Project Title	Dogger Bank B Safety Zone Application
Date:	06/12/2022

Dogger Bank B

Safety Zone Application

Rev	Prepared By	Sign Off	Checked By	Sign Off	Approved By	Sign Off	Date of Issue
1	Anatec	Sam Westwood	Liz Reynolds	[redacted]	Dave Scott	[redacted]	12/12/2022

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Abbreviations

Abbreviation	Definition
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
BEIS	Department for Business, Energy & Industrial Strategy
CLV	Cable Lay Vessel
CMP	Construction and Monitoring Programme
COLREGS	International Regulations for Preventing Collisions at Sea
DBA	Dogger Bank A
DBB	Dogger Bank B
ECC	Export Cable Corridor
FIR	Project Fishing Industry Representative
FI	Flashing
FLO	Fishing Liaison Officer
GE	General Electric
GW	Gigawatt
HAT	Highest Astronomical Tide
IALA	International Association of Lighthouse Authorities
IMO	International Maritime Organization
km	Kilometres
LAT	Lowest Astronomical Tide
kLMP	Lighting and Marking Plan
LOA	Length Overall
m	Metre

Abbreviation	Definition
MCG	Motion Compensate Gripper
MP	Monopile
nm	Nautical Mile
NUC	Not Under Command
OSP	Offshore Substation Platform
PLGR	Pre-Lay Grapnel Run
RAM	Restricted in Ability to Manoeuvre
s	Second
SAR	Search and Rescue
SOLAS	International Convention for the Safety of Life at Sea
SOV	Service Operations Vessel
SPS	Significant Peripheral Structure
TP	Transition Piece
VHF	Very High Frequency
VTMS	Vessel Traffic Monitoring System
WTG	Wind Turbine Generator
WtW	Walk to Work
Y	Yellow

1 Introduction

1.1 Background

Doggerbank Offshore Wind Farm Project 1 Projco Limited and Doggerbank Offshore Wind Farm Project 2 Projco Limited are a Joint Venture between SSE, Equinor and Vårgrønn (40%:40%:20% respectively) (herein referred to as the Developer). Consent was granted for the Dogger Bank A (DBA) and Dogger Bank B (DBB) Projects in February 2015 under The Dogger Bank Creyke Beck Offshore Wind Farm Order 2015 (as amended) (the Development Consent Order).

1.2 Scope of the Safety Zone Application

This document represents the primary supporting document to Dogger Bank Offshore Wind Farm's (DBWF) application for safety zones to be implemented for DBB, noting a separate application for DBA has already been submitted and accepted by BEIS. The approach taken to this application for DBB is aligned with the approach taken for DBA.

The purpose of the proposed safety zones is to manage potential interactions between vessels and the offshore wind farm construction and maintenance activities, with a view to minimising the risk of an incident which may threaten primarily life or the environment, as well as the DBB assets.

1.2.1 *Construction Phase*

During the construction phase, the following safety zones are applied for:

- 'Rolling' 500 metre (m) safety zone established around each wind farm structure, and/or their foundations, whilst construction is being performed, as indicated by the presence of construction vessels; and
- Pre-commissioning 50m safety zones established around any wind farm structure which is either partially completed or constructed but not yet commissioned where a construction vessel is not present.

Further details as to what will trigger these safety zones are provided in Section 8.

1.2.2 *Operation and Maintenance Phase – Major Maintenance*

During any periods of major maintenance (see Section 5) within the operation and maintenance phase, the following safety zones are applied for:

- 500m safety zones around all 'major maintenance' being undertaken around a wind farm structure, as denoted by the presence of a major maintenance vessel.

For reference, the definition of 'major maintenance' given within the Electricity Regulations 2007 (which details regulations associated with application procedures and control of access related to safety zones) 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*."

Further details as to what will trigger these safety zones are provided in Section 8. It is noted that safety zones triggered by Service Operation Vessel (SOV) Walk to Work (WtW) systems during the operational phase are not being included within this application. The Developer will continue to risk assess including monitoring of ongoing activities and traffic patterns and may apply for additional safety zones at a later date.

1.2.3 *Operation and Maintenance Phase – Normal Operations*

No permanent safety zones are applied for during normal operations (i.e., activities not classed under the definition of major maintenance given in Section 1.2.2).

1.2.4 *Decommissioning Phase*

Safety zones for the decommissioning phase of DBB will be applied for prior to such operations taking place once associated requirements are known.

1.3 Legislation Compliance

This document has been drafted in compliance with the following legislation and guidance to ensure all necessary information required is included within this safety zone application:

- Section 95 and Schedule 16 of the Energy Act 2004;
- Electricity (Offshore Generation Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007; and
- Guidance Notes: Applying for Safety Zones around Offshore Renewable Energy Installations (BEIS, 2011).

2 Project Overview

2.1 Layout

The DBB array site will be located in the southern North Sea, approximately 71 nautical miles (nm) northeast of the Yorkshire coast, as shown in Figure 2.1. DBA is also shown for reference.

All surface piercing structures associated with DBB will be located within the DBB array site, as shown in Figure 2.2 which shows the approved layout.

In summary, the DBB design consists of:

- Up to 95 Wind Turbine Generators (WTGs), with a total generating capacity of 1.2 gigawatts (GW);
- WTGs constructed on monopile (MP) foundations;
- One Offshore Substation Platform (OSP) installed on a jacket foundation fixed via four piles, to collect the generated electricity for transmission to shore;
- A network of inter-array cables to connect strings of WTGs together and connect WTGs to OSP; and
- Export cables (length of approximately 172kilometres (km)) to transmit the electricity from OSP to the landfall location north of Ulrome on the Holderness coast.

The hub height will be 139m above Lowest Astronomical Tide (LAT), whilst the maximum blade tip height will be 249m above LAT.

It is noted that the approved layout includes ten spare locations which may be used in the event that a preferred position proves unviable for installation. These are shown in Figure 2.2.

Micrositing of the WTGs of up to 50m may occur based on the locations presented in Figure 2.2, dependent on the relevant pre-construction surveys and ground conditions; however any micrositing requirements that arise will be discussed and agreed with the MCA.

Minimum spacing between the periphery WTGs is approximately 1,400m. The internal grid is spaced with approximately 3,200m between turbines.

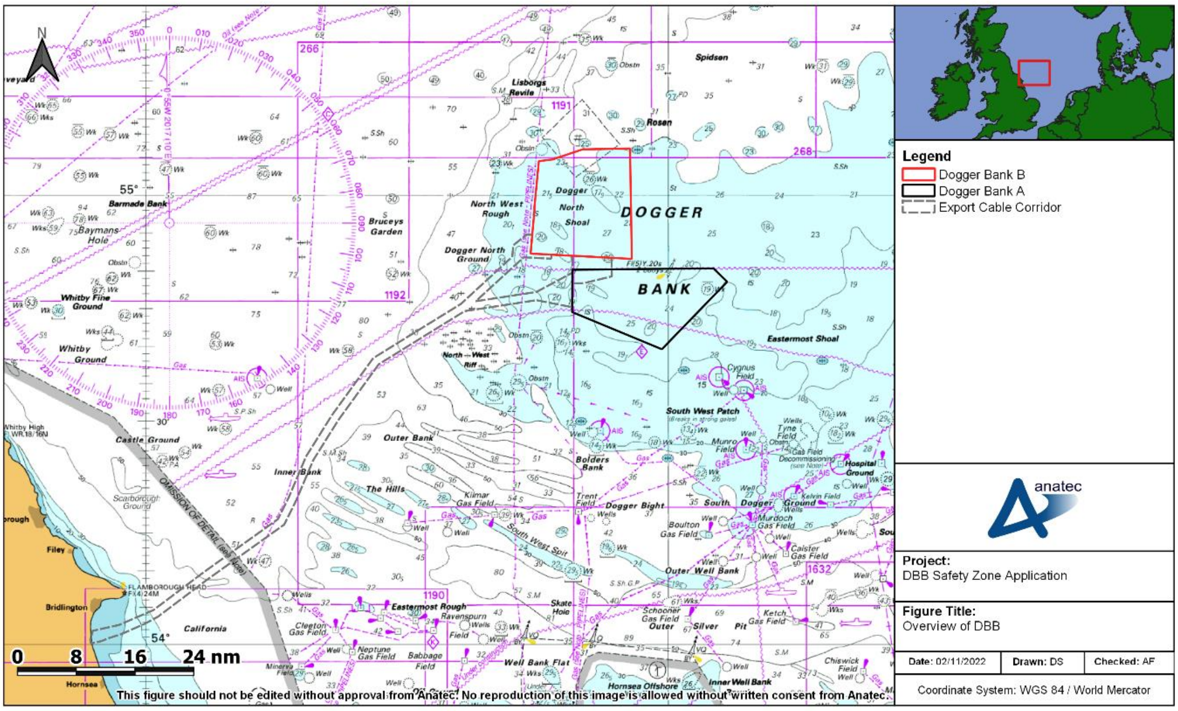

Figure 2.1: Overview of DBB

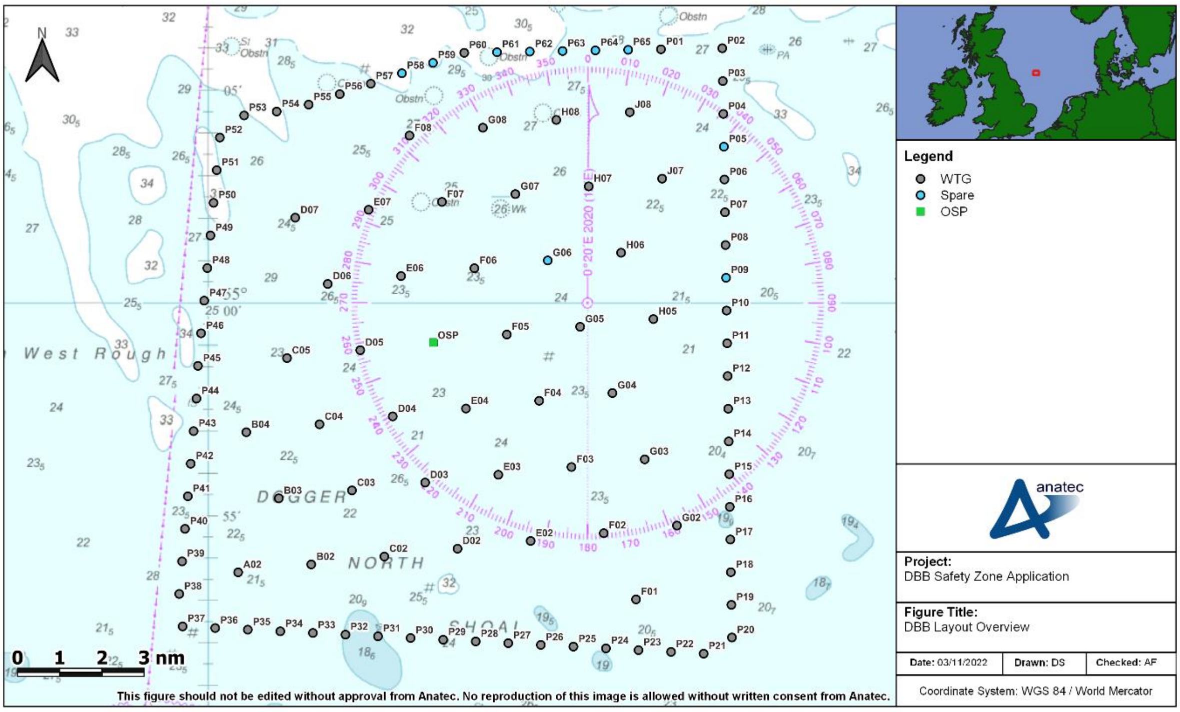

Figure 2.2: DBB Array Site Layout

2.2 Project Schedule

Offshore construction activities are scheduled to commence in Q1 2023, with completion and final commissioning expected in 2025. The provisional construction schedule for components of DBB is summarised in Table 2.1. It should be noted that the schedule below is based on a number of assumptions (e.g., weather, delivery, and installation plans etc.) and therefore the stated dates are subject to change.

Table 2.1: Indicative Project Schedule

Milestone	Indicative Dates
Export Cable Installation (offshore)	Q1 2023
Inter-Array Cables	Q1/2 2024
Substructures (Jackets)	Q1 2023
Substructures (Topside)	Spring 2024
Scour Protection	Q1/Q2 2023
Foundation Installation	Summer 2023
WTGs	Spring 2024

3 Project Components

3.1 Wind Turbine Generators

The 95 WTGs are to be installed via Transition Piece (TP) onto MP foundations. Key parameters of the WTGs are detailed in Table 3.1. Following this, an indicative schematic of the WTG substructure relative to the waterline is shown in Figure 3.1.

Table 3.1: WTG Parameters

Parameter	Value
Manufacturer	General Electric
Capacity	13 Mega Watts
Rotor Diameter	220m
Blade Length	107m
Hub Height (LAT)	139m
Maximum Tip Height (LAT)	249m
Interface Height (Foundation to TP) above LAT	22.4m
Blade Clearance (Highest Astronomical Tide (HAT))	26m

3.2 Offshore Substation

As detailed in Section 2.1, the DBB layout includes one OSP. The OSP will be installed on a jacket foundation fixed via four piles.

Key parameters of the OSP are detailed in Table 3.2, with a schematic then shown in Figure 3.2.

Table 3.2: OSP Topside Parameters

Parameter	Value
Length	69.8m
Width	50.6m
Maximum Height above LAT	37.3m

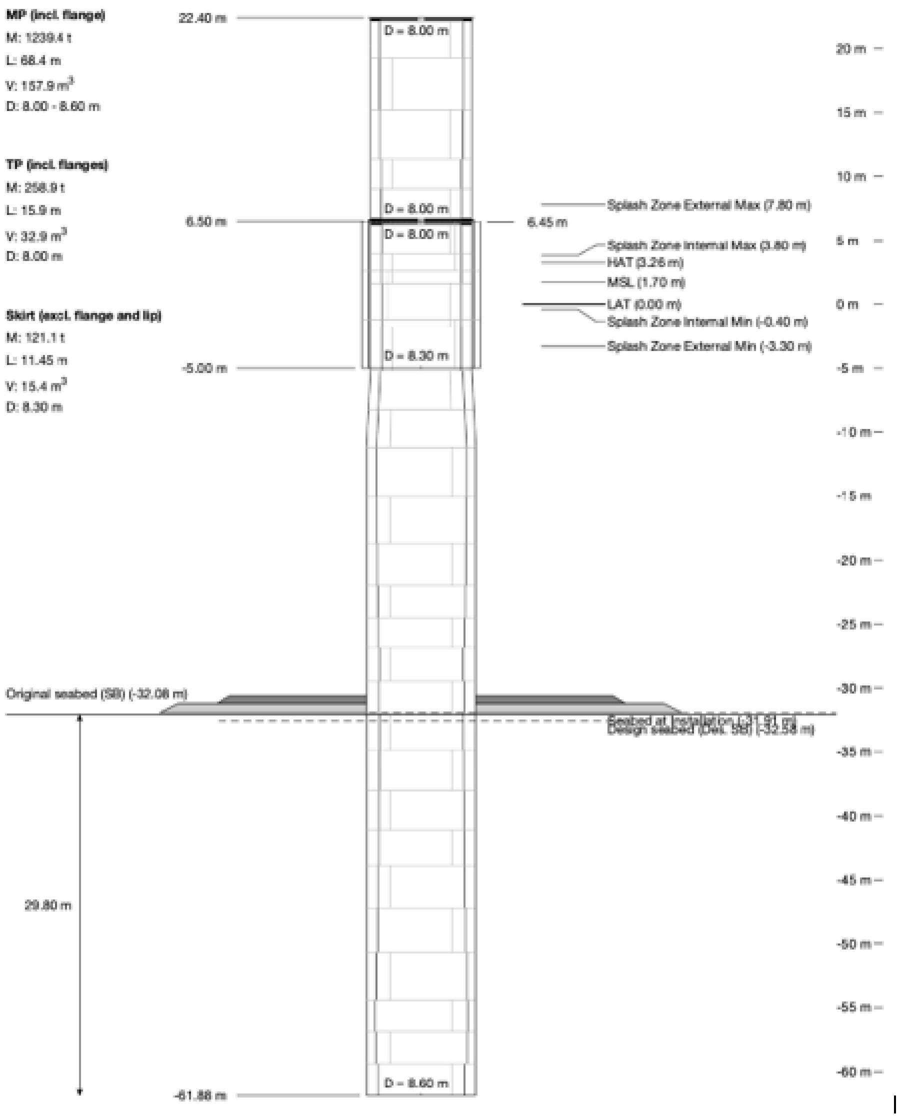

Figure 3.1: WTG Foundation Schematic (Indicative)

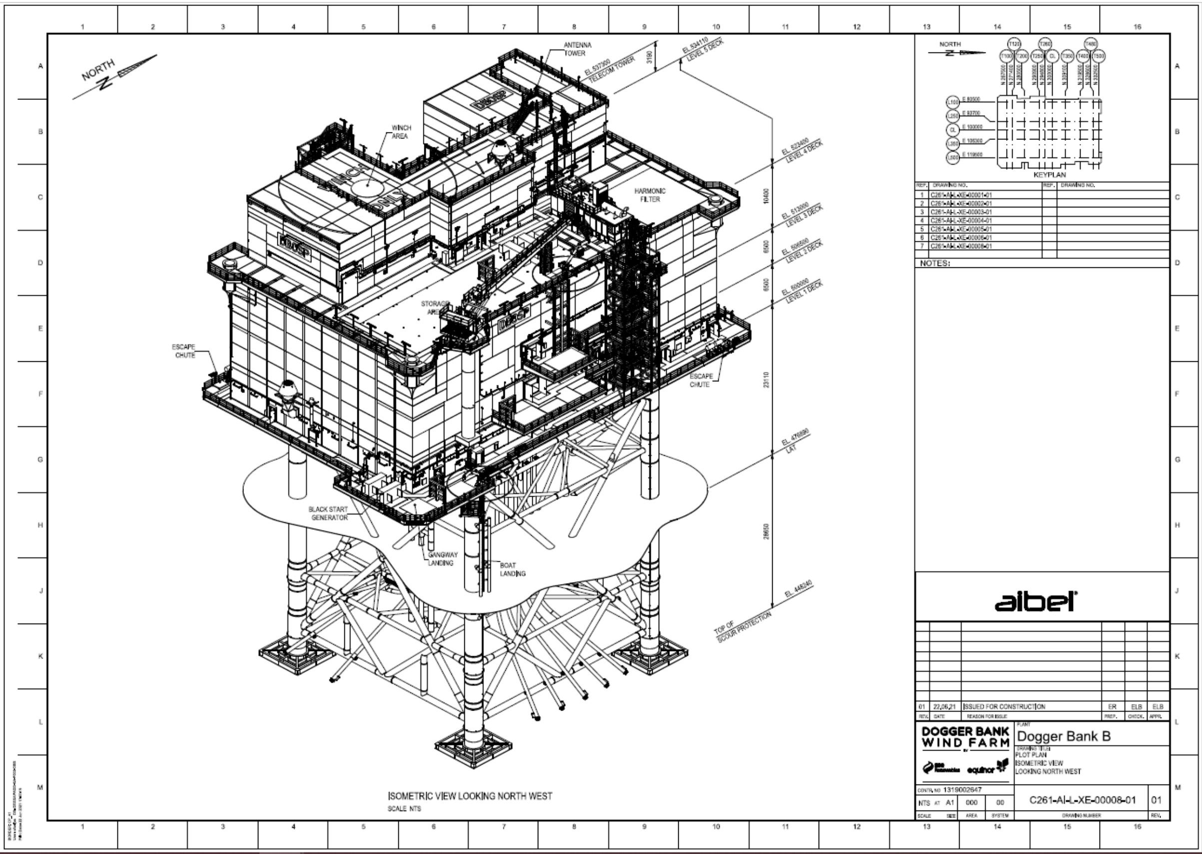

Figure 3.2: OSP Schematic (Indicative)

3.3 Cables

The OSP will connect to the onshore grid via offshore export cables making landfall to the north of Ulrome on the Holderness coast. Final export cable routes are still being assessed, noting they will be within the export cable corridor (ECC) shown in Figure 2.1.

WTGs and the OSP will be connected by a network of 95 inter-array cables. The final configuration of the inter-array cables is yet to be defined; however indicative routeing is shown in Figure 3.3.

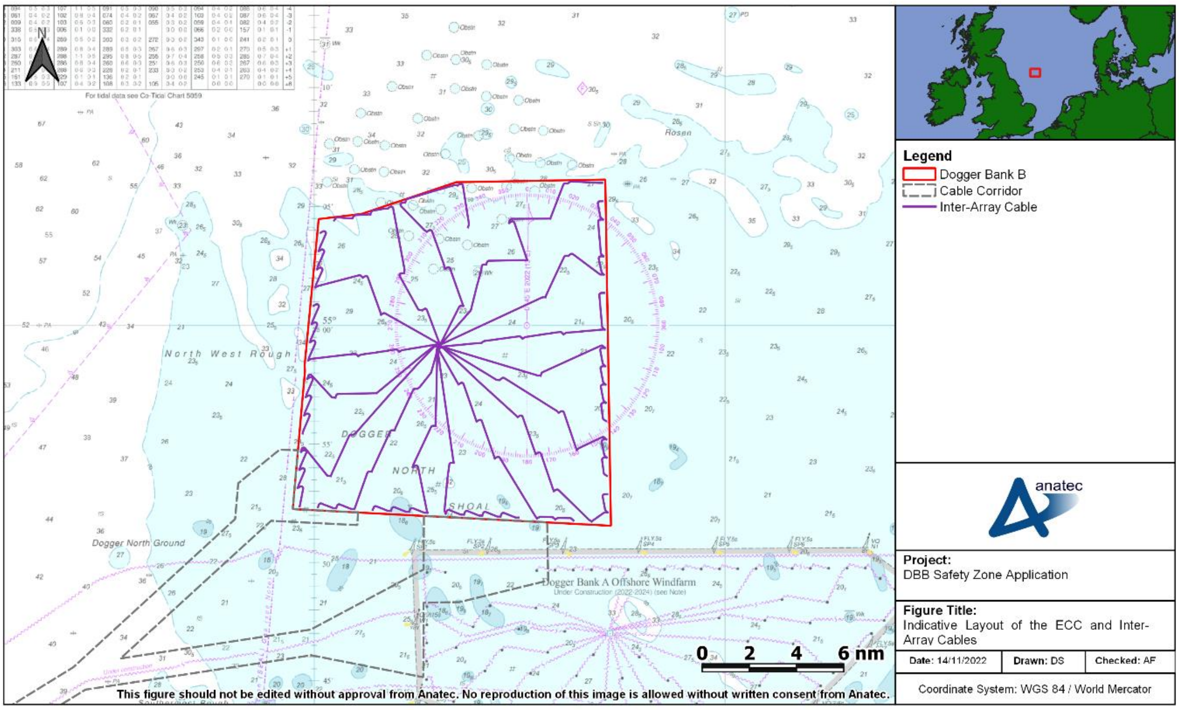

Figure 3.3: Indicative Layout of the Inter-Array Cables

4 Construction Overview

This section summarises the activities that will be undertaken as part of the construction phase. The details provided are based on current understanding and are therefore subject to change.

It is noted that promulgation of information will be undertaken in advance of and during construction including details of safety zones to maximise third party awareness of the activities. This will include Notice to Mariners (NtM), the Kingfisher Bulletin, and liaison with the fishing industry via the Fishing Liaison Officer (FLO) and project Fisheries Industry Representatives (FIRs).

4.1 Scour Protection

It is anticipated that each of the WTGs will require scour protection. Based on a scour assessment (DHI, 2021) WTGs were split into two zones with differing scour designs, depending on the water depth and the subsequent size of rock required.

The scour installation is anticipated to occur between Spring 2023 and Summer 2024.

The OSP jacket location will require dredging and the installation of scour protection prior to installation of the OSP jacket. This is anticipated to occur in early 2023.

4.2 Wind Turbine Generators

Installation of the WTG foundations is anticipated to commence in Summer 2023 and installation of the WTGs onto the foundations is expected to commence in Spring 2024.

4.2.1 *WTG Foundations and Transition Pieces*

The foundations of the WTGs will be delivered directly to the DBB wind farm site by sea transport from the site of fabrication.

Once the construction vessel arrives on site, it will position itself ready for the installation of the MPs. The crane will upend the MP and the pile gripper frame (Motion Compensate Gripper (MCG)) will take control of the lower end. Once an individual pile is upended and is within the MCG, it will be lowered to the seabed to the planned location of each foundation.

Each MP will be driven through the filter layer of the scour protection. In the event of pile refusal, the vessel will leave the location and the Project will determine the best course of action to either install or remove the pile.

The maximum piling duration for each pile will be up to 5.5 hours, which includes a soft-start and ramp-up of 30 mins for the MPs.

Once the MPs are successfully installed, the TPs (one per MP) will be installed. The TP will be lifted from the storage deck of the installation vessel, and secured on top of the MP.

4.2.2 *WTG Tower, Nacelle and Blades*

Prior to the installation of the remaining structures after the MPs are installed, the TPs of the foundations will be surveyed, checked and cleaned, ready to accept the tower sections and turbines.

At the lay-down construction port, the wind turbine components will be prepared for loading and installation. Five WTGs are anticipated to be loaded at a time (i.e., tower sections, nacelles and blades for five complete WTGs). A total of 19 installation trips are anticipated to be made.

Once the WTG components are loaded, the jack up vessel will transit to site, and position at the first WTG location adjacent to the pre-installed MP foundation.

Once the jack-up has arrived at the first MP foundation, the jack-up will lower its legs to the seabed prior to jacking up to the required level. The vessel will then prepare to lift the wind turbine tower, which will have been pre-assembled at the construction port.

After the WTG tower is installed, the jack up vessel will prepare to lift the WTG nacelle, after which the jack-up vessel will prepare to lift the WTG blades.

After completion of wind turbine installation, the jack-up hull is jacked down to sea level and the legs jacked up, and will then move to the next MP foundation to repeat the preceding wind turbine installation sequence.

Once all of the wind turbines on board have been installed, the jack-up will be prepared for the return to port (stowing equipment etc.) and return to the construction laydown port to load the next set of turbines.

4.3 Offshore Substation Platform

The installation of the OSP is intended to commence in spring 2023. The jacket foundations will be installed via a semisubmersible crane vessel and fixed to the seabed via piles, noting the Heavy Lift Crane Vessel will be working via Dynamic Positioning (DP) during jacket installation.

Topside installation is anticipated to occur in 2024. During topside installation the Heavy Lift Crane Vessel will be operating on anchors and supported by anchor handling tugs.

The hook up and commissioning of the OSP will then be undertaken, noting this will include use of a jack up at the OSP for a minimum of 90 days.

4.4 Commissioning

WTG commissioning will involve an SOV stationed at each structure for an estimated five days per structure, noting daughter craft deployment will also be required. The OSP commissioning process will include use of a jack up.

4.5 Cables

The installation of export cables is intended to commence in Q1 2023 and will involve the following key activities:

- Pre-Lay Grapnel Run (PLGR);
- Mobilisation of Cable Lay Vessel (CLV);
- Pull in of cables at landfall;
- Cable lay between landfall and OSP;
- Pull in of cables at OSP; and
- Installation of protection.

The installation of Inter-Array cables is intended to commence in Q1/Q2 2024, and will be undertaken by the CLV post PLGR.

5 Operations and Maintenance

The definition of 'major maintenance' given within the Electricity Regulations 2007 (which details regulations associated with application procedures and control of access related to safety zones) 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*."

Under this definition, only vessels that "*anchor next to*" or require *"attachment to*" the operational structures can trigger a 500m major maintenance safety zone during the operational phase. On this basis, vessel types that could trigger a major maintenance safety zone include (but are not necessarily limited to):

- Wind Turbine Installation Vessels;
- Jack-ups;
- Floating barges; and
- Heavy lift vessels / semi-submersible crane vessels.

Full details of major maintenance activities that will occur as part of the operation of DBB are unable to be confirmed at the time of writing based on the information available given this will include unexpected / unplanned operations. However, it is likely that the removal / replacement of components will be required and as such certain activities will be similar to those undertaken in the construction phase (see Section 4).

Additional details as to specific activities that could trigger a safety zone are provided in Section 8. However, throughout any periods of major maintenance, details of the work being carried out shall be promulgated through NtM, radio warnings as designated by the United Kingdom Hydrographic Office (UKHO), the Kingfisher bulletin, and liaison with the fishing industry via the FLO and project FIRs.

6 Lighting and Marking

This section summarises the lighting and marking of DBB which has been drafted in consultation with Trinity House and the MCA via the Lighting and Marking Plan (LMP) (Document No: LF500013-DOG-GEN-CON –PLN-000020). Aviation lighting (including Search and Rescue (SAR) lighting) is not considered pertinent to this safety zone application and has therefore not been included.

6.1 Construction Phase

6.1.1 *Lighting*

During construction all fixed structures, including partially constructed such as WTG foundations, will be mounted and marked with a Flashing (Fl) Yellow (Y) 2.5 second (s) light (Fl Y 2.5s) visible through 360 degrees with a 2nm range.

These lights should meet International Association of Lighthouse Authorities (IALA) Availability Category 2 (>99.0%) and will remain in place until the operational lighting has been commissioned and has been accepted as such by Trinity House.

6.1.2 *Buoyage*

All required construction phase buoyage will be established at least four weeks prior to the commencement of construction works and will remain in place until the operational marking requirements have been inspected and passed by Trinity House. The DBB array site will be marked with 20 buoys during the construction phase, noting that the positions have been agreed with Trinity House:

- 3 x north cardinal;
- 1 x east cardinal;
- 1 x south cardinal;
- 2 x west cardinal; and
- 13 x special marks.

It is noted that the construction schedules for DBA and DBB are such that there may be some overlap i.e., a period when both sites are concurrently under construction. Each will need to have its operational lighting and marking commissioned by Trinity House before any buoys can be removed. It has been agreed with Trinity House that this will be discussed and confirmed at the time that either project reaches its next phase.

6.2 Operational Phase

6.2.1 *Lighting*

During the operational phase, in line with requirements under IALA O-139[1] (IALA, 2013), certain peripheral structures will be marked as Significant Peripheral Structures (SPS). Each SPS will be fitted with three marine lights (spaced at 120° intervals), with criteria of each

[1] It is noted that a new version IALA O-139 was published in January 2021 (G1162) however the DBB LMP was agreed on the 2013 version.

depending on whether Trinity House has designated it as a Primary or Secondary SPS:

- Primary: 5nm light Fl (4) Y 12s, 360° visibility, flashing in synchronicity, IALA Category 2 (>99.0% availability).
- Secondary: 5nm light Fl Y 5s, 360° visibility, flashing in synchronicity, IALA Category 2 (>99.0% availability).

6.2.2 *Sound Signals*

Each SPS (see Section 6.2.1) will also be fitted with sound signals, which will activate whenever visibility is less than 2nm. When activated, the signals will sound a blast lasting 2s every 30s. They will meet IALA Category 3 availability requirements (>97.0%).

6.2.3 *Buoyage*

As directed by Trinity House, an operational special mark buoy will be used to mark the northern periphery of the DBB array site, noting this assumes spare locations on that periphery are not used.

7 Marine Traffic Survey Data

7.1 Introduction

In line with BEIS guidance (2011) this safety zone application includes assessment of up-to-date marine traffic survey data collected during 2021. Marine traffic assessment has primarily been based on 28 days of Automatic Identification System (AIS) data collected during July of 2021. The 28-day period was chosen such that downtime was minimal.

Any traffic deemed to be temporary has been removed from further analysis (e.g., survey vessels).

Noting the offshore location of the site, it should be considered that data coverage is not necessarily comprehensive of the entire study area. Further, the assessment may be unrepresentative of certain vessel types not required to transit via AIS (i.e., fishing vessels less than 15m and recreational vessels). It should also be considered that the COVID-19 pandemic may have had an impact on traffic recorded within the 2021 data.

Therefore, due consideration has also been given to the following data sources to validate the findings of the AIS assessment:

- Non AIS survey data collected via Radar as part of the NRA (Anatec, 2013); and
- Anatec's internal ShipRoutes database (Anatec, 2021).

Reference to these additional data sources has been made where appropriate, noting that the assessment is primarily based on the up to date AIS data.

7.2 AIS Assessment

7.2.1 *Vessel Type*

A plot of the vessel tracks recorded within the study area during the survey period is colour-coded by vessel type and presented in Figure 7.1. Following this, the distribution of these vessel types is presented in Figure 7.2.

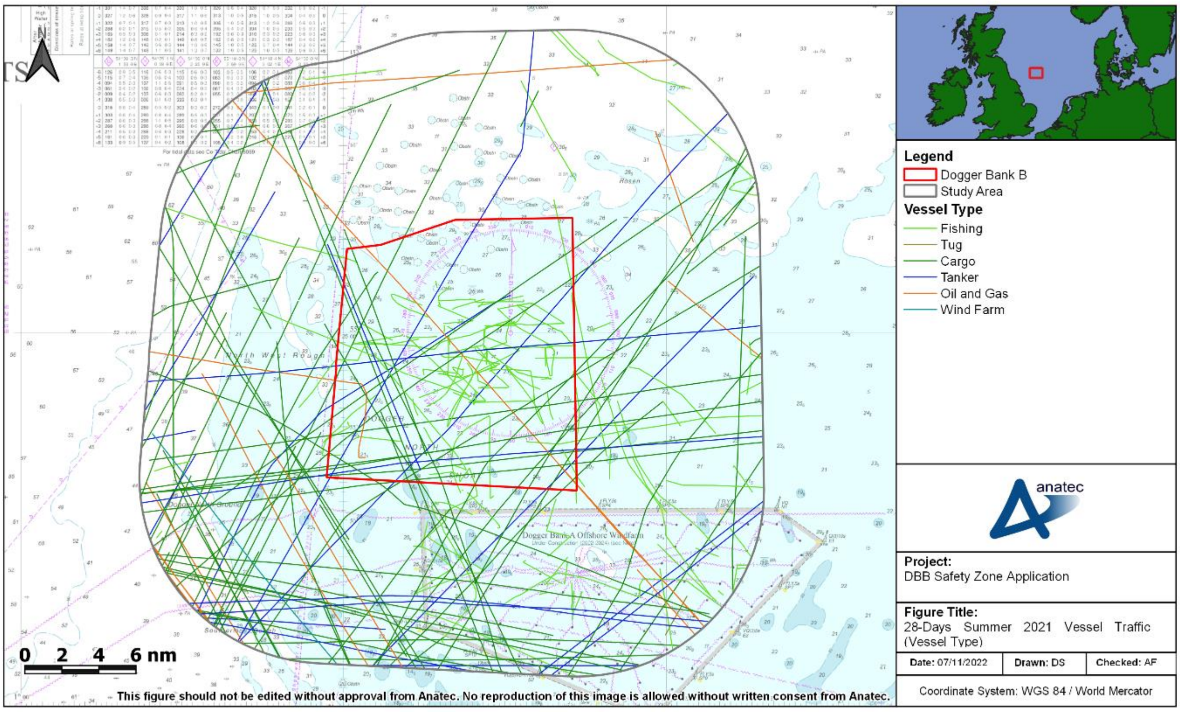

Figure 7.1: 28-Days Summer 2021 Vessel Traffic (Vessel Type)

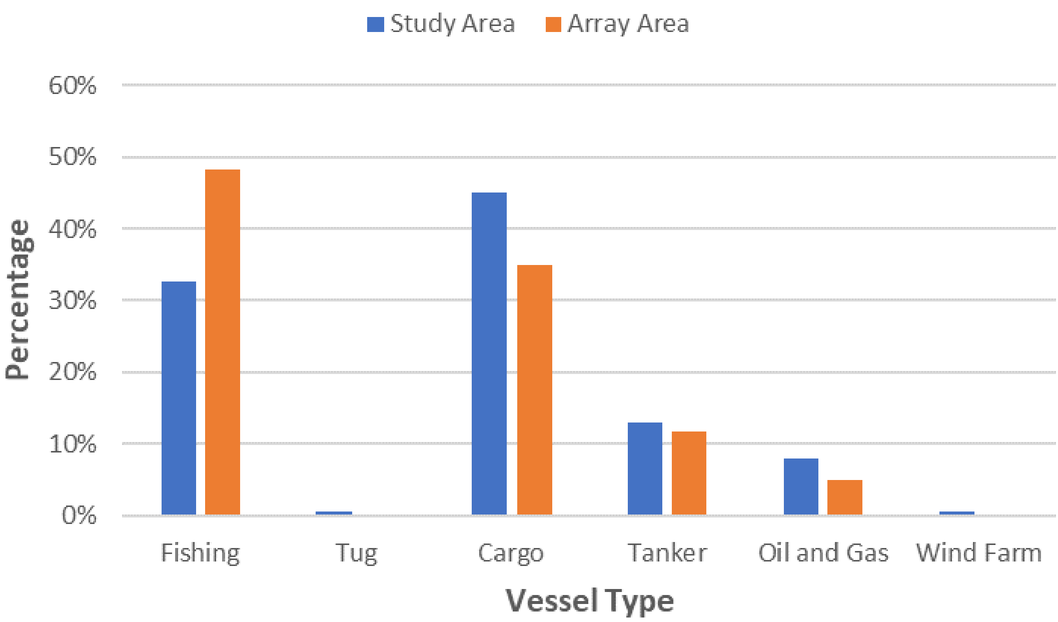

Figure 7.2: Vessel Type Distribution

The main vessel types within the study area during the survey period were cargo vessels (45%), fishing vessels (33%), tankers (13%) and oil and gas support vessels (8%).

The distribution of vessel types intersecting the DBB array site were similar to the study area as a whole, with the main types being fishing vessels (48%), cargo vessels (35%), tankers (12%), and oil and gas vessels (5%).

No passenger vessels were recorded within the study area during the survey period. It is noted that this aligns with Anatec's ShipRoutes database (Anatec, 2021) which indicates no regularly routed passenger vessels would be expected in the study area.

No recreational vessels were recorded within the study area during the survey period, noting that relevant discussion is provided in Section 7.2.7.

7.2.2 *Vessel Count*

The number of unique vessels recorded within the study area during the survey period is presented in Figure 7.3.

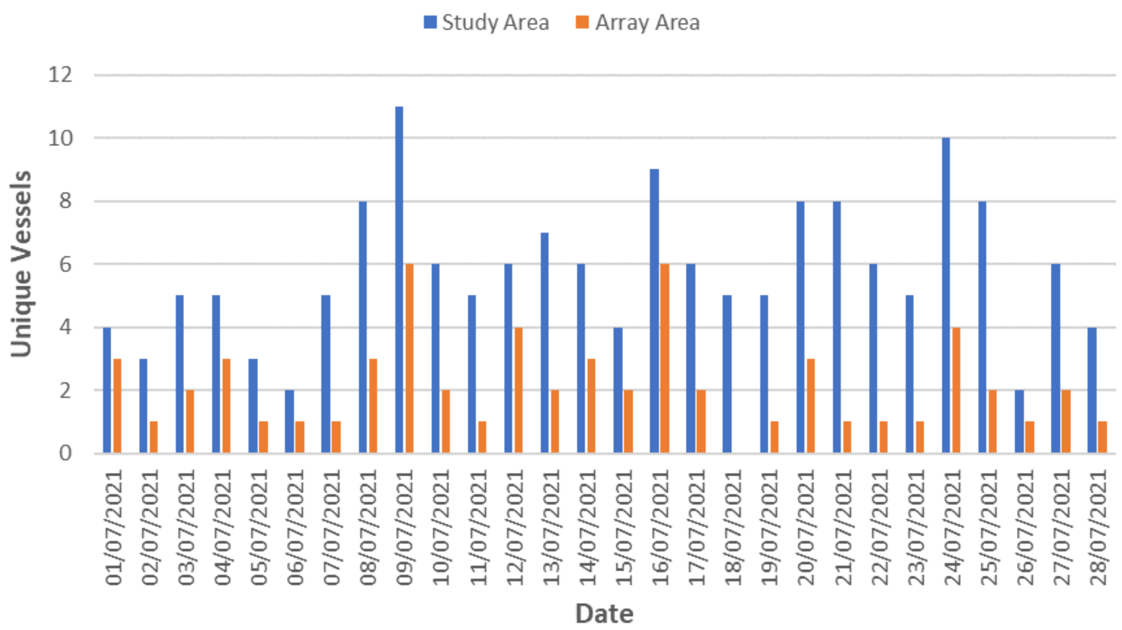

Figure 7.3: Unique Vessel Counts per Day

An average of between five and six unique vessels per day were recorded within the study area during the survey period, of which an average of two per day also intersected the DBB array site during the survey period.

Based on Anatec's ShipRoutes database (Anatec, 2021), an average of between three and four routed commercial vessels per day would be expected to pass through the study area, with between one and two per day expected through the DBB array site. Given that this only accounts for routed traffic, it is considered as broadly correlating with the AIS data.

7.2.3 *Cargo Vessels*

The tracks of cargo vessels recorded within the study area during the survey period are presented in Figure 7.4.

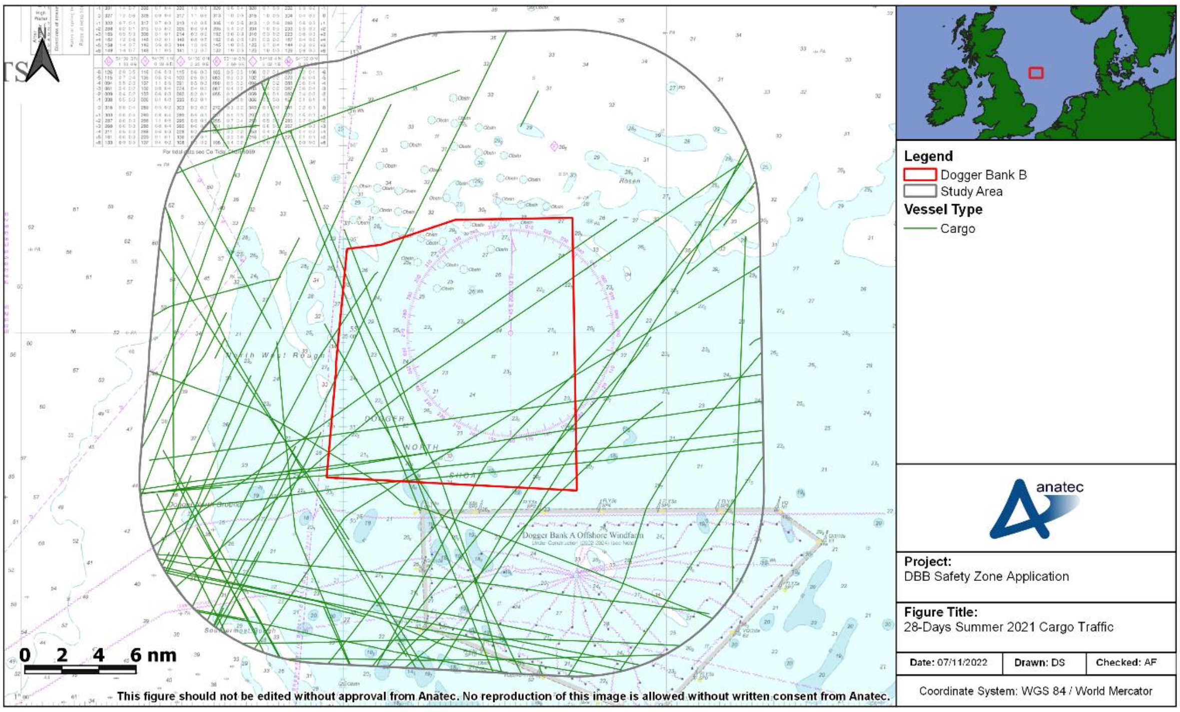

Figure 7.4: 28-Days Summer 2021 Cargo Vessel Traffic

There was an average of two to three cargo vessels per day recorded within the study area during the survey period, with an average of one cargo vessel per day recorded intersecting the DBB array site.

This broadly aligns with Anatec's ShipRoutes database (Anatec, 2021), which indicates an average of two cargo vessels per day through the study area, and one per day through the DBB array site.

7.2.4 *Tankers*

The tracks of tankers recorded within the study area during the survey period are presented in Figure 7.5.

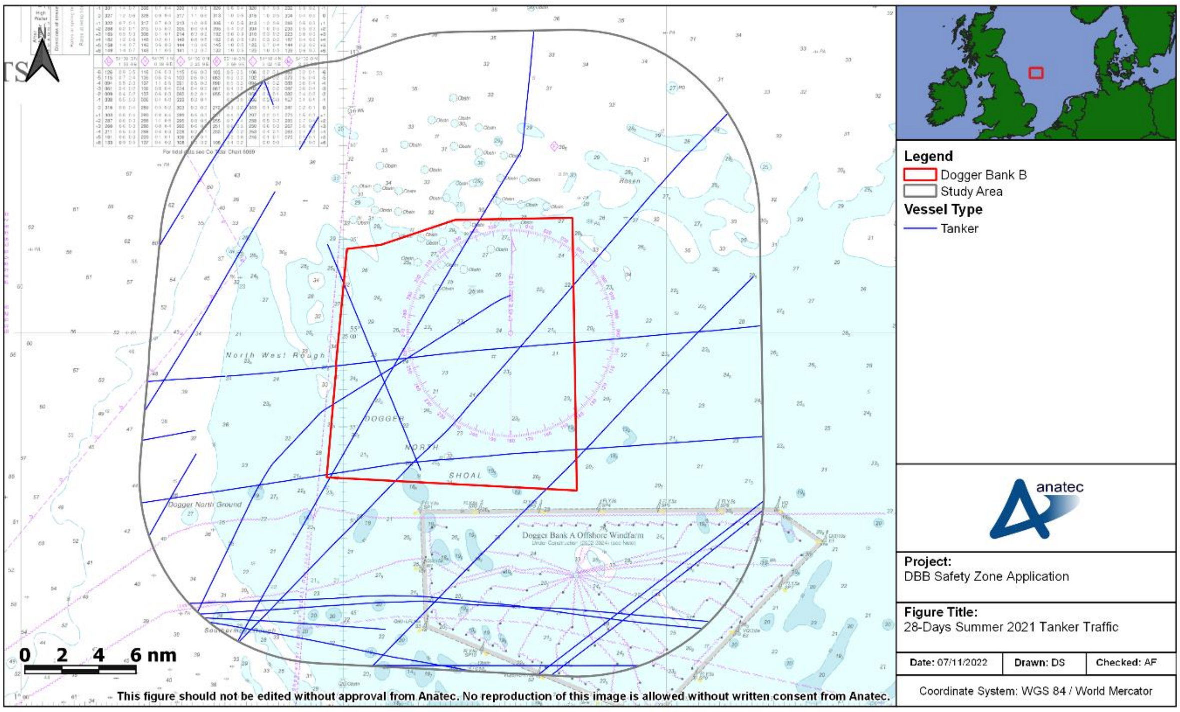

Figure 7.5: 28-Days Summer 2021 Tanker Traffic

There was an average of one tanker per day recorded within the study area during the survey period, with approximately a third of this traffic intersecting the DBB array site.

This broadly aligns with Anatec's ShipRoutes database (Anatec, 2021) which indicates an average of one tanker per day through the study area and limited numbers through the DBB array site itself.

7.2.5 *Oil and Gas Vessels*

The tracks of oil and gas vessels recorded within the study area during the survey period are presented in Figure 7.6.

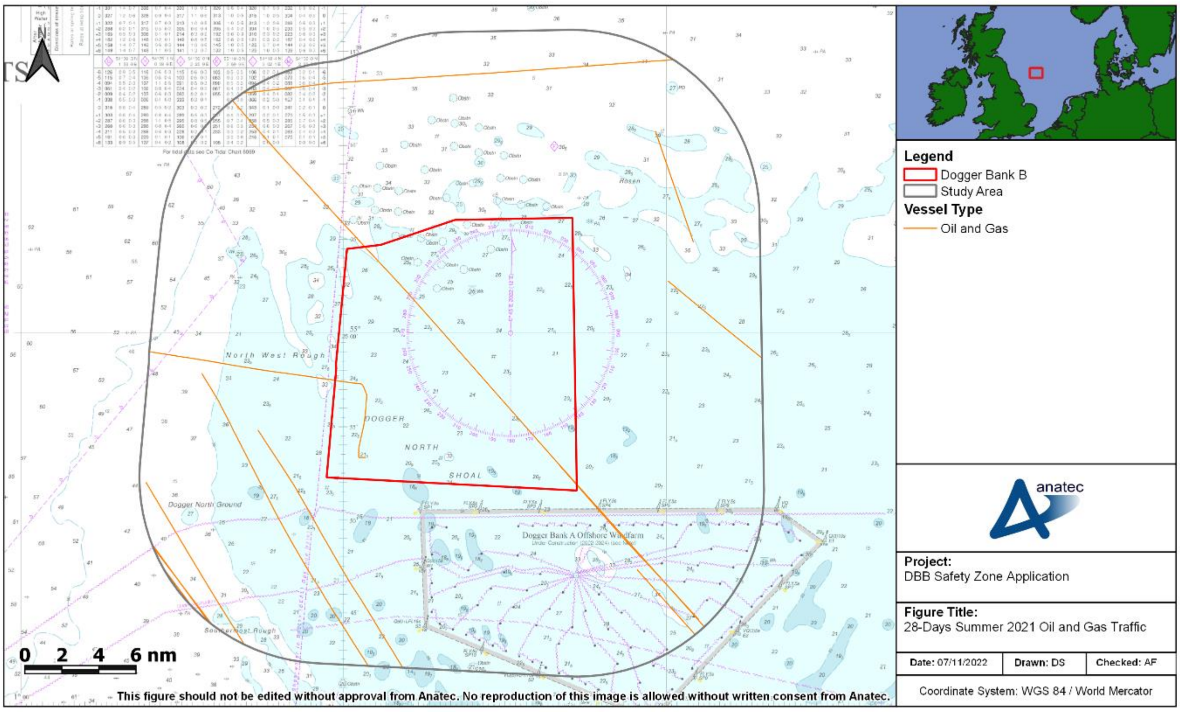

Figure 7.6: 28-Days Summer 2021 Oil and Gas Vessel Traffic

Oil and gas traffic within the study area during the survey period was typically recorded transiting in a northwest to southeast direction. There was an average of one oil and gas vessel every two days recorded within the study area during the survey period, noting the majority of this traffic did not pass through the DBB array site.

Anatec's ShipRoutes database (Anatec, 2021) indicated an average of less than one oil and gas vessel per day in the study area. It should be considered that this represents routed oil and gas traffic only, whereas the AIS is inclusive of all activity.

7.2.6 *Fishing Vessels*

The tracks of fishing vessels recorded within the study area during the survey period are presented in Figure 7.7.

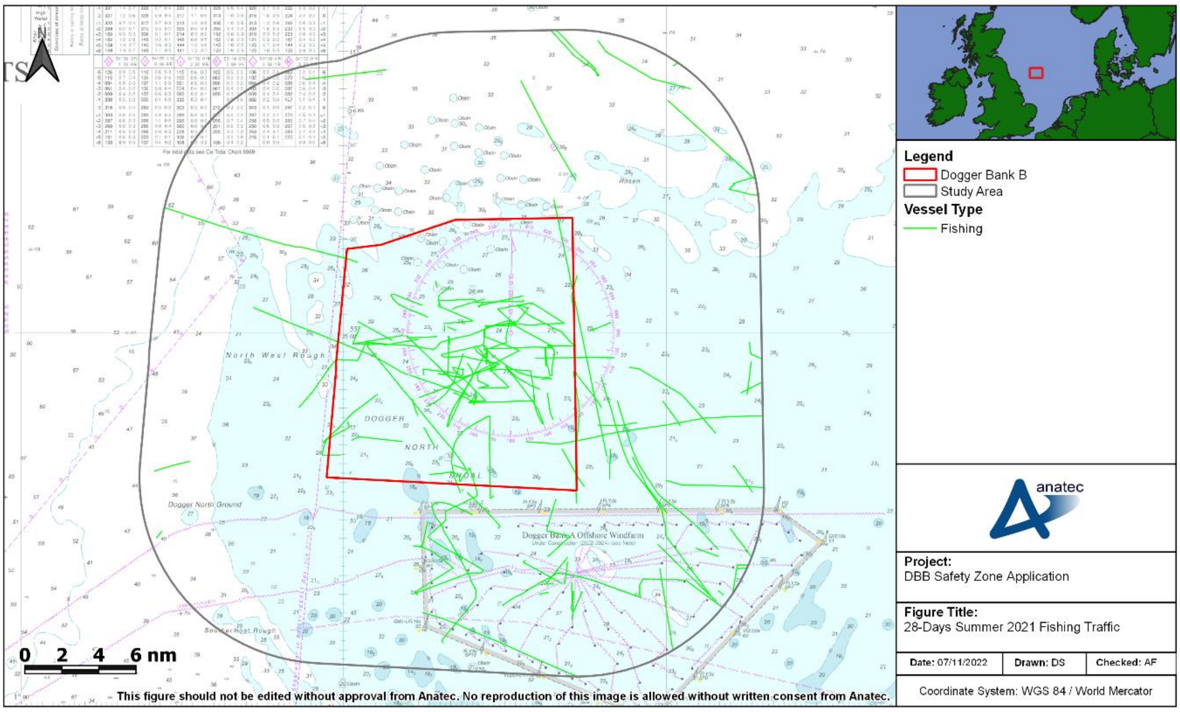

Figure 7.7: 28-Days Summer 2021 Fishing Vessel Traffic

There was an average of two fishing vessels per day recorded within the study area during the survey period, with an average of one fishing vessel per day recorded intersecting the DBB array site. Based on vessel speeds and behaviours this includes active fishing activity (i.e., potential that gear was deployed).

Given the distance offshore, it is expected that the majority of fishing vessels would be in excess of 15m Length Overall (LOA), and hence be required to broadcast via AIS. However, one vessel of less than 15m was recorded via AIS (LOA 14.9m). Review of the Radar-only survey data from the NRA (Anatec, 2013) indicated non AIS fishing vessels were recorded within the study area. However, it should be considered that AIS carriage requirements at the time (2010) were significantly less stringent. Length is not able to be derived from the Radar data unless the vessel was able to be identified visually.

Therefore, based on the available data, for the purposes of this safety zone application it has been assumed that fishing vessels may seek to transit through or fish within the DBB array site. The AIS data is assumed as providing good overall indication of activity, however smaller non AIS vessels may also be present (noting these are not likely to be in significant numbers given the distance offshore).

7.2.7 *Recreational Vessel Activity*

There were no recreational vessels recorded within the study area during the survey period, which is expected due to the distance of the site offshore. However, it is noted that one recreational vessel was recorded via Radar within the non AIS NRA survey (Anatec, 2013).

Given the distance offshore, it is considered unlikely that recreational vessels would regularly transit in or in proximity to the DBB array site and this aligns with the available data. However, for the purposes of the safety zone application is has been assumed that recreational transits may occur, noting these are likely to be from experienced users running between the UK and the continent.

7.2.8 *Anchored Vessels*

Assessment of the information transmitted via AIS and an additional behavioural assessment was undertaken to identify any potential instances of vessel anchoring within the study area. No anchoring activity was identified on this basis, noting this is to be expected given the distance offshore.

8 Safety Zone Overview

For the purpose of clarity, this section provides an indication as to what vessel scenarios are considered as triggering a safety zone during the construction and operational phase of DBB. The list of scenarios presented is not considered as being exhaustive however provides an indication of the types of activities that may require a safety zone.

The activities listed have been identified on the basis that they satisfy the following criteria:

- The activities are considered as being allowed safety zones under the relevant guidance and legislation as listed in Section 1.3; and
- Risk assessment has identified that where safety zones are able to be deployed under the legislative framework, such safety zones are a relevant mitigation measure to bring relevant risks (as per Section 9) to within As Low As Reasonably Practicable (ALARP) parameters.

The identified scenarios are listed below:

- Any construction operation involving a vessel Restricted in Ability to Manoeuvre (RAM) stationed at a structure (within 500m) noting this includes Service Operations Vessel (SOV) operations;
- Any construction or major maintenance operation involving any kind of attachment to a structure (e.g., goods transfer, power cabling); and
- Any construction or major maintenance operation involving a vessel that is required to be anchored to the seabed next to the structure for the purposes of that operation (e.g., heavy lift operations).

It is noted that during the operational phase, WtW operations will not trigger a safety zone under this application. However, the Developer will continue to risk assess including via monitoring of ongoing activities and traffic patterns and may apply for additional safety zones for SOVs at a later date.

9 Justifications for Safety Zones

The application of safety zones was identified as a mitigation measure within the NRA (Anatec, 2013). This section summarises the need for the safety zones based on:

- Marine traffic analysis undertaken for this application as per Section 7;
- Experience of other similar operational or constructing projects; and
- Findings of the NRA.

9.1 Reductions in Collision Risk

Throughout the construction of DBB, various vessels will be within the buoyed construction area engaged in the installation the WTGs, foundations, the OSP, and cables. Given the scale of the components, and the sensitive nature of the associated installation works, the vessels on site will include those that are RAM, with the potential for multiple such vessels to be on site simultaneously.

Vessel numbers during operation are anticipated to be significantly less than during construction. However, there may still be a requirement for RAM vessels, including those engaged in activities that fall under the definition of major maintenance given in the Electricity Regulations 2007 (see Section 5).

The marine traffic data studied indicates that routed cargo vessels and tankers do transit the DBB array site. Based on typical activity observed at other wind farms, it is likely that once the site is marked as a buoyed construction area (see Section 6.1.2), commercial vessels will deviate around the DBB array site, noting that details of DBB including buoyage arrangements will be promulgated in advance of construction to ensure vessels are aware and can passage plan accordingly. However, it should be considered that early on during construction before passing vessels have fully adapted to the site, commercial vessels may still choose to enter the buoyed construction area. The 500m rolling construction safety zones would make it clear to any such vessels areas where sensitive operations are ongoing (i.e., those involving a RAM vessel), and as such which areas should be avoided to reduce any potential collision risk to within ALARP parameters.

Experience of constructing wind farms indicates smaller vessels (e.g., fishing and recreational vessels) are more likely to transit through the buoyed construction area than commercial vessels and may also be more comfortable passing close to sensitive operations. The findings of the marine traffic assessment indicates that fishing and recreational vessels (see Sections 7.2.6 and 7.2.7 respectively) may seek to transit through the DBB array site, noting that recreational transit volumes are likely to be lower than fishing. The 500m rolling construction safety zones are therefore necessary to make it clear to any such vessels the areas where such operations are being undertaken (i.e., those involving a RAM vessel), and as such which areas should be avoided to reduce collision risk to within ALARP parameters.

During operation, it is considered likely that commercial vessels deviations would be firmly established, and as such associated traffic would already be avoiding the structures, noting that based on experience at other operational wind farm projects, such vessels (i.e., large commercial vessels) will continue to utilise the deviated routes even after the construction buoys have been removed. However, smaller vessels may choose to enter into the site (again based on operational experience). It is therefore necessary to protect any major maintenance activities via the proposed 500m safety zones to ensure collision risk to the maintenance vessels is within ALARP parameters.

9.2 Reductions in Allision Risk

The installation of structures within the DBB array site will create an allision risk to passing traffic, particularly during the construction phase when third party vessels may still be unfamiliar with DBB, partial structures will be present, and operational mitigations not yet active (in particular lighting and marking).

As noted in Section 9.1, based on experience at other wind farms, it is likely that during the construction phase the majority of commercial vessels will avoid the site altogether once it is marked as a buoyed construction area. However, it should be considered that such vessels may still transit through during the early stages of construction, in particular where works are not ongoing. Smaller vessels (e.g., fishing and recreation) are more likely to transit the DBB array site during construction than commercial vessels.

Therefore, the implementation of 50m safety zones around any pre-commissioned (including partial) structures would make it clear to passing vessels that the installations represent an allision risk and should be avoided. This will reinforce the need for all vessels to passage plan to take account of DBB. The lack of ongoing construction activity (in the form of construction vessel presence) at such structures may result in third party vessels passing closer than they would to structures where RAM vessels were present, and the 50m safety zones therefore ensure safe passing distances are maintained until the operational phase mitigations (most notably lighting and marking as per Section 6.2) are implemented.

Active safety zones would be monitored and policed as set out in Section 11. The formal approval of the safety zones provides the legislative framework to warn passing third party vessels that entry into active safety zones is prohibited. It should also be considered that details of the safety zones will be promulgated in advance to relevant marine users, and this will increase general awareness of DBB, which will further reduce allision risk.

The use of safety zones will therefore reduce the allision risk to ALARP parameters in combination with the other mitigations implemented.

9.3 Protecting Project Personnel

During the construction phase there will be a significant increase in the total number of persons within the DBB array site (i.e., crew members and wind farm technicians). This includes personnel on RAM vessels which are at particular risk of collision as per Section 9.1, or any vessel engaged in a sensitive operation. There will also be periods where technicians are stationed on the structures themselves, which are at risk of allision as per Section 9.2.

The implementation of mandatory 500m safety zones provides an alert to vessels transiting within the area that a sensitive operation is underway and allows them to passage plan to maintain a safe passing distance for any activity within the DBB array site and as such ensures the safety of the crew and personnel to within ALARP parameters. During the construction phase, in the event that personnel are left on a structure without construction vessel presence, the pre-commissioning 50m safety zones would allow for additional allision protection as per Section 9.2.

9.4 Prevention of Dangerous Behaviour

Feedback from other wind farms has indicated that third party vessels can pass sensitive operations at distances which are of concern to the construction or maintenance vessels engaged in those operations (including SOVs). During any such operations at DBB, the project vessels will be fully compliant with the International Regulations for Preventing Collisions at Sea (COLREGS) (International Maritime Organization (IMO), 1972), including watch keeping requirements.

Experience from these other wind farms shows that COLREGS does not fully provide the required level of mitigation to ensure that the safety of sensitive operations is not impacted by passing vessels. Although COLREGS provides responsibilities for vessels at sea, a clear demarcation of areas to be avoided for the safety of the project vessel, personnel, and third-party vessels and crew due to the risks of the operations occurring is required. By promulgating safety zones both in advance and at the time of operation, vessels can effectively passage plan to ensure they stay clear of any sensitive or dangerous operations, as identified by risk assessment. A 500m safety zone radius is well known as a safe passing distance in the offshore wind industry, and prevents the ambiguity often presented in the wording of COLREGS. For example, Rule 18 states that:

A vessel engaged in fishing when underway shall, so far as possible, keep out of the way of:

i. a vessel not under command (NUC);

ii. a vessel restricted in her ability to manoeuvre (RAM).

"So far as is possible" is not defined, which often leads to confusion. The intention of safety zones is not to over-regulate traffic or prosecute the third-party mariner, but to ensure that those mariners are aware that entering active safety zones could lead to dangerous occurrences.

9.5 Assistance in Passage Planning

As per the International Convention for the Safety of Life at Sea (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 DBB array site while constructing or once operational (where maintenance is underway). This facilitates effective passage planning and removes any ambiguity as to what warrants a safe passing distance (see Section 9.4).

9.6 Reduction in Fishing Gear Snagging

As per Section 7.2.6, fishing vessels do currently transit through and actively fish within (i.e., gear is deployed) the DBB array site.

On this basis it should be considered that any anchor spreads used by construction / maintenance vessels, any partially completed structures, and inter-array cables in proximity to structures all pose a potential snagging risk to deployed fishing gear. The implementation of 500m safety zones around active structures where construction or major maintenance works are ongoing and 50m safety zones around pre-commissioned structures will therefore reduce the likelihood of an associated snagging incident.

Further, as the presence of safety zones shall be broadcast to the fishing community, in addition to more general information surrounding the construction / maintenance works of DBB, the likelihood of a fishing vessel being made aware of the ongoing works increases, and this will further reduce the overall potential for interaction and snagging risk.

9.7 Reduction in Interaction with Anchor Spread

During construction of DBB, it may be necessary for certain vessels to utilise an anchor spread, with the potential for similar activity to also be required during periods of major maintenance. These subsea anchors and lines / chains create potential interaction risk with vessel anchors and fishing gear. This could lead to severe consequences for the construction / maintenance vessel and / or the passing vessel, with the potential for injury or loss of life as a worst case.

The implementation of mandatory 500m safety zones provides a buffer from passing traffic and thus reduces the likelihood of an anchor spread interaction. The safety zones would be monitored and policed as per Section 11, and the formal approval of the safety zones provides DBB with the legislative framework to warn passing vessels that entry into active safety zones is prohibited, ensuring the risk to and from sensitive operations requiring anchor spreads is minimised.

It should be noted that anchor spreads are likely to exceed the 500m radius of the safety zones, however the sections posing most under keel risk to passing vessels will likely be within the 500m confines (i.e., the area where the chains / lines are nearest the surface). Other forms of mitigation (e.g., marker buoys) may be utilised to alert passing vessels to the full extent of any anchor spreads.

9.8 Accounting for Inexperienced Mariners

As detailed in Section 9.8, recreational activity was observed to be limited based on the available data. Given the distance offshore, it is likely that any recreational users in the area would be experienced, however it should be considered that transits from inexperienced mariners, or mariners with few formal qualifications may occur. Furthermore, recreational vessels do not carry as high a standard of navigational equipment as commercial vessels, as there is no requirement for them to do so.

Therefore, there is a need to mitigate against the potential for lack of experience and / or reduced navigational equipment on board recreational vessels. Implementation of mandatory safety zones in conjunction with other embedded mitigation measures (e.g., guard vessel used where identified as necessary, construction site marking and charting) is required.

As previously detailed, if a vessel were identified as infringing or potentially infringing a safety zone (thus becoming at risk of an allision / collision), the monitoring and policing procedures as detailed in Section 11 would be implemented. Any infringements to these safety zones shall be noted and recorded where possible, and efforts would be made to contact the vessel using standard marine procedures, alerting it to the safety zone infringement. Furthermore, on site vessels would be contactable (via Very High Frequency (VHF)) and be able to provide information to recreational vessels navigating in proximity to the DBB array site

Therefore, the implementation of safety zones in tandem with other relevant mitigation measures shall bring the risk to inexperienced mariners to within ALARP parameters.

9.9 Accounting for Unforeseen Risk

Throughout the construction phase and during periods of major maintenance, there is the potential for a number of events to occur which may result in previously unforeseen risk, for example:

- Fire / Explosion on board construction / maintenance vessel;
- Machinery failure (including steering) on board construction / maintenance vessel;
- Cargo (e.g. wind turbine components) shifting on board construction / maintenance vessel;
- Structural failure of wind farm component;
- Dropped object;
- Accidental interaction with unexploded ordnance / wreck; or
- Accident associated with adverse weather.

If any of these incidents were to occur during the construction phase or during periods of major maintenance, there is potential for loss of life and serious environmental damage. It is therefore important to sterilise the immediate working area of existing marine traffic. The presence of active safety zones allows third party traffic to passage plan and pass at a safe distance, and therefore reduces the risk of a third-party vessel becoming involved in any of the aforementioned unforeseen risk scenarios.

It is noted that safety zones may not directly mitigate against the listed scenarios, however they are likely to greatly reduce the overall severity of consequence to third party users should such incidents occur.

The safety zones will be implemented in tandem with other mitigation measures (e.g. dedicated onsite vessel(s), construction site marking and charting) and therefore bringing the risk to within ALARP parameters.

10 Impact of Safety Zones

This section considers the potential impact of safety zones on relevant traffic, which has been identified based on the marine traffic assessment undertaken (see Section 7).

10.1 Commercial Vessel Routeing (Including Commercial Ferries)

Based on experience of other wind farms, commercial vessels will typically avoid wind farm sites once construction is underway (i.e., from the point at which the site is marked as a buoyed construction area). This may involve deviations of baseline vessel routeing whereby the vessels will passage plan to pass around the buoyed construction area.

As can be seen in Sections 7.2.3 and 7.2.4, cargo vessel and tanker routes currently intersect the DBB array site based on the data studied, and as such it is anticipated that these vessels will deviate. Based on operational experience these deviations will be around the buoyed construction area i.e., they will occur irrespective of active safety zones. Similarly, experience shows that once wind farms become operational, commercial vessels will generally continue to avoid the commissioned structures even after construction buoyage is removed, and consequently any major maintenance works and associated safety zones.

It is noted that early on in the construction phase, some commercial vessels may still enter into the buoyed construction area, however this would likely be into areas where construction works were not yet commenced and hence avoiding active safety zones.

On this basis, the safety zones are not considered as having any additional impact on commercial vessels over that of the structures themselves.

10.2 Fishing Vessels

As per Section 7.2.6, based on the available marine traffic data and general site understanding, fishing vessels currently transit and actively fish (i.e., deploy gear) within the DBB array site. As such, fishing vessels may still seek to transit and / or fish within the DBB array site during the construction and operational phases.

As per Section 2.1, WTG spacing in the internal grid is 3,200m, and therefore even with the implementation of 500m safety zones there is still considered to be sufficient space internally to accommodate fishing vessels. WTG spacing on the periphery is 1,400m, which again leaves sufficient space for fishing vessels to enter into the DBB array site and navigate internally, noting the decision as to whether to transit through and / or actively fish would be at the discretion of individual vessel masters.

Further, during the construction phase the 500m safety zones would only apply where construction works were ongoing (i.e., a construction vessel was present), and as such affected areas will be limited in spatial terms when considered against the DBB array site as a whole. The 50m pre-commissioning safety zones are considered unlikely to have any notable impact given the minimum spacing of 1,400m.

During the operational phase, safety zones would only be active during periods of major maintenance and such will only be present for limited periods of time, and will be lower in terms of frequency than during the construction phase.

It should also be considered that as per Section 4 and 5, promulgation of information will be undertaken in advance of during construction and major maintenance activities including in relation to associated safety zones. This will include via the Kingfisher Bulletin, the FLO and the project FIRs.

Therefore, any impact from safety zones on fishing vessels is anticipated to be minimal.

10.3 Recreational Vessels

As per Section 7.2.7, the available data indicates that recreational activity within the DBB array site is low in volume. However, transits may still occur noting these are likely to be from experienced recreational users. The decision as to whether to transit through would be at the discretion of each individual vessel.

Regardless, minimum periphery spacing of 1,400m and internal grid spacing of 3,200m is considered sufficient to facilitate recreational vessel transits including with the implementation of 50m pre-commissioning safety zones and 500m construction / major maintenance safety zones. This, in addition to low expected numbers of recreational vessels indicates that any impact from safety zones on recreational users is likely to be minimal.

10.4 Anchored Vessels

No vessels were identified at anchor within the available marine traffic data, which would be expected given the location of the DBB array site. Regardless, it is considered unlikely that a vessel would deliberately choose to anchor within the site once construction was underway or operational (except in an emergency).

On this basis any impact from safety zones on anchoring activity is likely to be minimal.

11 Monitoring and Policing

11.1 Monitoring

Typically, safety zones are most effectively monitored through use of a guard vessel, or other mobile vessel on-site which is not critical to ongoing construction or operational activities. However, such a vessel may not always be available (e.g., during any periods of adverse weather). Therefore, it is necessary to have monitoring means and procedures in place to cover all eventualities in terms of vessel presence on-site. On this basis, the following approach is to be undertaken with regards to monitoring of safety zones:

- Where available / feasible, a guard vessel or other dedicated monitoring vessel will be designated primary responsibility for monitoring active safety zones. It is noted that the vessel may also undertake other work scopes, but a dedicated watchkeeper must be available on the bridge to undertake visual, Radar, and AIS monitoring.
- Any installation vessels operating within a safety zone will also be required to maintain an independent bridge watch during operations to include the use of visual lookout and Radar and AIS monitoring. The designated watchkeeper must not be engaged in the work routines, and must be dedicated to watchkeeping.
- The Marine Coordination Centre will maintain a 24hr AIS surveillance of the construction site using the Vissim Vessel Traffic Monitoring System (VTMS). During any periods where there are no vessels on-site this will be the primary monitoring means.

Where a vessel is monitoring the safety zone (via AIS, Radar, and visual watch), VHF communications shall be utilised to make early contact with any third-party vessels in the area identified as approaching the site. Such third party vessels will be alerted to the presence of any currently active (or soon to be active) safety zones. Any vessels observed to enter into a safety zone (or pass in close proximity) will be contacted again by the monitoring vessel (using standard marine procedures), and informed that they have or are close to infringing the safety zone. The vessel will be instructed to increase their minimum passing distance from the safety zone and to avoid or refrain from entering them in the future.

Where no monitoring vessel is available, the DBB array site will be monitored via the VTMS to identify (where practicable) any vessels approaching or infringing the active safety zones. Where feasible, contact will be made with the associated vessels at the earliest opportunity, and details of any incidents will be logged, with any evidence retained for submission to BEIS where appropriate as discussed in Section 11.2.

It is noted that direct navigational advice will not be given to any vessel. Standard marine terminology will be used to warn any relevant vessels in instances where action to avoid active safety zone is required.

11.2 Policing

The details of any vessels which consistently ignore the warnings issued by the designated monitoring vessel (see Section 11.1) with regards to safety zones will be noted and reported to BEIS as the licensing authority noting that the MCA will also be notified. Details of any incidents where a vessel is considered to be causing a potential danger to other vessels and / or assets within the area will also be logged and provided. Reporting will include any supporting evidence collected (e.g., AIS recording, photographs or video, witness statements).

Where infringements occur when no monitoring vessel was available, reports may still be made to BEIS where the associated activity was considered dangerous based on the available evidence, or where the infringement was made by a vessel which has previously infringed a safety zone.

BEIS will then decide what action, in consultation with other stakeholders notably the MCA, is required. Prosecutions are only likely to be sought where infringements are deliberate and malicious, causing damage, nuisance or endangering lives. Due regard will be given to the relevant exceptions to infringement detailed in the legislation (see Section 1.3), in particular prosecution would not be sought in the event of a third-party vessel entering into a safety zone to fulfil obligations under SOLAS (IMO, 1974) to render assistance to persons in danger.

11.3 Existing Experience

It is noted that due to the development of other existing wind farms including large scale projects throughout the North Sea area (e.g., Hornsea One and Two, Triton Knoll, Race Bank), the majority of regular operators will be familiar with the implementation and operation of construction / major maintenance safety zones, and the associated procedures around how they are monitored and policed. In particular, it is noted that construction phase safety zones have been implemented at DBA since it began construction in 2022.

12 Summary

This document provides a safety case which demonstrates the need for safety zones to be implemented at DBB during the construction phase, and also in the operational phase during periods of major maintenance. Based on the safety case which is supported by the NRA (Anatec, 2013), the following safety zones are being applied for to ensure relevant risks are ALARP:

- ‘Rolling’ 500m safety zone established around each wind farm structure (WTG or OSP), and/or their foundations, whilst construction is being performed, as indicated by the presence of construction vessels.
- Pre-commissioning 50m safety zones established around any wind farm structure (WTG or OSP) which is either partially completed or constructed but not yet commissioned where a construction vessel is not present.
- 500m safety zones around all ‘major maintenance’ being undertaken around a wind farm structure (WTG or OSP), as denoted by the presence of a major maintenance vessel.

The findings of the safety case have shown the safety zones are necessary to bring the following potential risks to within ALARP parameters:

- Collision risk between DBB vessel and third party vessel;
- Allision risk between vessels and WTGs / OSPs;
- Interaction with the anchor spread of construction / maintenance vessels;
- Risks to persons involved in the construction / maintenance process; and
- Fishing gear snagging.

The safety zones will also assist third party vessels in passage planning, provide additional mitigation to account for inexperienced mariners, and reduce consequences in the event of an unforeseen incident. On this basis the implementation of mandatory safety zones in conjunction with other relevant mitigation measures will ensure that the risks to passing traffic, construction vessels, crews and personnel are within ALARP parameters.

Assessment of up to date marine traffic data and consideration of marine traffic assessment within the NRA (Anatec, 2013) shows that no significant impacts on third party vessels are expected from the safety zones. On this basis they are considered a proportionate mitigation measure noting the benefit they bring in terms of risk reduction.

The safety zones shall primarily be monitored for infringements by a guard vessel or other nominated vessel where available / feasible, noting site monitoring via the VTMS will also be undertaken from the Marine Coordination Centre including when no vessels are on-site. The primary response will be to warn passing traffic of the ongoing works and any active safety zones, and to alert any vessels where an infringement may occur or has occurred.

Details of all infringements and / or near misses shall be recorded. Where necessary (i.e., where a vessel has infringed safety zones on multiple occasions or where a vessel has behaved dangerously), details and relevant evidence shall be passed to BEIS as the licensing authority and the MCA will also be notified.

13 References

Anatec, 2013. Navigational Risk Assessment – Dogger Bank Creyke Beck A and B. Aberdeen: Anatec

BEIS, 2011. Guidance Notes: Applying for Safety Zones around Offshore Renewable Energy Installations. London: BEIS

IALA, 2013. O-139 the Marking of Man-Made Offshore Structures. Edition 2. Saint Germaine en Laye, France: IALA.

Appendix 1 Structure Coordinates

ID	Structure	Long	Lat
A02	Turbine	001° 31.220' E	54° 53.654' N
B02	Turbine	001° 34.217' E	54° 53.841' N
B03	Turbine	001° 32.886' E	54° 55.400' N
B04	Turbine	001° 31.554' E	54° 56.959' N
C02	Turbine	001° 37.214' E	54° 54.027' N
C03	Turbine	001° 35.885' E	54° 55.587' N
C04	Turbine	001° 34.555' E	54° 57.146' N
C05	Turbine	001° 33.222' E	54° 58.705' N
D02	Turbine	001° 40.212' E	54° 54.212' N
D03	Turbine	001° 38.885' E	54° 55.772' N
D04	Turbine	001° 37.556' E	54° 57.332' N
D05	Turbine	001° 36.226' E	54° 58.892' N
D06	Turbine	001° 34.893' E	55° 0.451' N
D07	Turbine	001° 33.559' E	55° 2.010' N
E02	Turbine	001° 43.211' E	54° 54.395' N
E03	Turbine	001° 41.885' E	54° 55.956' N
E04	Turbine	001° 40.558' E	54° 57.517' N
E06	Turbine	001° 37.899' E	55° 0.637' N
E07	Turbine	001° 36.567' E	55° 2.196' N
F01	Turbine	001° 47.531' E	54° 53.016' N
F02	Turbine	001° 46.209' E	54° 54.578' N
F03	Turbine	001° 44.886' E	54° 56.139' N
F04	Turbine	001° 43.561' E	54° 57.700' N
F05	Turbine	001° 42.234' E	54° 59.261' N
F06	Turbine	001° 40.905' E	55° 0.821' N
F07	Turbine	001° 39.575' E	55° 2.381' N
F08	Turbine	001° 38.243' E	55° 3.941' N
G02	Turbine	001° 49.209' E	54° 54.758' N
G03	Turbine	001° 47.887' E	54° 56.320' N
G04	Turbine	001° 46.564' E	54° 57.882' N
G05	Turbine	001° 45.239' E	54° 59.443' N
G06	Spare	001° 43.912’ E	55° 1.004’ N
G07	Turbine	001° 42.583' E	55° 2.565' N
G08	Turbine	001° 41.253' E	55° 4.126' N
H05	Turbine	001° 48.244' E	54° 59.625' N
H06	Turbine	001° 46.919' E	55° 1.186' N
H07	Turbine	001° 45.592' E	55° 2.748' N
H08	Turbine	001° 44.264' E	55° 4.309' N

ID	Structure	Long	Lat
J07	Turbine	001° 48.602' E	55° 2.929' N
J08	Turbine	001° 47.275' E	55° 4.490' N
OSP	OSP	001° 39.229' E	54° 59.077' N
P01	Turbine	001° 48.554' E	55° 5.968' N
P02	Turbine	001° 51.068' E	55° 5.992' N
P03	Turbine	001° 51.090' E	55° 5.221' N
P04	Turbine	001° 51.112' E	55° 4.450' N
P05	Spare	001° 51.134’ E	55° 3.680’ N
P06	Turbine	001° 51.156' E	55° 2.909' N
P07	Turbine	001° 51.178' E	55° 2.138' N
P08	Turbine	001° 51.200' E	55° 1.367' N
P09	Spare	001° 51.222’ E	55° 0.596’ N
P10	Turbine	001° 51.244' E	54° 59.825' N
P11	Turbine	001° 51.266' E	54° 59.054' N
P12	Turbine	001° 51.288' E	54° 58.283' N
P13	Turbine	001° 51.310' E	54° 57.513' N
P14	Turbine	001° 51.332' E	54° 56.742' N
P15	Turbine	001° 51.354' E	54° 55.971' N
P16	Turbine	001° 51.376' E	54° 55.200' N
P17	Turbine	001° 51.397' E	54° 54.429' N
P18	Turbine	001° 51.419' E	54° 53.658' N
P19	Turbine	001° 51.441' E	54° 52.887' N
P20	Turbine	001° 51.463' E	54° 52.116' N
P21	Turbine	001° 50.302' E	54° 51.734' N
P22	Turbine	001° 48.968' E	54° 51.776' N
P23	Turbine	001° 47.633' E	54° 51.818' N
P24	Turbine	001° 46.298' E	54° 51.859' N
P25	Turbine	001° 44.964' E	54° 51.901' N
P26	Turbine	001° 43.629' E	54° 51.942' N
P27	Turbine	001° 42.294' E	54° 51.983' N
P28	Turbine	001° 40.959' E	54° 52.023' N
P29	Turbine	001° 39.624' E	54° 52.064' N
P30	Turbine	001° 38.289' E	54° 52.104' N
P31	Turbine	001° 36.954' E	54° 52.144' N
P32	Turbine	001° 35.619' E	54° 52.184' N
P33	Turbine	001° 34.284' E	54° 52.223' N
P34	Turbine	001° 32.949' E	54° 52.262' N
P35	Turbine	001° 31.614' E	54° 52.301' N
P36	Turbine	001° 30.279' E	54° 52.340' N
P37	Turbine	001° 28.943' E	54° 52.378' N

ID	Structure	Long	Lat
P38	Turbine	001° 28.804' E	54° 53.145' N
P39	Turbine	001° 28.922' E	54° 53.913' N
P40	Turbine	001° 29.040' E	54° 54.681' N
P41	Turbine	001° 29.158' E	54° 55.449' N
P42	Turbine	001° 29.275' E	54° 56.217' N
P43	Turbine	001° 29.393' E	54° 56.985' N
P44	Turbine	001° 29.511' E	54° 57.753' N
P45	Turbine	001° 29.571' E	54° 58.523' N
P46	Turbine	001° 29.699' E	54° 59.290' N
P47	Turbine	001° 29.827' E	55° 0.058' N
P48	Turbine	001° 29.956' E	55° 0.825' N
P49	Turbine	001° 30.084' E	55° 1.593' N
P50	Turbine	001° 30.212' E	55° 2.360' N
P51	Turbine	001° 30.341' E	55° 3.127' N
P52	Turbine	001° 30.469' E	55° 3.895' N
P53	Turbine	001° 31.464' E	55° 4.413' N
P54	Turbine	001° 32.798' E	55° 4.505' N
P55	Turbine	001° 34.111' E	55° 4.669' N
P56	Turbine	001° 35.385' E	55° 4.914' N
P57	Turbine	001° 36.659' E	55° 5.160' N
P58	Spare	001° 37.933' E	55° 5.405' N
P59	Spare	001° 39.207' E	55° 5.650' N
P60	Turbine	001° 40.488' E	55° 5.885' N
P61	Spare	001° 41.832' E	55° 5.900' N
P62	Spare	001° 43.176' E	55° 5.914' N
P63	Spare	001° 44.520' E	55° 5.928' N
P64	Spare	001° 45.865' E	55° 5.941' N
P65	Spare	001° 47.209' E	55° 5.955' N