as sailing vessels. Recreational activity was only observed in summer (i.e., no winter transits were recorded), which is typical of recreational activity, given that the conditions during winter periods may be unfavourable for recreational transits.

The recorded levels of recreational activity are similar to that of the 2017 validation survey, where six recreational vessels were recorded through the Seagreen Site in total.

### 7.8 Anchored Vessels

Vessels transmitting a status of “At Anchor” via AIS or vessels transmitting another status but exhibiting behaviour which may indicate anchor deployment were identified and subsequently checked to identify any cases of anchoring within the study area. Based on this analysis, no vessels were identified as being at anchor within the study area. This finding aligns with that of the 2017 validation data, where only one vessel was identified as being at anchor.

## 8. Safety Zone Overview

### 8.1 Construction

The total number of safety zones that can be active at any one time across the Seagreen site will be agreed as part of the separate WTG application. However, under this application, no more than two safety zones can be active, and prior to WTG installation there will not be more than one active safety zone (around the first OSP installed).

A 500m construction safety zone will be active around any OSP where a construction vessel is on station. For the purposes of this application, this is defined as an instance of a construction vessel being anchored next to an OSP, alongside an OSP via Dynamic Positioning, attached to an OSP, or displaying Restricted in Ability to Manoeuvre (RAM) status whilst alongside an OSP.

However, it is noted that any activities undertaken by a Service Operations Vessel (SOV) will not trigger a 500m safety zone regardless of structure.

The OSPs will have a 50m pre commissioning safety zone up until the point of commissioning of the wind farm whenever a 500m safety zone is not active.

### 8.2 Operational Phase

As per Section 1.2.2, during the operational phase, safety zones are only being applied for around the OSPs where "major maintenance" is underway. The definition of "major maintenance" given within the Electricity Regulations 2007 is as follows:

*"works relating to any renewable energy installation which has become operational, requiring the attachment to, or anchoring next to, such an installation of a self-elevating platform, jack-up barge, crane barge or other maintenance vessel."*

On this basis, major maintenance activities that will occur as part of the operation of the Seagreen Project will vary, and will depend on various factors (e.g., need for component repair / replacement). The total number of 500m major maintenance safety zones that can be active at any one time across the Seagreen site will be agreed as part of the separate WTG application, however under this application no more than two will be active simultaneously.

In terms of vessel types to be used, it is likely that the majority of maintenance activities will be SOV led. However, there may be a need for separate vessel types in the event that any significant "major maintenance" is required. The vessel types needed will be dependent on needs arising, and as such cannot be confirmed at this stage, however large vessels including HLVs or jack ups may be required.

Therefore, under this application a 500m safety zone will only be triggered during the operational phase when a vessel is "anchoring next to" or in "attachment to" an OSP. However, as for the construction phase (see Section 8.1) any activities undertaken by an SOV will not trigger a 500m safety zone.

Where necessary during major maintenance, details of the work being carried out, the associated vessels engaged in the works, and the safety zones in place shall be promulgated via the usual means including local Notice to Mariners. Full details of the approach to Promulgation of Information for the Seagreen Project is provided in the Navigational Safety Plan (NSP) (Doc Ref LF000009-CST-OF-PLN-0007).

## 9. Need for Safety Zones

This section considers the potential risks to shipping and navigation identified for the construction, and operation and maintenance phases of the Seagreen Project for which safety zones are considered to be a relevant mitigation. On this basis this section forms the safety case-based element of the application that provides the justification for the safety zones being applied for.

### 9.1 Reduction in Collision Risk

As per Section 5.3, installation of the OSPs will require the use of large vessels (e.g., HLV, jack up) that will be RAM. It is anticipated that there would be similar vessel requirements in terms of RAM vessels during the operational phase during any periods of major maintenance (see Section 8.2).

Based on the marine traffic data studied and as per Section 7, an average of four to five vessels per day were recorded within the Seagreen site (not accounting for non AIS traffic), including vessels in proximity to the OSPs. The presence of RAM construction and maintenance vessels at the OSPs create additional collision risk to any third party vessels choosing to transit through the Seagreen site once the project begins constructing, and it is therefore necessary to implement safety zones around structures when and where such project vessels are stationed.

It is anticipated that the presence of construction and major maintenance vessels as well as the partially completed or pre-commissioned OSPs will encourage mariners to pass at a safe distance. However, the use of mandatory 500m safety zones where construction or major maintenance activities are ongoing (or 50m for pre commissioned or partially completed structures) will make it clear to passing vessels the radius around the structures that should be avoided to ensure risks are As Low As Reasonably Practicable (ALARP).

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

In addition to the safety zones, other mitigation measures which shall be implemented to reduce the collision risk during the construction, and operation and maintenance phases include:

- Use of buoys to mark the Seagreen site as per NLB consultation;
- Charting of the structures (including OSPs) during all phases;
- Marine Coordination including site monitoring;
- Where identified as necessary via risk assessment, provision of a guard vessel(s); and
- Promulgation of information (e.g., Notice to Mariners, Kingfisher bulletins, weekly Notices of Operations, etc.).

### 9.2 Reduction in Allision Risk

During the construction phase (i.e., prior to operational mitigations becoming active), the OSPs pose an allision risk to passing traffic, particularly earlier in the construction phase when mariners may be less aware of the Seagreen Project and the associated construction activities. This is of particular pertinence for the first OSP, given its foundation is being installed prior to other works commencing.

It is also noted that during construction, the operational lighting and marking scheme will not yet be commissioned. As per Section 9.1, the presence of construction vessels as well as the OSPs themselves are

anticipated to encourage mariners to pass at a safe distance. However, the use of mandatory 500m safety zones around structures where construction is ongoing (or 50m for partially complete / pre commissioned structures) will make it clear which areas should be avoided to minimise allision risk.

Details of the safety zones will be promulgated to stakeholders as required (see Section 11.1), and it is noted that this will further increase awareness of the Seagreen Project, and therefore reduce the overall allision risk.

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

In addition to the safety zones, other mitigation measures which shall be implemented to reduce the allision risk during the construction, and operation and maintenance phases include:

- Lighting of partially completed structures with temporary lighting during construction;
- Operational lighting and marking;
- Use of buoys to mark the Seagreen site as per NLB consultation;
- Charting of the structures (including OSPs) during all phases;
- Marine Coordination including site monitoring;
- Where identified as necessary via risk assessment, provision of a guard vessel(s); and
- Promulgation of information (e.g., Notice to Mariners, Kingfisher bulletins, weekly Notices of Operations, etc.).

### 9.3 Protecting Seagreen Personnel and Third Party Crew

Throughout the construction phase and during periods of major maintenance of the Seagreen Project there shall be a significant number of personnel working in the Seagreen site and surrounding sea area, including alongside or on the OSPs. Given the collision and allision 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 Seagreen personnel and the crews of passing third party vessels should an emergency incident occur.

The implementation of mandatory 500m safety zones in conjunction with other mitigation measures such as the use of a guard vessel (where identified as necessary) will ensure that vessels are able to passage plan effectively in order to pass at a safe distance, thus minimising the risk of an allision or collision occurring and hence minimising the risk to the personnel and crew.

### 9.4 Assistance in Passage Planning

As per the International Convention for the SOLAS (IMO, 1974), all vessels are required to passage plan before proceeding to sea, taking all known and relevant factors into consideration. The implementation of safety zones will make it clear to all vessels the areas which should be avoided within the Seagreen site while constructing or once operational (where maintenance is underway), which as noted in Section 9.4 will allow for effective passage planning by removing any ambiguity as to what warrants a safe passing distance.

## 9.5 Accounting for Inexperienced Mariners

Based on the marine traffic data studied (see Section 7.7), recreational transits through the Seagreen site do occur, and as such, transits from such vessels may pass in proximity to the OSPs. There is the potential that such users may not be experienced mariners or hold many formal marine qualifications. Furthermore, recreational craft generally do not carry as high a standard of navigational equipment as commercial vessels since 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 (when compared to commercial vessels).

The implementation of mandatory 500m safety zones around the OSPs during construction or major maintenance activity (or 50m for pre commissioned structures) in conjunction with other mitigation measures such as the use of a guard vessel (where appropriate), marine coordination, the buoyed construction area and charting of the structures within the Seagreen site would increase awareness of the ongoing works. This is particularly important for recreational users since inexperienced mariners may not be equipped to effectively assess their distance from a structure or an active safety zone.

As per Section 11, in the event that a recreational vessel were to approach or infringe a safety zone, contact would be made by the on-site vessel assigned monitoring duties to alert the vessel to the safety zone and any associated ongoing works.

## 9.6 Accounting for Unforeseen Risk

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

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

Any of these events could lead to severe consequences upon both people and the environment. It is noted that while safety zones in of themselves do not necessarily specifically mitigate against these unforeseen risks occurring, their implementation does ensure the likelihood of a third party vessel becoming involved in any of these events is reduced by ensuring they are not in proximity to an OSP, which in turn would reduce the overall severity of consequence for any potential incident.

## 10. Impact of Safety Zones

This section considers the potential impacts to shipping and navigation users that may occur as a result of the implementation and presence of safety zones during the construction, and operation and maintenance phases of the Seagreen Project.

### 10.1 Passing Commercial Vessels

Based on the marine traffic data studied (see Section 7.4), an average of two to three commercial vessels per day intersected the Seagreen site, and this includes transits in proximity to the OSPs. However, based on experience at other UK wind farms, commercial vessels will typically avoid wind farm sites once construction is underway (i.e., from when the site is marked as a buoyed construction area). Any vessels that did still choose to enter the Seagreen site once the buoyed construction area was present would likely avoid the active works at the OSPs and by extension the 500m safety zones.

Similarly, experience shows that once wind farms become operational, commercial vessels will generally continue to avoid the commissioned structures therein even after construction buoyage is removed, and consequently any major maintenance works and associated safety zones. It should be considered that prior to commencement of installation of the WTGs, some commercial vessels may still choose to transit through the site, however during this time as a worst case there will be only a single safety zone around the first OSP.

On this basis the 500m safety zones are not considered as having any additional impact on commercial vessels over that of the structures and construction / maintenance operations themselves.

The smaller 50m pre commissioning safety zones are considered as having no impact on commercial vessel transit given their radius, noting that it is considered unlikely that a commercial vessel would choose to transit within 50m of a wind farm structure (including the OSP) except in emergency circumstances.

### 10.2 Fishing and Recreational Vessels

The marine traffic data collected shows that while the majority of fishing vessel activity in the area occurs inshore of the Seagreen site, fishing vessels do transit through and actively fish within the site boundary (see Section 7.5). Additional input from the Seagreen Project Fishing Liaison Officer indicates that non-AIS traffic is also likely to be present. An estimated one recreational vessel per day was also recorded via AIS during summer periods, noting that activity was limited during winter (see Section 7.7).

Prior to the commencement of the installation of the WTGs, there will be a maximum of one safety zone active at any given time (as there will be only one structure present {the first OSP}), and this will not have any significant effect on vessels choosing to transit through the Seagreen site. The maximum number of safety zones that could be active once WTG installation commences will be agreed in the separate WTG application process.

On this basis the implementation and presence of safety zones applied for within this application is not anticipated to cause any significant impact upon fishing activity.

### 10.3 Anchoring Activity

Given the presence of the buoyed construction area, project vessels in operation and the promulgation of work taking place in the area, it is considered unlikely that vessels would seek anchor within the Seagreen site during the construction phase except in an emergency (e.g., engine failure resulting in a vessel drifting towards construction vessels). Similar holds for the operational phase noting the infrastructure that will be in place.

Further, it is noted that anchoring activity is considered low in the area based on the marine traffic data studied (see Section 7.8), with no vessels identified as being at anchor within the Seagreen site. On this basis, the safety zones are not anticipated as having any impact on vessels at anchor.

## 11. Notifications, Monitoring, and Policing

### 11.1 Promulgation of Information

Details of any safety zone associated with the Seagreen Project shall be promulgated using standard marine procedures, including Notice to Mariners, Radio Warnings, Kingfisher bulletins, and the Weekly Notice of Operations. Seagreen will also have regular contact direct with fishing stakeholders via the company Fisheries Liaison Officer (FLO), and this will include promulgation of information with regards to the safety zones to both local associations (e.g., Arbroath and Montrose Static Gear Association), and regional stakeholders such as the North & East Coast Regional Inshore Fisheries Group and the Scottish Fishermen's Federation.

Further, "live" details of any active or soon to be active safety zones will be promulgated via Very High Frequency (VHF) to passing traffic by the vessel assigned monitoring duties (see Section 11.2).

Full details of Seagreen approach to promulgation of information can be found in the NSP (Doc Ref LF000009-CST-OF-PLN-0007).

### 11.2 Monitoring

All vessels associated with the Seagreen Project will be supplied with the safety zone procedures as summarised in this application.

Whenever active safety zones are in place, at least one on-site 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. This will be either a dedicated guard vessel, or, if no guard vessel is being utilised at the time, another on-site vessel (performing non-critical duties and not RAM). Where no vessel is available on site (e.g., in adverse weather conditions), site monitoring would still be undertaken as far as is practicable via the Marine Coordination Centre.

Other on-site vessels will also be keeping a watch as required under Rule 5 of COLREGS (IMO, 1972).

Where a third party vessel is observed to be approaching the site, early contact will be made by the designated on-site vessel to advise the passing vessel of the construction/maintenance work underway, and alert them to the presence of any active, or soon to be active safety zones. Where a third party vessel is observed to enter or come in close proximity to an active safety zone, the designated on-site vessel 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.

Direct navigational advice will not be given to any third party vessel, with COLREGS (IMO, 1972) remaining the navigational priority for all vessels.

### 11.3 Policing

Where feasible, details and actions of any vessels which consistently ignore the warnings issued by Seagreen via the designated on-site vessel, and / or are considered to be causing a potential danger to vessels (including themselves), personnel or assets within the safety zone areas will be monitored and action (including steps taken) recorded. The safety zones supplement more general regulations that are

applicable to all sea users including The Merchant Shipping (Safety of Navigation) Regulations 2020 which implement COLREGS (IMO, 1972). These general regulations remain in force and require vessels to take appropriate action when encountering vessels that are RAM, as well as the presence of any active safety zones. Any infringements of the safety zone deemed as representing dangerous behaviour or unsafe navigational acts (as required under the relevant regulations implementing international conventions) will be reported to Marine Scotland and the MCA as the relevant authorities. Any vessel repeatedly entering active safety zones despite warnings may also be reported.

It is also acknowledged that assistance measures under Regulation 33 of SOLAS (IMO, 1974) remain valid and a third party vessel is obliged to render assistance to another vessel in trouble even if entry into a safety zone is required.

## 12. Summary

This document presents the Seagreen application for safety zones to be implemented at the OSPs within the Seagreen Offshore Wind Farm during the construction phase, and also during any periods of major maintenance in the operational phase. A separate application will be submitted for the WTGs.

The safety zones are considered necessary on the basis that they will:

- Reduce the potential for collision risk;
- Reduce the potential for allision;
- Protect personnel or crew engaged in the construction / maintenance process;
- Assist third party vessels in passage planning;
- Provide an additional level of mitigation to account for inexperienced mariners; and
- Provide an additional level of mitigation to account for unforeseen risks.

The implementation of mandatory construction / major maintenance safety zones, when applied in conjunction with other mitigation measures listed throughout this safety case will ensure that the risks to both passing traffic and construction / maintenance vessels are within ALARP parameters, and will also ensure risks to personnel and crew associated with the Seagreen Project are minimised.

Under this application, no more than two safety zones can be simultaneously active at any one time, as it only includes the OSPs. Further, between June 2021 and September 2021 prior to WTG installation, **there will be no more than one safety zone active at any given time** (as there will be only one structure in place, with that being the first OSP). The maximum number of safety zones that could be active following commencement of the WTG installation will be agreed as part of the separate WTG application process.

Activities undertaken by SOVs will not trigger a safety zone during any phase.

The mandatory safety zones shall be monitored for infringements from third party vessels by at least one on-site vessel assigned with monitoring duties. The primary response will be to warn passing traffic of the ongoing works and any active safety zones, and to alert infringing vessels to an infringement by VHF radio. Records of all infringements shall be kept, and, if necessary, evidence passed to the relevant authorities for follow-up action should they deem it appropriate.

### 13. References

Anatec (2012). Seagreen Offshore Wind Farm Navigation Risk Assessment. Aberdeen: Anatec.

Anatec (2018). Marine Traffic Validation Exercise. Aberdeen: Anatec.

Electricity Act 1989

<https://www.legislation.gov.uk/ukpga/1989/29/section/36> (accessed Jan 2021).

Energy Act 2004.

<https://www.legislation.gov.uk/ukpga/2004/20/contents> (accessed Jan 2021).

Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007

<http://www.legislation.gov.uk/uksi/2007/1948/contents/made> (accessed Jan 2021).

IALA (2013). International Association of Marine Aids to Navigation and Lighthouse Authorities Recommendations O-139: The Marking of Man-Made Offshore Structures, Edition 2. Saint Germain en Laye, France: IALA.

IMO (1972 as amended). Convention on the International Regulations for Preventing Collisions at Sea. London: IMO.

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

The Merchant Shipping (Safety of Navigation) Regulations 2020.

<https://www.legislation.gov.uk/uksi/2020/673/contents/made> (accessed Jan 2021)

## Appendix A List of Abbreviations

Term	Description
°	Degrees
AIS	Automatic Identification System
AtoN	Aids to Navigation
BEIS	Department for Business, Energy and Industrial Strategy
COLREGs	International Convention for the Prevention of Collisions at Sea
Fl	Flashing
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ID	Identification
IMO	International Maritime Organisation
km	Kilometres
LAT	Lowest Astronomical Tide
LMP	Lighting and Marking Plan, required under Condition 19 of the S36 Consent and Condition 3.2.2.14 of the Marine Licence
m	Metre
MCA	Maritime and Coastguard Agency
NLB	Northern Lighthouse Board
nm	Nautical Mile(s)
NSP	Navigational Safety Plan
NUC	Not Under Command
OREI	Offshore Renewable Energy Installation

Term	Description
OSP	Offshore Substation Platform means an alternating current Offshore substation platform which is a standalone modular unit that utilises the same substructure and foundation design as a wind turbine generator
OTA	Offshore Transmission Asset, comprising the OSPs and the transmission cable required to connect the Wind Farm Assets to the OnTW from the OSPs to the MHWS at the landfall at Carnoustie
OWF	The Wind Farm Assets
s	Second
SOLAS	Safety of Life at Sea
SOV	Service Operations Vessel
SPS	Significant Peripheral Structure
VHF	Very High Frequency
UK	United Kingdom
WTG	Wind Turbine Generator
Y	Yellow



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