RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

Environmental Statement

Volume 7

Chapter 15 – Aviation and Radar

June 2024

Application Reference: 7.15

APFP Regulation: 5(2)(a)

Revision: 01

Unrestricted

Company:	**RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited**	Asset:	**Development**
Project:	**Dogger Bank South Offshore Wind Farms**	Sub Project/Package:	**Consents**
Document Title or Description:	Environmental Statement– Chapter 15 – Aviation and Radar		
Document Number:	004300156-01	Contractor Reference Number:	PC2340-RHD-OF-ZZ-RP-Z-0098

Rev No.	Date	Status/Reason for Issue	Author	Checked by	Approved by
01	June 2024	Final for DCO Application	Cyrrus	RWE	RWE

Contents

Tables

Volume 7 – Figures

Figure 15-1 Airports and Radars Within the Study Area

Figure 15-2 Existing Airspace Environment

Figure 15-3 HMRIs and Oil and Gas Platforms in the Vicinity of the Projects' Array Areas

Volume 7 – Appendices

Appendix 15-1 Aviation and Radar Consultation Responses

Appendix 15-2 Airspace Analysis and Radar Modelling

Appendix 15-3 Helicopter Access Report

Glossary

Term	Definition
Air Navigation Service Provider (ANSP)	A public or private entity managing air traffic on behalf of a company, region or country. NATS is the main ANSP in the UK.
Array Areas	The DBS East and DBS West offshore Array Areas, where the wind turbines, offshore platforms and array cables would be located. The Array Areas do not include the Offshore Export Cable Corridor or the Inter-Platform Cable Corridor within which no wind turbines are proposed. Each area is referred to separately as an Array Area.
Collector Platforms (CPs)	Receive the AC power generated by the wind turbines through the array cables, collect it and transform the voltage for onward transmission to the Offshore Converter Platforms (OCPs).
Concurrent Scenario	A potential construction scenario for the Projects where DBS East and DBS West are both constructed at the same time.
Controlled airspace	Defined airspace within which pilots must follow Air Traffic Control instructions implicitly. In the UK, Classes A, C, D and E are areas of controlled airspace.
Cumulative effects	The combined effect of the Projects in combination with the effects of a number of different (defined cumulative) schemes, on the same single receptor / resource.
Cumulative Effects Assessment (CEA)	The assessment of the combined effect of the Projects in combination with the effects of a number of different (defined cumulative) schemes, on the same single receptor/resource.
Cumulative Impact	The combined impact of the Projects in combination with the effects of a number of different (defined cumulative) schemes, on the same single receptor / resource.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Project (NSIP).
Development Scenario	Description of how the DBS East and / or DBS West Projects would be constructed either in isolation, sequentially or concurrently.

Term	Definition
Dogger Bank South (DBS) Offshore Wind Farms	The collective name for the two Projects, DBS East and DBS West.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the value, or sensitivity, of the receptor or resource in accordance with defined significance criteria.rm used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the value, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Electrical Switching Platform (ESP)	The Electrical Switching Platform (ESP), if required would be located either within one of the Array Areas (alongside an Offshore Converter Platform (OCP)) or the Export Cable Platform Search Area.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Statement (ES).
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the Environmental Impact Assessment (EIA) and Habitats Regulations Assessment (HRA) for certain topics.
Expert Topic Group (ETG)	A forum for targeted engagement with regulators and interested stakeholders through the EPP.
Flight Information Region (FIR)	Airspace managed by a controlling authority with responsibility for ensuring air traffic services are provided to aircraft flying within it.
Flight Level (FL)	An aircraft altitude expressed in hundreds of feet at a standard sea level pressure datum of 1013.25 hectopascals.

Term	Definition
In Isolation Scenario	A potential construction scenario for one Project which includes either the DBS East or DBS West array, associated offshore and onshore cabling and only the eastern Onshore Converter Station within the Onshore Substation Zone and only the northern route of the onward cable route to the proposed Birkhill Wood National Grid Substation.
Instrument Flight Rules (IFR)	IFR are rules which allow properly equipped aircraft to be flown under Instrument Meteorological Conditions (IMC).
Instrument Meteorological Conditions (IMC)	IMC are meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minima specified for Visual Meteorological Conditions (VMC).
Offshore Converter Platforms (OCPs)	The OCPs are fixed structures located within the Array Areas that collect the AC power generated by the wind turbines and convert the power to DC, before transmission through the Offshore Export Cables to the Project's Onshore Grid Connection Points.
Offshore Development Area	The Offshore Development Area for ES encompasses both the DBS East and West Array Areas, the Inter-Platform Cable Corridor, the Offshore Export Cable Corridor, plus the associated Construction Buffer Zones.
Offshore Export Cable Corridor	This is the area which will contain the offshore export cables (and potentially the ESP) between the Offshore Converter Platforms and Transition Joint Bays at the landfall.
Offshore Export Cables	The cables which would bring electricity from the offshore platforms to the Transition Joint Bays (TJBs).
Primary Surveillance Radar (PSR)	A radar system that measures the bearing and distance of targets using the detected reflections of radio signals.
Projects Design (or Rochdale) Envelope	A concept that ensures the EIA is based on assessing the realistic worst-case scenario where flexibility or a range of options is sought as part of the consent application.
Scoping opinion	The report adopted by the Planning Inspectorate on behalf of the Secretary of State.

Term	Definition
Scoping report	The report that was produced in order to request a Scoping Opinion from the Secretary of State.
Secondary Surveillance Radar (SSR)	A radar system that transmits interrogation pulses and receives transmitted responses from suitably equipped targets.
Sequential Scenario	A potential construction scenario for the Projects where DBS East and DBS West are constructed with a lag between the commencement of construction activities. Either Project could be built first.
The Applicants	The Applicants for the Projects are RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited. The Applicants are themselves jointly owned by the RWE Group of companies (51% stake) and Masdar (49% stake).
The Projects	DBS East and DBS West (collectively referred to as the Dogger Bank South Offshore Wind Farms).
Uncontrolled airspace	Defined airspace in which Air Traffic Control does not exercise exclusive authority but may provide basic information services to aircraft in radio contact. In the UK, Class G is uncontrolled airspace.
Visual Flight Rules (VFR)	VFR are the rules that govern the operation of aircraft in Visual Meteorological Conditions (VMC), conditions in which flight solely by visual reference is possible.
Visual Meteorological Conditions (VMC)	VMC are the meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima.
Wind turbine	Power generating device that is driven by the kinetic energy of the wind.

Acronyms

Term	Definition
AARA	Air-to-Air Refuelling Area
AD	Air Defence
AD&OW	Air Defence and Offshore Wind
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Service
amsl	Above mean sea level
ANO	Air Navigation Order
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATS	Air Traffic Service
ATSOCAS	Air Traffic Services Outside Controlled Airspace
BEIS	Department for Business, Energy and Industrial Strategy
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
cd	Candela
CEA	Cumulative Effects Assessment
CNS	Communications, Navigation and Surveillance
DA	Danger Area
DASA	Defence and Security Accelerator

Term	Definition
DBS	Dogger Bank South
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DESNZ	Department for Energy Security and Net Zero
DGC	Defence Geographic Centre
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ERCoP	Emergency Response and Cooperation Plan
ES	Environmental Statement
ESP	Electrical Switching Platform
FIR	Flight Information Region
FL	Flight Level
ft	Feet
GASCo	General Aviation Safety Council
HAT	Highest Astronomical Tide
HMRI	Helicopter Main Routing Indicator
HTZ	Helicopter Traffic Zone
HVAC	High-Voltage Alternating Current
HVDC	High-Voltage Direct Current

Term	Definition
ICAO	International Civil Aviation Organisation
IFP	Instrument Flight Procedure
IFR	Instrument Flight Rules
ILT	Inspectie Leefomgeving en Transport
IMC	Instrument Meteorological Conditions
IPMP	In-Principle Monitoring Plan
km	Kilometre
LARS	Lower Airspace Radar Service
LAT	Lowest Astronomical Tide
LMP	Lighting Management Plan
m	Metre
MAA	Military Aviation Authority
MCA	Maritime and Coastguard Agency
MDA	Managed Danger Area
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MOD	Ministry of Defence
NERL	NATS (En Route) plc
nm	Nautical miles
NOTAM	Notice to Airmen

Term	Definition
NPS	National Policy Statement
NSL	NATS (Services) Limited
OCP	Offshore Converter Platform
OREI	Offshore Renewable Energy Installation
ORS	Official Record Series
PEIR	Preliminary Environmental Information Report
PEXA	Practice and Exercise Area
PSR	Primary Surveillance Radar
RAF	Royal Air Force
RRH	Remote Radar Head
RLoS	Radar Line of Sight
SAR	Search and Rescue
SARPs	Standards and Recommended Practices
SMS	Safety Management System
SSR	Secondary Surveillance Radar
TRA	Temporary Reserved Area
UK	United Kingdom
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

15 Aviation and Radar

15.1 Introduction

1. This chapter of the Environmental Statement (ES) considers the likely significant effects of the Projects on aviation and radar, including the aviation interests of the United Kingdom (UK) Civil Aviation Authority (CAA), Ministry of Defence (MOD), regional airports, local aerodromes, NATS (that currently comprises NATS (En Route) plc (NERL) and NATS (Services) Limited (NSL)) and other UK aviation stakeholders. The chapter provides an overview of the existing environment for the proposed Offshore Development Area, followed by an assessment of likely significant effects for the construction, operation, and decommissioning phases of the Projects.

2. The assessment should be read in conjunction with the following linked chapters in **Volume 7**:

   - **Chapter 14 Shipping and Navigation (application ref: 7.14)** (due to marine activities associated with Search and Rescue (SAR) operations);
   - **Chapter 16 Infrastructure and Other Users (application ref: 7.16)** (which considers military activities and oil and gas operations); and
   - **Chapter 23 Seascape, Landscape and Visual Impact (application ref: 7.23)** (due to the effect of aviation lighting on visual impact).

3. Additional information to support the aviation and radar assessment is included in **Volume 7**:

   - **Appendix 15-2 Airspace Analysis and Radar Modelling (application ref: 7.15.15.2)**; and
   - **Appendix 15-3 Helicopter Access Report (application ref: 7.15.15.3)**.

4. **Volume 7, Appendix 15-2 (application ref: 7.15.15.2)** identifies the Primary Surveillance Radars (PSRs) liable to detect the Dogger Bank South (DBS) wind turbines and gives details of the Radar Line of Sight (RLoS) analyses. It also sets out a detailed analysis of the airspace occupied by the DBS East and DBS West Array Areas and summarises the effects that the Projects could have on aviation activities in the vicinity.

5. **Volume 7, Appendix 15-3 (application ref: 7.15.15.3)** assesses the impact that the Projects would have on adjacent oil and gas infrastructure by identifying the baseline helicopter access and then any changes to the access with the Projects constructed.

15.2 Consultation

6. Consultation with regard to aviation and radar has been undertaken in line with the general process described in **Volume 7, Chapter 7 Consultation (application ref: 7.7)** and **Volume 5, Consultation Report (application ref: 5.1)**. The key elements to date have included EIA scoping and formal consultation on the Preliminary Environmental Information Report (PEIR) and e-mail correspondence with aviation stakeholders.

7. The feedback received throughout this process has been considered in preparing the ES, and this chapter has been updated following consultation in order to produce the final assessment submitted within the Development Consent Order (DCO) application. **Volume 7**, **Appendix 15-1 (application ref: 7.15.15.1)** provides a summary of the consultation responses received to date relevant to this topic, and details how the comments have been addressed within this chapter.

15.3 Scope

15.3.1 Study Area

8. The aviation and radar study area has been defined on the basis of the potential for wind turbines within the Projects' Array Areas to have an impact on civil and military radars, taking into account required radar operational ranges. In general, PSRs installed on civil and military airfields have an operational range of between 40 nautical miles (nm) and 60nm. All radar equipped airfields within 60nm of the Array Areas are therefore included in the aviation and radar study area. En route radars operated by NERL and military Air Defence (AD) radars are required to provide coverage at ranges in excess of 60nm and so all such radars with potential RLoS of wind turbines in the Array Areas are also included in the aviation and radar study area. Radar locations within the aviation and radar study area are shown on **Volume 7, Figure 15-1 (application ref: 7.15.1)**.

9. The aviation and radar study area includes DBS East and DBS West Array Areas and the airspace between the Array Areas and the UK mainland, extending from the MOD AD radar facility at Remote Radar Head (RRH) Brizlee Wood to the north, to the MOD AD radar facility at RRH Neatishead to the south and the NERL radar facility at Great Dun Fell to the west.

10. The criteria in the following sections have been used to identify receptors within the study area.

15.3.1.1 Civil Aerodromes

11. Civil Aviation Publication (CAP) 764 Policy and Guidelines on Wind Turbines (CAA, 2016) states the distances from various types of aerodromes where consultation should take place. These distances include:

- Aerodromes with a surveillance radar: 30 kilometres (km);
- Non-radar equipped licensed aerodromes with a runway of more than 1,100 metres (m): 17km;
- Licensed aerodromes where the wind turbines will lie within airspace coincidental with any published Instrument Flight Procedures (IFPs);
- Unlicensed aerodromes with runways of more than 800m: 4km;
- Unlicensed aerodromes with runways of less than 800m: 3km;
- Gliding sites: 10km; and
- Other aviation activity such as parachute sites and microlight sites: 3km.

12. CAP 764 goes on to state that these distances are for guidance purposes only and do not represent ranges beyond which all wind turbine developments will be approved or within which they will always be objected to. For example, aerodromes with a surveillance radar may utilise their radars at ranges in excess of 30km. There are no civil or military radar-equipped airfields within 60nm of the Projects' Array Areas, however the nearest such airfields are identified on **Volume 7, Figure 15-1 (application ref: 7.15.1)** and referenced in sections 15.5.2 and 15.5.3. While only guidance the distances for other aerodromes, gliding sites and other aviation activities are considered reasonable and, given that the Projects' Array Areas lie approximately 106km from the coast, these receptors are not considered further.

13. As well as examining the technical impact of wind turbines on Air Traffic Control (ATC) facilities, it is also necessary to consider the physical safeguarding of ATC operations using the criteria laid down in CAP 168 Licensing of Aerodromes (CAA, 2022a) to determine whether a proposed development has potential to breach obstacle clearance criteria at any aerodromes.

15.3.1.2 Ministry of Defence

14. It is necessary to consider the aviation, air defence and other activities of the MOD. This includes:

- MOD airfields, both radar and non-radar equipped;
- MOD AD radars; and
- MOD Practice and Exercise Areas (PEXAs) for both aviation and non-aviation activities.

15.3.1.3 NERL Facilities

15. It is necessary to consider the possible effects of wind turbines upon NERL radar systems; a network of primary and secondary radar facilities around the country.

15.3.1.4 Other Aviation Activities

16. Other aviation activities considered include:

- General military low flying training operations; and
- Military and civilian 'off-route' fixed-wing and helicopter operations, SAR missions and offshore helicopter operations in support of the oil and gas industry.

15.3.1.5 Meteorological Radio Facilities

17. Wind turbines have the potential to adversely impact meteorological radio facilities such as weather radar. The Met Office must be consulted when wind turbine proposals are within a 20km radius zone of any of their UK weather radar sites; however, weather radars have a maximum range of 255km so all weather radar receptors within the wider study area are identified.

18. Airports and radars within the aviation and radar study area that are under consideration are shown on **Volume 7, Figure 15-1 (application ref: 7.15.1)**.

15.3.2 Realistic Worst Case Scenario

15.3.2.1 General Approach

19. The realistic worst case design parameters for likely significant effects scoped into the ES for the aviation and radar assessment are summarised in **Table 15-1**. These are based on the project parameters described in **Volume 7, Chapter 5 Project Description (application ref: 7.5)**, which provides further details regarding specific activities and their durations.

20. In addition to the design parameters set out in **Table 15-1**, consideration is also given to the different Development Scenarios still under consideration and the possible phasing of the construction as set out in sections 15.3.2.2 to 15.3.2.4.

Table 15-1 Realistic Worst Case Design Parameters

Impacts	Maximum Parameters			
	DBS East or DBS West In Isolation	**DBS East and DBS West concurrently**	**DBS East and DBS West sequentially**	**Notes and rationale**
Construction				
Impacts on civil and military PSR systems due to high construction vessels / cranes and partially complete structures.	Up to 100 wind turbines. Maximum blade tip height of 394m above Mean High Water Springs (MHWS). High crane installation vessels. Construction period of up to five years.	Up to 200 wind turbines. Maximum blade tip height of 394m above MHWS. High crane installation vessels. Construction period of up to five years.	Up to 200 wind turbines. Maximum blade tip height of 394m above MHWS. High crane installation vessels. Construction period of up to seven years.	Maximum number of the tallest wind turbines, or maximum number of wind turbines for the Projects. (Either of the above scenarios could be worst-case and both have been assessed for all impacts). Potential impacts starting from a point of zero infrastructure present to full presence over the construction period.
Creation of an aviation obstacle environment.	Up to 100 wind turbines. Maximum blade tip height of 394m above MHWS. High crane installation vessels. Up to three Offshore Converter Platforms (OCPs) / Collector Platforms (CPs) height 205m above Lowest Astronomical Tide (LAT). Up to one accommodation platform / Electrical Switching Platform (ESP). (ESP located either within Array Areas or along Offshore Export Cable Corridor). Construction period of up to five years.	Up to 200 wind turbines. Maximum blade tip height of 394m above MHWS. High crane installation vessels. Up to six Offshore Converter Platforms (OCPs) / Collector Platforms (CPs) height 205m above LAT. Accommodation platform and ESP (ESP located either within Array Areas or along Offshore Export Cable Corridor). Construction period of up to five years.	Up to 200 wind turbines. Maximum blade tip height of 394m above MHWS. High crane installation vessels. Up to six Converter Platforms (OCPs) / Collector Platforms (CPs) height 205m above LAT. Accommodation platform and ESP (ESP located either within Array Areas or along Offshore Export Cable Corridor). Construction period of up to seven years.	Maximum number of the tallest wind turbines, or maximum number of wind turbines for the Projects. (Either of the above scenarios could be worst-case and both have been assessed for all impacts). Maximum physical obstruction to aviation operations due to the size and number of above sea level infrastructure within the Projects' Array Areas. Potential impacts starting from a point of zero infrastructure present to full presence over the construction period.
Increased air traffic in the area related to wind farm construction activities.	Up to 365 helicopter return trips per construction year are anticipated.	Up to 730 helicopter return trips per construction year are anticipated.	Up to 365 helicopter return trips per project per construction year are anticipated (i.e. 730 per year where construction periods overlap).	Helicopter trips as a result of being engaged in works on the Projects causing increased likelihood of aircraft to aircraft collision.

Impacts	Maximum Parameters			
	DBS East or DBS West In Isolation	**DBS East and DBS West concurrently**	**DBS East and DBS West sequentially**	**Notes and rationale**
Operation				
Wind turbines causing permanent interference on civil and military PSRs.	Up to 100 wind turbines. Maximum blade tip height of 394m above MHWS. Operational lifetime of 30 years.	Up to 200 wind turbines. Maximum blade tip height of 394m above MHWS. Operational lifetime of 30 years.	Up to 200 wind turbines. Maximum blade tip height of 394m above MHWS. Operational lifetime of up to 32 years.	Maximum number of the tallest wind turbines, or maximum number of wind turbines for the Projects. (Either of the above scenarios could be worst-case and both have been assessed for all impacts). Impact present for operational lifetime.
Creation of an aviation obstacle environment.	Up to 100 wind turbines. Maximum blade tip height of 394m above MHWS. Up to three Converter Platforms (OCPs) / Collector Platforms (CPs) height 205m above LAT. Up to one accommodation platform / Electrical Switching Platform (ESP). (ESP located either within Array Areas or along Offshore Export Cable Corridor). Operational lifetime of 30 years.	Up to 200 wind turbines. Maximum blade tip height of 394m above MHWS. Up to three Converter Platforms (OCPs) / Collector Platforms (CPs) height 205m above LAT. Accommodation platform and ESP (ESP located either within Array Areas or along Offshore Export Cable Corridor). Operational lifetime of 30 years.	Up to 200 wind turbines. Maximum blade tip height of 394m above MHWS. Up to six Offshore Converter Platforms (OCPs) / Collector Platforms (CPs) height 205m above LAT. Accommodation platform and ESP (ESP located either within Array Areas or along Offshore Export Cable Corridor). Operational lifetime of up to 32 years.	Maximum number of the tallest wind turbines, or maximum number of wind turbines for the Projects. (Either of the above scenarios could be worst-case and both have been assessed for all impacts). Maximum physical obstruction to aviation operations due to the size and number of above sea level infrastructure within the Projects' Array Areas. Impact present for operational lifetime.
Increased air traffic in the area related to wind farm support activities.	Maximum number of 20 helicopter return trips per year during Operation phase. Operational lifetime of 30 years.	Maximum number of 20 helicopter return trips per year during Operation phase. Operational lifetime of 30 years.	Maximum number of 20 helicopter return trips per year during Operation phase. Operational lifetime of up to 32 years.	Helicopter trips as a result of being engaged in works on the Projects causing increased likelihood of aircraft to aircraft collision. Impact present for operational lifetime.
Decommissioning				
No final decision regarding the final decommissioning policy for the offshore project infrastructure has yet been made. It is also recognised that legislation and industry best practice change over time. However, it is likely that offshore project infrastructure will be removed above the seabed and reused or recycled where practicable. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that for the worst case scenario, the impacts will be no greater than those identified for the construction phase. A decommissioning plan for the offshore works would be submitted prior to any decommissioning commencing.				

15.3.2.2 Development Scenarios

21. Following Statutory Consultation high voltage alternating current (HVAC) technology (previously assessed in PEIR) was removed from the Projects' design envelope (see **Volume 7, Chapter 4 Site Selection and Assessment of Alternatives (application ref: 7.4)** for further information). As a result, only high voltage direct current (HVDC) technology has been taken forward for assessment purposes. The ES considers the following development scenarios:

    - Either DBS East or DBS West is built In Isolation; or
    - DBS East and DBS West are both built either Sequentially or Concurrently.

22. An In Isolation Scenario has been assessed within the ES on the basis that theoretically one Project could be taken forward without the other being built out. If an In Isolation Scenario is taken forward, either DBS East or DBS West may be constructed. As such the offshore assessment considers both DBS East and DBS West in isolation.

23. In order to ensure that a robust assessment has been undertaken, all Development Scenarios have been considered to ensure the realistic worst case scenario for each topic has been assessed. A summary is provided here, and further details are provided in **Volume 7, Chapter 5 Project Description (application ref: 7.5)**.

24. The three Development Scenarios to be considered for assessment purposes are outlined in **Table 15-2**.

Table 15-2 Development Scenarios and Construction Durations

Development scenario	Description	Total Maximum Construction Duration (Years)	Maximum construction Duration Offshore (Years)	Maximum construction Duration Onshore (Years)
In Isolation	Either DBS East or DBS West is built in isolation	Five	Five	Four
Sequential	DBS East and DBS West are both built sequentially, either Project could commence construction first with staggered / overlapping construction	Seven	A five year period of construction for each project with a lag of up to two years in the start of construction of the second project (excluding landfall duct installation) – reflecting the maximum duration of effects of seven years.	Construction works (i.e. onshore cable civil works, including duct installation) to be completed for both Projects simultaneously in the first four years, with additional works at the landfall, substation zone and cable joint bays in the following two years. Maximum duration of effects of six years.
Concurrent	DBS East and DBS West are both built concurrently reflecting the maximum peak effects	Five	Five	Four

25. The In Isolation, Concurrent and Sequential Development Scenarios all allow for flexibility to build out either or both Projects using a phased approach offshore. Under a phased approach the maximum timescales for individual elements of the construction are assessed.

26. Any differences between the Projects, or differences that could result from the manner in which the first and the second Projects are built (concurrent or sequential and the length of any lag) are identified and discussed where relevant in section 15.6. For each potential impact, the worst case construction scenario for the In Isolation Scenario and the Concurrent or Sequential Scenario is presented. The worst case scenario presented for the Concurrent or Sequential Scenario will depend on which of these is the worst case for the potential impact being considered. The justification for what constitutes the worst case is provided, where necessary, in section 15.6.

15.3.2.3 Operation Scenarios

27. Operation scenarios are described in detail in **Volume 7, Chapter 5 Project Description (application ref: 7.5)**. The assessment considers the following scenarios:

- Only DBS East in operation;
- Only DBS West in operation; and
- DBS East and DBS West operating concurrently with or without a lag of up to two years between each Project commencing operation.

28. If the Projects are built out using a phased approach, there would also be a phased approach to starting the operational stage. The worst case scenario for the operational phases for the Projects have been assessed. See section 5.1.1 of **Volume 7, Chapter 5 Project Description (application ref: 7.5)** for further information on phasing scenarios for the Projects.

29. The operations lifetime of each Project is expected to be 30 years.

15.3.2.4 Decommissioning Scenarios

30. Decommissioning scenarios are described in **Volume 7, Chapter 5 Project Description (application ref: 7.5)**. Decommissioning arrangements will be agreed through the submission of a Decommissioning Programme prior to construction, however for the purpose of this assessment it is assumed that decommissioning of the Projects could be conducted separately, or at the same time.

15.3.3 Embedded Mitigation

31. This section outlines the embedded mitigation relevant to the Aviation and Radar assessment, which has been incorporated into the design of the Projects or constitutes standard mitigation measures for this topic (**Table 15-3**). Mitigation is also detailed within **Volume 8, Commitments Register (application ref: 8.5)** and cross-referenced within **Table 15-3**. Where additional mitigation measures are proposed, these are detailed in the impact assessment (section 15.4).

Table 15-3 Embedded Mitigation Measures

Parameter	Embedded Mitigation Measures	Where commitment is secured
Information, notifications and charting	Under Article 225A of the Air Navigation Order 2016 (as amended), obstacle details would be passed to the CAA at least eight weeks before construction commences. CAA would forward the information to MOD DGC and NATS AIS for inclusion in the AIP and on relevant civil and military aeronautical charts. To ensure stakeholder awareness of the Projects while charts are being updated, obstacle details would be notified to Defence Infrastructure Organisation Safeguarding and the CAA at least 14 days prior to the commencement of construction.	Deemed Marine Licence (DML) 1 & 2 - Condition 12 DML 3 & 4- Condition 10 DML 5 - Condition 8
Lighting and marking	Lighting and marking of obstacles would be in accordance with the latest relevant industry guidance, as required by Trinity House, MCA, and Civil Aviation Authority (CAA). Final requirements will be detailed and agreed pre-construction in a Lighting and Marking Plan(s) produced as part of the Aids to Navigation Management Plan(s). The DML will include conditions for the Projects to exhibit such lights, with such shape, colour, and character as are required in writing by the ANO 2016 and determined necessary for aviation safety in consultation with the DIO Safeguarding and as directed by the CAA.	Aids to Navigation Management Plan DML 1 & 2 - Condition 10 DML 3 & 4 - Condition 8 DML 5 - Condition 6

Parameter	Embedded Mitigation Measures	Where commitment is secured
Marine coordination for Project vessels	Marine coordination would be implemented to manage project vessels throughout construction and maintenance periods, and will be detailed in one or more Emergency Response Cooperation Plans (ERCoPs) produced in compliance with MGN654.	ERCoPs DML 1 & 2 - Condition 18 DML 3 & 4 - Condition 16 DML 5 - Condition 12

15.3.3.1 Information, Notifications and Charting

32. The Projects would create an obstacle environment which can be partially mitigated by compliance with appropriate international and national requirements for the promulgation of the obstacle locations on charts and in aeronautical documentation, together with the permanent marking and lighting of obstacles.

33. Measures would be adopted no later than 14 days prior to the commencement of works on the Projects to ensure that aviation stakeholders are made aware of the creation of a further aviation obstacle environment in the North Sea. These measures would include issuing Notices to Airmen (NOTAMs) and Aeronautical Information Circulars (AICs), warning of the establishment of obstacles within the Projects' Array Areas and publicity in such aviation publications as the General Aviation Safety Council (GASCo) Flight Safety magazine. Obstacle considerations include temporary cranes and wind turbine components being towed from shore to the Projects' Array Areas.

34. In accordance with The Air Navigation Order (ANO) 2016/765 (CAA, 2022b) Article 225A, at least eight weeks before construction commences, details of the position, height above mean sea level (amsl) and lighting for all of the completed permanent structures that are 100m or more amsl would be notified in writing to the CAA who would forward the relevant information to NATS Aeronautical Information Services (AIS) and the MOD Defence Geographic Centre (DGC) for inclusion in the Aeronautical Information Publication (AIP) and on relevant civil and military aeronautical charts, as notifiable permanent obstructions. This permanent information would replace the short-term NOTAMs that would continue to be issued to cover the Projects until construction has been completed.

15.3.3.2 Marking and Lighting

35. The international marking and lighting requirement, as set out in the International Civil Aviation Organisation (ICAO) document Annex 14 (ICAO, 2022), specifies that:

- "*A wind turbine shall be marked and / or lighted if it is determined to be an obstacle.*"; and
- *"The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines should be painted white, unless otherwise indicated by an aeronautical study."*

36. UK regulations adopt ICAO Annex 14's requirements for the lighting of wind turbines but do not require that wind turbines follow the ICAO recommendation for paint colour, although CAP 764 does set out the ICAO recommendation by way of guidance. In terms of marking the wind turbines, in keeping with recent practice for offshore wind farms, Trinity House would require all structures to be painted yellow from the level of Highest Astronomical Tide (HAT) to a height directed by Trinity House (at least 15m), and above the yellow section all wind turbines would be painted submarine grey. The Deemed Marine Licences in the **draft DCO (application ref: 3.1)** capture the wind turbine marking requirements in a condition.

37. The Projects would be lit in accordance with the ANO. ANO Article 222 defines an 'en route obstacle' as any building, structure or erection, the height of which is 150m or more above ground level and requires these to be lit. Article 223 modifies the Article 222 requirement with respect to offshore wind turbines, requiring these to be lit where they exceed 60m above HAT with a medium intensity (2000 candela (cd)) steady red light mounted on the top of each nacelle and requires for limited downward spillage of light. Article 223 allows for the CAA to permit that not all wind turbines are lit in this way. CAP 764 states that the CAA will permit that only wind turbines on the periphery of any wind farm need to be equipped with aviation warning lighting and such lighting, where achievable, shall be spaced at longitudinal intervals not exceeding 900m. There is no current routine requirement for offshore obstacles to be fitted with intermediate vertically spaced aviation lighting.

38. CAA guidance has been subject to coordination with maritime agencies to avoid confusion with maritime lighting. To that end, the CAA has indicated that the use of a flashing red Morse Code letter 'W' is likely to be approved to resolve potential issues for the maritime community. A Lighting Management Plan (LMP) must be agreed and implemented in consultation with the CAA post consent and will be included as part of the Aids to Navigation Management Plan.

39. The Maritime and Coastguard Agency (MCA) is seeking that wind turbine blade tips are marked in red, together with markings down the blade, to provide a SAR helicopter pilot with a hover reference point as set out in Marine Guidance Note (MGN) 654 Annex 5 (MCA, 2021b). The MCA also seeks a lighting scheme comprising 200cd red / infra-red lights on the nacelles of non-Article 223 wind turbines, to be operated on demand during SAR operations and a wind turbine shutdown protocol to be applied during rescue situations. An Emergency Response and Cooperation Plan (ERCoP) would be developed and implemented for all phases of the Projects, based upon the MCA's standard template. Appropriate lighting would be utilised to facilitate heli-hoisting if undertaken within the Array Areas, as outlined in CAP 437: Standards for Offshore Helicopter Landing Areas (CAA, 2023b).

40. To satisfy MOD requirements, the wind turbines would also be required to be fitted with infra-red lighting in combination with the ANO Article 223 lights. MOD lighting guidance indicates that provided combination infra-red / 2000cd visible red lights are used to light the wind turbines required to be lit under ANO Article 223, this satisfies the MOD operational requirement.

15.4 Assessment Methodology

15.4.1 Policy, Legislation and Guidance

15.4.1.1 National Policy Statements

41. The assessment of potential impacts upon aviation and radar has been made with specific reference to the relevant National Policy Statements (NPS) including the Overarching NPS for Energy (EN-1), the NPS for Renewable Energy Infrastructure (EN-3) and the NPS for Electricity Networks Infrastructure (EN-5). These were published in November 2023 and were designated in January 2024. The specific assessment requirements for aviation and radar, as detailed in the NPS, are summarised in **Table 15-4** together with an indication of the section of this chapter where each is addressed.

Table 15-4 NPS Assessment Requirements

NPS Requirement	NPS Reference	ES Section Reference
Overarching NPS for Energy (EN-1) (DESNZ, 2023a)		
Where the proposed development may affect the performance of civil or military aviation CNS, meteorological radars and/or other defence assets an assessment of potential effects should be set out in the ES.	Paragraph 5.5.37	Potential effects are set out in section 15.6. Impacts on meteorological radars are considered unlikely, as confirmed in section 15.5.7.
The applicant should consult the MOD, Met Office, Civil Aviation Authority (CAA), NATS and any aerodrome – licensed or otherwise – likely to be affected by the proposed development in preparing an assessment of the proposal on aviation, meteorological or other defence interests.	Paragraph 5.5.39	Consultation undertaken with relevant civil and military aviation stakeholders is detailed in **Volume 7, Appendix 15-1 (application ref: 7.15.15.1)**. Consultation will continue with stakeholders through examination and post-consent.

NPS Requirement	NPS Reference	ES Section Reference
Any assessment of effects on aviation, meteorological or other defence interests should include potential impacts of the project upon the operation of CNS infrastructure, flight patterns (both civil and military), generation of weather warnings and forecasts, other defence assets (including radar) and aerodrome operational procedures. It should also assess the demonstratable Cumulative Effects of the project with other relevant projects in relation to aviation, meteorological and defence.	Paragraph 5.5.40	Effects on civil and military aviation during the phases of the Projects are assessed in section 15.6. Cumulative effects are assessed in section 0.
If there are conflicts between the government's energy and transport policies and military interests in relation to the application, the Secretary of State should expect the relevant parties to have made appropriate efforts to work together to identify realistic and pragmatic solutions to the conflicts. In so doing, the parties should seek to protect the aims and interests of the other parties as far as possible, recognising simultaneously the evolving landscape in terms of the UK's energy security and the need to tackle climate change, which necessitates the installation of wind turbines and the need to maintain air safety and national defence and the national weather warning service.	Paragraph 5.5.53	Potential mitigation for impacts on military radars are discussed in section 15.6.2.1.5. Engagement with the MOD will continue through examination and post-consent.
There are statutory requirements concerning lighting to tall structures. Where lighting is requested on structures that goes beyond statutory requirements by any of the relevant aviation and defence consultees, the Secretary of State should be satisfied of the necessity of such lighting taking into account the case put forward by the consultees. The effect of such lighting on the landscape and ecology may be a relevant consideration. Lighting must also be designed in such a way as to ensure that there is no glare or dazzle to pilots and/or ATC, aerodrome ground lighting is not obscured and that any lighting does not diminish	Paragraph 5.5.54 and 5.5.55	Marking and lighting requirements are discussed in section 15.3.3.2. In accordance with ANO Article 223, lighting intensity would be reduced at and below the horizontal and further reduced when visibility in all directions from every

NPS Requirement	NPS Reference	ES Section Reference
the effectiveness of aeronautical ground lighting and cannot be confused with aeronautical lighting.		wind turbine is more than 5km.
Where, after reasonable mitigation, operational changes, obligations and requirements have been proposed, the Secretary of State should consider whether: • a development would prevent a licensed aerodrome from maintaining its licence and the operational loss of the said aerodrome would have impacts on national security and defence, or result in substantial local/national economic loss, or emergency service needs. • it would cause harm to aerodromes' training or emergency service needs. • the development would impede or compromise the safe and effective use of defence assets or unacceptably limit military training. • the development would have a negative impact on the safe and efficient provision of en-route air traffic control services for civil aviation, in particular through an adverse effect on CNS infrastructure. • the development would compromise the effective provision of weather warnings by the NSWWS, or flood warnings by the UKs flood agencies. Provided that the Secretary of State is satisfied that the impacts of proposed energy developments do not present risks to national security and physical safety, and where they do, provided that the Secretary of State is satisfied that appropriate mitigation can be achieved, or appropriate requirements can be attached to any Development Consent Order to secure these mitigations, consent may be granted.	Paragraphs 5.5.59 and 5.5.60	The Projects have the potential to generate clutter on radar displays and thus have an effect on the safe and effective use of defence assets. However, technical mitigation is being sought, as discussed in section 15.6.2.1.5. Once mitigation has been implemented there will be no significant effects on any of the stated infrastructure or services.
NPS for Renewable Energy Infrastructure (EN-3) (DESNZ, 2023b)		

NPS Requirement	NPS Reference	ES Section Reference
Aviation and navigation lighting should be minimised and/or on demand (as encouraged in EN-1 Section 5.5) to avoid attracting birds, taking into account impacts on safety.	Paragraph 2.8.230	Proposed lighting is discussed in section 15.3.3.2. In accordance with ANO Article 223, lighting intensity would be reduced at and below the horizontal and further reduced when visibility in all directions from every wind turbine is more than 5km.
Detailed discussions between the applicant for the offshore wind farm and the relevant consultees should have progressed as far as reasonably possible prior to the submission of an application. As such, appropriate mitigation should be included in any application, and ideally agreed between relevant parties. In some circumstances, the Secretary of State may wish to consider the potential to use requirements involving arbitration as a means of resolving how adverse impacts on other commercial activities will be addressed.	Paragraphs 2.8.251 to 2.8.252	Consultation was initiated with NATS and the MOD at the Scoping stage. Further engagement with the MOD and other relevant aviation stakeholders will continue through examination and post-consent in order to agree appropriate mitigations, if required once the final design is known.
Where a proposed offshore wind farm potentially affects other offshore infrastructure or activity, a pragmatic approach should be employed by the Secretary of State. Much of this infrastructure is important to other offshore industries as is its contribution to the UK economy. In such circumstances, the Secretary of State should expect the applicant to work with the impacted sector to minimise negative impacts	Paragraphs 2.8.332 to 2.8.334	Potential effects during the various phases are assessed in section 15.6. Negative impacts will be minimised, and risks reduced through the embedded mitigation measures outlined in section 15.3.3 and by continuing

NPS Requirement	NPS Reference	ES Section Reference
and reduce risks to as low as reasonably practicable.		engagement with relevant stakeholders to agree any appropriate additional mitigation measures.
As such, the Secretary of State should be satisfied that the site selection and site design of the proposed offshore wind farm and offshore transmission has been made with a view to avoiding or minimising disruption or economic loss or any adverse effect on safety to other offshore industries. Applicants will be required to demonstrate that risks to safety will be reduced to as low as reasonably practicable. The Secretary of State should not consent applications which pose intolerable risks to safety after mitigation measures have been considered.	Paragraphs 2.8.335 to 2.8.336	Potential effects on offshore helicopter operations are assessed in section 15.6. Consultation with relevant platform operators and offshore helicopter operators is ongoing to agree any potential additional mitigation measures post-consent, once the final design is known, and ensure offshore oil and gas operations in the vicinity of the Array Areas are safeguarded.
Providing schemes have been carefully designed, and that the necessary consultation has been undertaken at an early stage, mitigation measures may be possible to negate or reduce effects on other offshore infrastructure or operations to a level sufficient to enable the Secretary of State to grant consent.	Paragraph 2.8.338	Embedded mitigation measures are outlined in section 15.3.3 and further mitigation measures discussed in section 15.6.

15.4.1.2 Other

42. In addition to the NPS, there are a number of pieces of legislation, policy and guidance applicable to the assessment of Aviation and Radar. These include:

- CAP 032: UK Aeronautical Information Publication (AIP) (CAA, 2023a);

- CAP 168: Licensing of Aerodromes (CAA, 2022a);
- ANO 2016/765 (CAA, 2022b);
- CAP 764: Policy and Guidelines on Wind Turbines (CAA, 2016);
- CAP 670: Air Traffic Services Safety Requirements (CAA, 2019);
- CAP 437: Standards for Offshore Helicopter Landing Areas (CAA, 2023b);
- CAP 1616: Airspace Change (CAA, 2021a);
- UK Military AIP (MOD, 2023);
- Military low flying in the United Kingdom: the essential facts (MOD, 2017);
- MOD Obstruction Lighting Guidance (Low Flying Operations Flight, 2020);
- MCA MGN 654 Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021a);
- MCA document: Offshore Renewable Energy Installations: Requirements, Guidance and Operational Considerations for SAR (Search and Rescue) and Emergency Response (MCA, 2021b; and
- ICAO Annex 14: Aerodrome Design and Operations (ICAO, 2022).

43. Further detail is provided in **Volume 7, Chapter 3 Policy and Legislative Context (application ref: 7.3)**.

15.4.2 Data and Information Sources

44. Sources that have been used to inform the assessment are listed in **Table 15-5**.

Table 15-5 Data and Information Sources

Data Set	Spatial Coverage	Notes
CAP 032: UK AIP (CAA, 2023a)	Full coverage across the DBS aviation study area.	The main resource for information and flight procedures at all licensed UK airports as well as airspace, en route procedures, charts and other air navigation information.
UK Military AIP (MoD, 2023)	Full coverage across the DBS aviation study area.	The main resource for information and flight procedures at all military aerodromes.

Data Set	Spatial Coverage	Notes
Office of Communications (Ofcom) Protected Radar list (Ofcom, 2023)	Full coverage across the DBS aviation study area.	This document lists the locations and antenna heights of UK civil and military PSRs.
Met Office Planning Maps	Full coverage across the DBS aviation study area	These are online maps of consultation zones for safeguarded UK weather radar sites.
North Sea Transition Authority (NSTA) Open Data	Full coverage across the DBS aviation study area	The NSTA website is a source of regularly updated shapefiles containing details of offshore infrastructure data.

15.4.3 Impact Assessment Methodology

45. **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)** provides a summary of the general impact assessment methodology applied. The following sections describe the methods used to assess the likely significant effects on aviation and radar.

15.4.3.1 Significance of Effect

46. In assessing the significance of the effects from the Projects it is necessary to identify whether or not there would be an impact on aviation operations. The aviation industry is highly regulated and subject to numerous mandatory standards, checks and safety requirements (for example CAP 670), many international in nature and requiring the issue of operating licences. In all cases, the sensitivity or magnitude of the impact on operations can only be identified by the appropriate aviation organisation conforming to the Risk Classification Scheme used to quantify and qualify the severity and likelihood of a hazard occurring.

47. The Risk Classification Scheme is a fundamental element of an aviation organisation's Safety Management System (SMS), which must be acceptable to, and approved by, the UK CAA or the Military Aviation Authority (MAA), as appropriate. As such, for the purposes of this assessment, no detailed grading has been made of the magnitude of the impact or sensitivity of the receptor on the basis that any potential reduction in aviation safety cannot be tolerated. Instead, the following definitions of basic significance have been used as defined in **Table 15-6**. This represents a deviation from the standard methodology presented within **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)**.

Table 15-6 Definition of Effect Significance

Significance	Definition
Major significant	Receptor would be unable to continue safe operations or safe provision of air navigation services (radar) or effective air defence surveillance in the presence of the wind turbines. Technical or operational mitigation of the impact would be required.
Moderate significant	Receptor would be able to continue safe operations but with some restrictions in place.
Not significant	The Projects would have little effect on the aviation receptor, or the level of effect would be acceptable to the aviation receptor.
No change	The Projects would have no effect on the aviation receptor and would be acceptable to the aviation receptor.

15.4.4 Cumulative Effect Assessment Methodology

48. The cumulative effect assessment (CEA) considers other schemes, plans, projects and activities that may result in significant effects in cumulation with the Projects. **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)** (and accompanying **Volume 7, Appendix 6-2 Offshore Cumulative Effects Assessment (CEA) Methodology (application ref: 7.6.6.1)** provides further details of the general framework and approach to the CEA.

15.4.5 Transboundary Effects Assessment Methodology

49. The transboundary assessment considers the potential for transboundary effects to occur on aviation and radar receptors as a result of the Projects; either those that might arise within the Exclusive Economic Zone (EEZ) of European Economic Area (EEA) states or arising on the interests of EEA states e.g. a non UK fishing vessel. **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)** provides further details of the general framework and approach to the assessment of the transboundary effects.

50. For aviation and radar, the potential for transboundary effects has been assessed in relation to obstacles to flight, increase in air traffic, radar visibility and airspace management.

15.4.6 Assumptions and Limitations

51. No further overarching assumptions or limitations have been identified that apply to the assessment for aviation and radar. Where routine assumptions have been made in the course of undertaking the assessment, these are noted throughout.

15.5 Existing Environment

52. An initial desktop study was undertaken at Scoping to determine those aviation stakeholders that were likely to be affected by the Projects, including all radar systems within operational range. This study formed part of the statutory consultation at PEIR.

53. The main issue identified is associated with potential wind turbine interference for PSRs. Due to the physical size of the wind turbines proposed, there is also potential for the wind turbines to become aviation obstacles or obstructions, particularly to helicopters engaged in offshore operations. This is considered within the impact assessment.

54. CAP 764 advises that wind turbine effects on Secondary Surveillance Radars (SSRs) can be caused due to the physical blanking and diffracting effects of the wind turbine towers, depending on the size of the wind turbines and the wind farm. However, CAP 764 goes on to say that these effects are only a consideration when the wind turbines are located close to the SSR, i.e. less than 10km. NATS recommend a safeguarded zone of radius 28km around their SSR facilities. The closest SSR (Claxby) is 162km from the Projects' Array Areas. As all known SSRs are outside the stipulated parameters by a significant margin they will not be affected by the wind turbines and are therefore not considered further.

55. Similarly, there will be no measurable effects upon other terrestrial based aviation Communications, Navigation and Surveillance (CNS) systems as the Projects are considerably outside applicable safeguarding limits pertaining to such CNS infrastructure. Therefore, terrestrial CNS infrastructure (other than PSR) are not considered further.

15.5.1 Radar Modelling and Airspace Analysis

56. Computer modelling using a contemporary software modelling tool (HTZ communications) has been undertaken to predict if RLoS exists between PSRs and wind turbines within the Projects' Array Areas, and the likelihood of the rotating wind turbine blades being detected. This exercise identified those PSRs that could detect the wind turbines and has been based on wind turbines with a maximum tip height of between 311m and 396m amsl[1].

[1] Radar modelling was based on tip heights amsl as opposed to above MHWS. Within the Projects Array Areas MHWS is approximately 1.3m amsl, therefore tip heights of 311m for smaller wind turbines and 396m amsl for larger wind turbines incorporate additional precautionary height buffers above the proposed maximum tip heights of 308.87m and 394.08m above MHWS.

57. The RLoS modelling undertaken is based on generic data as the specific and detailed characteristics of the modelled PSRs are considered commercially sensitive. Therefore, contemporary PSR performance characteristics and publicly available PSR data has been used in lieu. Modelling by radar operators with detailed configuration data may reveal marginally different results. However, confidence is high that the PSR performance characteristics used have a high level of compatibility with actual PSR performance.

58. **Volume 7, Appendix 15-2 (application ref: 7.15.15.2)** details the computer modelling undertaken and uses the outputs of the modelling to identify potential impacts and, where necessary, to determine potential mitigation strategies for inclusion in this document. **Volume 7, Appendix 15-2 (application ref: 7.15.15.2)** also provides further details of the airspace analysis undertaken. An overview of the existing civil and military airspace environment is shown on **Volume 7, Figure 15-2 (application ref: 7.15.1)** and summarised in the following sections.

15.5.2 Civil Aviation

59. The airspace above and adjacent to the Projects' Array Areas is used by civil and military aircraft and lies within the London Flight Information Region (FIR) for ATC, the airspace regulated by the UK CAA. Approximately 30km north of the Projects' Array Areas is the boundary between the London FIR and the Scottish FIR, which is also regulated by the UK CAA.

60. The London FIR is adjacent to the Amsterdam FIR, whose boundary is approximately 134km south-east of the Array Areas and is regulated by the Netherlands Inspectie Leefomgeving en Transport (ILT). A portion of UK FIR airspace known as North Sea Area V is also delegated to the Netherlands, as depicted on **Volume 7, Figure 15-2 (application ref: 7.15.1)**. Within this area, which lies approximately 41km east of the Projects' Array Areas, the Netherlands provides an Air Traffic Service (ATS) to all aircraft at Flight Level (FL) 55 (approximately 5,500ft amsl) and below.

61. Airspace is classified as either controlled or uncontrolled and is divided into a number of classes depending on what kind of ATS is provided and under what conditions. In the UK there are five classes of airspace: A, C, D, E and G. The first four are Controlled Airspace classes while Class G is uncontrolled. Within Controlled Airspace aircraft are monitored and instructed by ATC, whereas in Uncontrolled Airspace aircraft are not subject to ATC instruction but rather operate according to a simple set of regulations. ATC may still provide information, if requested, to ensure flight safety.

62. Aircraft operate under one of two flight rules: Visual Flight Rules (VFR) or Instrument Flight Rules (IFR). VFR flight is permitted when the weather satisfies Visual Meteorological Conditions (VMC) and is conducted with visual reference to the natural horizon. Aircraft must be flown under IFR when weather restricts visibility, known as Instrument Meteorological Conditions (IMC). IFR flight requires reference solely to aircraft instrumentation.

63. From sea level to FL195, approximately 19,500ft or 5,950m amsl, the airspace in the vicinity of the Projects' Array Areas is Class G Uncontrolled Airspace. This airspace is used predominantly by low level flight operations and generally by aircraft flying under VFR. Under VFR flight the pilot is responsible for maintaining a safe distance from terrain, obstacles, and other aircraft.

64. In Uncontrolled Airspace, aircraft are not obliged to be in receipt of an ATS, although it is open to pilots to seek Air Traffic Services outside Controlled Airspace (ATSOCAS) from the designated ATS provider. The extent of the ATSOCAS supplied will depend on the CNS capability of the ATS provider, its workload and any regulatory provisions relating to the carriage of CNS equipment by aircraft (for example, transponders). All aircraft above approximately 10,000ft amsl in the London FIR are required to carry and operate transponders in accordance with national regulations.

65. Above FL195 is Class C Controlled Airspace in the form of a Temporary Reserved Area (TRA). This airspace, TRA 006, has an upper vertical limit of FL245, approximately 24,500ft amsl, and is available for use by both military and civil aircraft, though its main use is to accommodate VFR military flying activity. Above FL245 are airways known as ATS routes. Aircraft fly along ATS routes using either ground-based electronic aids or Global Navigation Satellite System waypoints for navigation.

66. To gain access to Controlled Airspace, a pilot must comply with various mandatory requirements. This includes establishing two-way radio communications with the designated ATC authority for the specified airspace and obtaining permission to enter it. The pilot must then comply with instructions received. In this way, the controllers know of all the air traffic in the defined airspace. The controllers can then take appropriate measures to ensure that standard separation minima are maintained between all known aircraft by using various techniques that may or may not include the use of PSR.

67. Flight procedures in the vicinity of the Projects' Array Areas are conducted in accordance with national UK CAA and MOD Standards and Recommended Practices (SARPs) as promulgated in the UK AIP.

68. Given that all aircraft operating above circa 10,000ft amsl are required to be equipped with and operate transponders, the significance of primary radar for the provision of an ATS is more acute in the lower airspace outside of Controlled Airspace and is especially relevant to helicopter operators.

69. To enhance flight safety and expedite SAR operations over the southern North Sea, various Flight Information Services are provided by NATS Anglia Radar based at Aberdeen Airport. These services are available to helicopters operating in support of the offshore oil and gas and renewables industries and other civil and military aircraft transiting the airspace. The Anglia Radar Area of Responsibility in which these services are available is depicted on **Volume 7, Figure 15-2 (application ref: 7.15.1)** and extends from sea level to FL65 (approximately 6,500ft amsl).

70. There are no radar-equipped airports within 60nm (111km) of the Projects' Array Areas. The nearest such airports are Humberside, 156km to the south-west, and Teesside, 181km west of the Projects' Array Areas, as shown on **Volume 7, Figure 15-1 (application ref: 7.15.1)**. Controllers at both these airports may provide a Lower Airspace Radar Service (LARS) to aircraft operating outside Controlled Airspace at a maximum range of 30nm (56km) from the Humberside facility and 40nm (74km) from the Teesside facility. The Projects' Array Areas are not below airspace coincidental with any published IFPs for either Humberside or Teesside and RLoS modelling detailed in **Volume 7, Appendix 15-2 (application ref: 7.15.15.2)** shows that wind turbines within the Projects' Array Areas would not be detected by the Humberside or Teesside PSRs. Impacts on civil airports and radars are thus scoped out of the assessment.

71. The nearest major European airport is Schiphol Airport in the Netherlands, which lies approximately 290km from the Projects' Array Areas and is outside any area of effect.

72. NERL provides en route civil air traffic services within the London FIR. NERL operates a network of radar facilities which provide en route information for both civil and military aircraft. The closest NERL radars to the Projects' Array Areas are based at Claxby, 165km to the south-west, Cromer, 165km to the south, and Great Dun Fell, 244km to the west. The Claxby and Cromer radars are utilised by NATS Anglia Radar. RloS modelling detailed in **Volume 7, Appendix 15-2 (application ref: 7.15.15.2)** shows that it is unlikely that wind turbines within the Projects' Array Areas would be detected by the Claxby, Cromer or Great Dun Fell radars, therefore impacts on NERL radars are scoped out of the assessment.

15.5.3 Military Aviation

73. The Projects' Array Areas and Offshore Export Cable Corridor lie beneath the Southern Managed Danger Area (MDA), one of four MDA complexes in UK airspace that provide segregated airspace for military training. These areas of airspace are not permanently active, but rather are activated on request. Specifically, the DBS East Array Area is beneath Danger Areas (DA) EG D323D, the DBS West Array Area is beneath Das EG D323B and C, while the Offshore Export Cable Corridor is beneath DAs EG D323C, D and K.

74. When activated, EG D323B to D have vertical limits from FL50 (approximately 5,000ft amsl) up to FL660 (approximately 66,000ft amsl). EG D323K has a lower limit of FL150 (approximately 15,000ft amsl). Activities within the Southern MDA include high energy manoeuvres, ordnance, munitions and explosives, and electrical / optical hazards.

75. The Southern MDA in the vicinity of the Projects is shown on **Volume 7, Figure 15-2 (application ref: 7.15.1)**. Also shown on **Volume 7, Figure 15-2 (application ref: 7.15.1)** is the Staxton DA (EG D412), approximately 24km north-west of the DBS West Array Area. When active, the Staxton DA has vertical limits from the surface to 10,000ft amsl. Ordnance, munitions and explosives activities take place within the Staxton DA.

76. Area 06 and Area 07, shown to the north-west and north-east of the Projects' Array Areas on **Volume 7, Figure 15-2 (application ref: 7.15.1)**, are Air-to-Air Refuelling Areas (AARAs) with vertical limits of FL100 (approximately 10,000ft amsl) to FL290 (approximately 29,000ft amsl). Within AARA airspace, fuel is transferred from tanker aircraft to receiver aircraft under a radar control service provided by military controllers based at Swanwick.

77. There are no further PEXAs identified, including PEXAs for non-aviation activities, in the vicinity of the Projects' Array Areas.

78. There are no radar-equipped military airfields within 60nm (111km) of the Projects' Array Areas. The nearest such airfield is Royal Air Force Leeming, 190km west of the Projects' Array Areas (**Volume 7, Figure 15-1 (application ref: 7.15.1)**). Controllers at this station offer a LARS to a range of 30nm (56km). RIoS modelling detailed in **Volume 7, Appendix 15-2 (application ref: 7.15.15.2)** shows that wind turbines within the Projects' Array Areas would not be detected by the Leeming PSR. Impacts on radar-equipped military airfields are thus scoped out of the assessment.

79. The MOD safeguard a network of long range high powered AD radars used to provide the UK with airspace surveillance and security and to fulfil national and international obligations. The nearest MOD AD radars to the Projects' Array Areas are based at RRH Staxton Wold, 123km to the west, RRH Neatishead, 185km to the south, and RRH Brizlee Wood, 213km to the north-west. The Neatishead radar was formerly located at RRH Trimingham and was relocated to its current site in 2023.

80. RIoS modelling detailed in **Volume 7, Appendix 15-2 (application ref: 7.15.15.2)** shows that wind turbines within the Projects' Array Areas would not be detected by Neatishead PSR or Brizlee Wood PSR and so these radars are scoped out of the assessment. However, RIoS modelling does show that wind turbines within up to 66% of the DBS West Array Area would be visible to Staxton Wold PSR. wind turbines within the DBS East Array Area would not be in RIoS of Staxton Wold PSR.

15.5.4 Helicopter Main Routing Indicators

81. Helicopter Main Routing Indicators (HMRIs) are routes typically and routinely flown by helicopters operating to and from offshore destinations and are promulgated for the purpose of highlighting concentrations of helicopter traffic to other airspace users. HMRI promulgation does not predicate the flow of helicopter traffic. Whilst HMRIs have no airspace status and assume the background airspace classification within which they lie (in the case of the southern North Sea, Class G), they are used by the Air Navigation Service Provider (ANSP) and helicopter operators for flight planning and management purposes. In summary, HMRIs are recognised routes to assist in regularising routeings and effectively managing traffic safely and do not comprise Controlled Airspace.

82. HMRIs have no promulgated lateral dimensions although CAP 764 states that there should be no obstacles within 2nm (3.7km) either side of the route centreline. The 2nm distance is based upon operational experience, the accuracy of navigation systems, and practicality. Such a distance provides time and space for helicopter pilots to descend safely to an operating altitude below the icing level.

83. HMRIs over the southern North Sea are shown on **Volume 7, Figure 15-3**. **(application ref: 7.15.1)** They generally extend vertically from 1,500ft amsl to FL60 (approximately 6,000ft amsl), although icing conditions or other flight safety considerations may require helicopters to operate below 1,500ft amsl. HMRI 8 routes from the coast, east of Humberside Airport, to the Munro offshore platform and passes within approximately 1.5nm of the DBS East Array Area. All other HMRIs are more than 2nm from the Projects' Array Areas.

84. Planned obstacles within 2nm of an HMRI should be consulted upon with the helicopter operators and the ANSP which in this case is NATS Anglia Radar. The potential for wind turbines to be within 2nm of HMRI 8 has been highlighted to NATS and the opportunity for consultation offered (email to NATS Safeguarding, March 2023). NATS advised that they had no concerns. Further clarification was sought by the Applicants (via email February 2024) highlighting the potential impact on HMRI 8 since NATS Anglia Radar as ANSP, provides ATS for HMRI users. In their response, NATS had no concerns relating to CNS infrastructure and therefore the ability to undertake the ATC function for which they are licensed. The physical proximity of turbines to an HMR is generally not a concern for NATS but helicopter operators may have concerns, which potentially lead to proposals to alter the ATC function. Useful helicopter operator details were provided by NATS, which the Applicants have contacted, providing **Volume 7, Appendix 8-3 (application ref: 7.8.8.3)** and the opportunity for consultation (via email February 2024).

85. The proposed maximum wind turbine tip height of 396m amsl is equivalent to 1,300ft amsl rounded up to the nearest 100ft. Helicopters operating under IFR must maintain at least 1,000ft vertical clearance above the highest obstacles within 5nm, and would therefore need to transit the Array Areas at a minimum altitude of 2,300ft amsl. Under VFR, helicopters must maintain a minimum of 500ft separation from obstacles.

86. The ability of a helicopter to fly higher over wind turbines depends on the icing level, and on days of low cloud base helicopters could be required to fly lower and extend their routings around wind turbine obstacles.

15.5.5 Offshore Helidecks

87. To help achieve a safe operating environment, a 9nm (16.7km) consultation zone for planned obstacles exists around offshore helicopter destinations, in accordance with CAA / CAP 764. Within 9nm (16.7km), obstacles such as wind turbines can potentially impact upon the feasibility of helicopters to safely fly low visibility or missed approach procedures at the associated helideck site. There are four offshore helidecks within 9nm of the Projects' Array Areas (**Volume 7, Figure 15-3 (application ref: 7.15.1)**), which are listed in **Table 15-7**. Of these platforms, it is understood that Cavendish is no longer in production, with decommissioning activities scheduled to conclude in 2024 (Lepic, 2020). A decommissioning programme for Munro MH was also approved in July 2022.

Table 15-7 Offshore Helideck Ranges from Projects' Array Areas

Platform	Operator	Range from Projects' Array Areas (nm)
Cavendish	INEOS Industries	1.9
Cygnus A (AUQ)	Neptune E&P	9.2
Cygnus B (BWHP)	Neptune E&P	7.1
Munro MH	Harbour Energy	6.0

88. As stated in CAP 764, this zone does not prohibit development, but is a trigger for consultation with offshore helicopter operators, the operators of existing installations and exploration and development locations to determine a solution that maintains safe offshore helicopter operations alongside proposed developments. The CAA advises wind energy lease holders, oil and gas developers, and petroleum licence holders to discuss their development plans with each other to minimise the risks of unanticipated conflict.

89. Helicopter Traffic Zones (HTZs) are established around individual and groups of offshore platforms to notify of helicopters engaged in platform approaches, departures and inter-platform transits. HTZ airspace extends vertically from sea level to 2,000ft amsl and laterally to 1.5nm (2.8km) from the platform helidecks.

15.5.6 Search and Rescue

90. SAR operations are a highly specialised undertaking involving not only aviation assets, but also small boats, ships and shore-based personnel. SAR operations are generally carried out in extremely challenging conditions and at all times of the day and night. There are ten helicopter SAR bases, incorporating 22 aircraft, around the UK with Bristow Helicopters providing helicopters and aircrew.

91. The nearest SAR base is at Humberside Airport, approximately 156km south-west of the Projects' Array Areas. Its helicopters can provide rescue services up to approximately 460km away from base.

92. The random nature of people, watercraft or aircraft in distress makes it very difficult to determine the routes taken by SAR aircraft. Fixed wing SAR aircraft would tend to stay at higher altitudes in a command-and-control role during major incidents, whilst helicopters would be used in a low-level role, sometimes in support of small rescue boats.

15.5.7 Meteorological Radio Facilities

93. The closest Met Office weather radars to the Projects' Array Areas are located at High Moresley in Tyne and Wear, 181km to the west, and Ingham in Lincolnshire, 186km to the south-west. wind turbines within the Projects' Array Areas would not be visible to these facilities and would be significantly beyond their 20km safeguarded zones.

94. Impacts on weather radar are unlikely and therefore not considered further in this chapter.

15.5.8 Receptors to be Taken Forward for Assessment

95. A summary of the receptors to be taken forward for assessment is presented in **Table 15-8**.

Table 15-8 Aviation and Radar Receptors Taken Forward for Assessment

Receptor Group	Receptor
Military radars	Staxton Wold PSR
Other aviation activities	Military low flying
	Helicopter traffic transiting to and from offshore oil and gas helidecks
	Helicopters utilising HMRI 8
	Other offshore fixed-wing and helicopter operations, including SAR

15.5.9 Future Trends

96. In the event that the Projects are not developed, an assessment of future conditions for Aviation and Radar has been carried out and is described within this section.

97. Although the aviation industry is under long-term pressure to reduce its contribution to climate change, this is not considered to have significant implications for the Aviation and Radar baseline parameters discussed above. However, an increasing amount of offshore oil and gas infrastructure in the North Sea is being decommissioned which will potentially reduce the volume of helicopter traffic to and from offshore platforms.

15.6 Assessment of Significance

15.6.1 Potential Effects During Construction

15.6.1.1 Impact 1: Impacts on Staxton Wold PSR due to High Construction Vessels / Cranes and Partially Complete Structures

15.6.1.1.1 DBS East or DBS West In Isolation

98. Wind turbines and other tall obstacles have the potential to impact PSRs which would in turn affect the effectiveness of surveillance services due to interference on radar displays, as radar operators are unable to distinguish between those primary radar returns generated by the obstacles and aircraft.

99. To discriminate wanted aircraft targets from unwanted clutter, PSRs ignore static objects and only display moving targets. The rotating blades of wind turbines impart a Doppler frequency shift to the reflected radar pulse, which the radar receiver 'sees' as a moving target; these targets are then presented on the radar display as primary radar returns, indistinguishable from those returns originating from aircraft. This is not a steady effect but has dependency on the axis of rotation of the turbine in relation to the radar. Such unwanted radar returns are known as 'clutter'.

100. No infrastructure within the DBS East Array Area would be in RloS of Staxton Wold PSR. Within the DBS West Array Area, until such time as wind turbine blades were allowed to rotate at operational speeds, Staxton Wold PSR would not detect the partially completed structures. In the same way, tall construction vessels and cranes that were in RloS would not be moving fast enough to generate PSR clutter. Therefore, there would be no impact on Staxton Wold PSR.

15.6.1.1.2 DBS East and DBS West Together

101. As with the previous scenario, there would be no impact on Staxton Wold PSR caused by infrastructure within the DBS West Array Area and infrastructure within the DBS East Array Area would not be in RloS.

15.6.1.1.3 Significance of Effect – DBS East or DBS West In Isolation

102. As a result of non-detection of obstacles during the construction phase, the significance of effect is **No Change**.

15.6.1.1.4 Significance of Effect – DBS East and DBS West Together

103. As a result of non-detection of obstacles during the construction phase, the significance of effect is **No Change**.

15.6.1.2 Impact 2: Creation of an Aviation Obstacle Environment

15.6.1.2.1 DBS East or DBS West In Isolation

104. Construction of the wind farm would involve the installation of infrastructure above sea level which could pose a physical obstruction to aircraft utilising the airspace in the vicinity of the DBS East or West Array Areas. From a starting point of no infrastructure within the DBS East or West Array Area, the infrastructure outlined in **Table 15-1** would gradually be installed over a period of five years. An offshore platform may be constructed mid-way along the Offshore Export Cable Corridor, but the height of this structure is not expected to be sufficient to have an aviation impact. Depending on the final height of the platform, aviation lighting and marking, and notification to the CAA may be required for compliance with ANO legislation and would be included within the Aids to Navigation Management Plan if required).

105. Specifically, permanent or temporary obstacles could increase collision risk for:

- General military low flying training and operations;
- Helicopter traffic transiting to and from offshore oil and gas helidecks;
- Helicopters utilising HMRI 8 (DBS East only); and
- Other offshore fixed-wing and helicopter operations, including those undertaking SAR missions over the southern North Sea.

15.6.1.2.2 DBS East and DBS West Together

106. The impact would be similar as for the Projects in isolation but over a larger area and if the DBS East and West Array Areas were constructed sequentially the construction phase would extend a maximum of an additional two years, to a total of up to seven years.

15.6.1.2.3 Significance of Effect – DBS East or DBS West In Isolation

107. Embedded mitigation in the form of compliance with international and national requirements with respect to notification, charting, marking and lighting is summarised in **Table 15-3**. This would make pilots aware of the addition of infrastructure to the Array Area, and it is assumed that pilots would comply with aviation regulatory requirements.

108. The Projects would occupy uncontrolled (Class G) airspace (below approximately 19,500ft amsl), therefore the responsibility for avoiding other traffic and obstacles rests with captains of civilian and military aircraft. Thus, logically a pilot would avoid the charted areas, and individually lit wind turbines and any other obstacles, laterally and / or vertically, by the legislated standard minimum separation distance. This is outlined in CAA Official Record Series (ORS) 4 No. 1496: (UK) Standardised European Rules of the Air – Exceptions to the Minimum Height Requirements (CAA, 2021b), which sets out that to avoid persons, vessels, vehicles and structures, pilots must give clearance of a minimum distance of 500ft. This applies equally to the avoidance of wind turbines and any other structure.

109. Military operations are subject to separate rules sponsored by the MOD. Pilots of military aircraft would be required to ensure that a Minimum Separation Distance of 250ft from any person, vessel, vehicle, or structure exists whilst operating in the vicinity of the Array Areas. The charting and lighting of the Projects should also be taken into account by MOD low flying units and SAR operators.

110. It is assumed that aviation stakeholders would adhere to all relevant CAA and MOD safety guidance in the conduct of their specific operations to ensure safe operations for all users of the airspace above the Projects.

111. An ERCoP would be developed and implemented for all phases of either Project.

112. Considering embedded mitigation and assuming compliance with aviation regulatory requirements, the significance of effect has been assessed to be **Moderate Significant**.

15.6.1.2.4 Significance of Effect – DBS East and DBS West Together

113. Considering embedded mitigation and assuming compliance with aviation regulatory requirements, the significance of effect has been assesradarsed to be **Moderate Significant**.

15.6.1.2.5 Mitigation and Residual Significance of Effect – DBS East or DBS West In Isolation

114. **Volume 7, Appendix 15-3 (application ref: 7.15.15.3)** assesses the impact of the Projects on helicopter access to adjacent oil and gas infrastructure.

115. For the Cygnus A and B platforms neither DBS East or DBS West would have an impact on helicopter access, however in icing conditions helicopters transiting to the Cygnus fields from Norwich Airport would have to extend routings around the Projects' Array Areas to avoid flying over wind turbines. This would marginally increase the cost of the flights.

116. If decommissioning work on Cavendish is still required, then only day VMC helicopter access would be available due to the proximity of the DBS East Array Area. Available daytime access would be an average of 93.8%, therefore this would be unlikely to impair decommissioning operations.

117. If decommissioning work on Munro is still required, then both VMC and IMC access would still be available.

118. Consultation with relevant platform operators and offshore helicopter operators is ongoing to determine whether additional mitigation plans are required to safeguard offshore oil and gas helicopter operations in the vicinity of either Projects Array Area.

119. Engagement will continue with relevant offshore stakeholders to obtain required approvals of pre-construction plans and documentation once the final design is known, including any appropriate mitigation where required, in addition to the embedded mitigation. Embedded mitigation together with any required additional mitigation would likely mean that the residual effect significance will be **Not Significant**.

15.6.1.2.6 Mitigation and Residual Significance of Effect – DBS East and DBS West Together

120. Engagement will continue with relevant stakeholders throughout the consenting process to agree any appropriate mitigation where required in addition to the embedded mitigation. Embedded mitigation together with any required additional mitigation would likely mean that the residual effect significance will be **Not Significant**.

15.6.1.3 Impact 3: Increased Air Traffic in the Area Related to Wind Farm Construction Activities

15.6.1.3.1 DBS East or DBS West In Isolation

121. Up to one helicopter return trip per day during offshore construction is anticipated. The possible increase in air traffic would bring with it the potential increased risk of aircraft collision in the airspace around either Project.

15.6.1.3.2 DBS East and DBS West Together

122. Up to two helicopter return trips per day during offshore construction are anticipated for the Projects. The impact would be similar to a Project in isolation but over a larger area and if the DBS East and DBS West Array Areas were constructed sequentially the construction phase would extend by a maximum of an additional two years to seven years.

15.6.1.3.3 Significance of Effect – DBS East or DBS West In Isolation

123. The increase in air traffic would be managed by the existing ATS infrastructure, provided in accordance with national procedures, and pilots would be expected to operate in accordance with regulatory requirements.

124. Assuming compliance with regulatory requirements and national procedures, the significance of effect on aircraft operators in the vicinity of either Project is considered to be **Not Significant**.

15.6.1.3.4 Significance of Effect – DBS East and DBS West Together

125. Assuming compliance with regulatory requirements and national procedures, the significance of effect on aircraft operators in the vicinity of the Projects is considered to be **Not Significant**.

15.6.2 Potential Effects During Operation

15.6.2.1 Impact 1: Wind Turbines Causing Permanent Interference on Staxton Wold PSR

15.6.2.1.1 DBS East or DBS West In Isolation

126. No infrastructure within the DBS East Array Area would be in RloS of Staxton Wold PSR. The DBS West Array Area would be within the operational range of Staxton Wold PSR. Radar modelling detailed in **Volume 7, Appendix 15-2 (application ref: 7.15.15.2)** shows that wind turbines with a maximum blade tip height of 396m amsl would be theoretically detectable by Staxton Wold PSR within at least 65.9% of the DBS West Array Area, and the smallest wind turbines with a maximum blade tip height of 311m amsl would be theoretically detectable by Staxton Wold PSR within at least 12.3% of the DBS West Array Area. The final number of wind turbines detected would depend on the maximum tip heights of individual wind turbines and the detailed array layouts selected at final design post-consent.

127. When operational (with blades fitted and rotating), wind turbines have the potential to generate 'clutter' (or false targets) upon radar displays because current generation PSRs are unable to differentiate between the moving blades of wind turbines and aircraft. As a consequence, radar operators can be unable to distinguish between primary radar returns generated by wind turbines and those generated by aircraft. This could compromise the ability of the MOD to undertake its Air Defence role utilising the Staxton Wold AD PSR.

128. Staxton Wold PSR has recently been upgraded to an Indra Lanza Long-Range Tactical Radar (LTR-25) system. Detailed technical information for this system is not publicly available, however for the purposes of this assessment it has been assumed that any wind turbines that would be in RloS would be detected by the radar.

15.6.2.1.2 DBS East and DBS West Together

129. Given that wind turbines would not be detectable within the DBS East Array Area, the impact would be the same as DBS West in isolation.

15.6.2.1.3 Significance of Effect – DBS East or DBS West In Isolation

130. Should DBS East be built in isolation there would be no expected impact on Staxton Wold PSR. The significance of any effect on the MOD's ability to provide security from airborne threats has been assessed to be **No Change** for DBS East in isolation.

131. Given that most of the DBS West Array Area would be in RloS of Staxton Wold PSR there is unlikely to be a layout utilising maximum height turbines that would be acceptable to the MOD without mitigation. Therefore, without additional mitigation the significance of any effect on the MOD's ability to provide security from airborne threats has been assessed to be **Major Significant** for DBS West in isolation with the largest wind turbines. For the smallest proposed wind turbines, there may be scope for a layout that would locate all turbines within the DBS West Array Area beyond RloS. Should such a layout be acceptable to the MOD then the significance of effect would be **Not Significant**.

15.6.2.1.4 Significance of Effect – DBS East and DBS West Together

132. Without additional mitigation, the significance of effect on the MOD's ability to provide security from airborne threats has been assessed to be **Major Significant** as a consequence of the Staxton Wold PSR RloS of 65.9% of DBS West for the largest wind turbines. For the smallest wind turbines, there may be scope for a layout that would locate all turbines within the DBS West Array Area beyond RloS. Should such a layout be acceptable to the MOD then the significance of effect would be **Not Significant**.

15.6.2.1.5 Mitigation and Residual Significance of Effect – DBS West In Isolation

133. In August 2019 an Air Defence and Offshore Wind (AD&OW) Windfarm Mitigation Task Force was formed as a collaborative initiative between MOD, what was then the Department for Business, Energy and Industrial Strategy (BEIS) and is now the Department for Energy Security and Net Zero (DESNZ), the Offshore Wind Industry Council and The Crown Estate. The aim of the Task Force is to enable the co-existence of UK Air Defence and offshore wind by identifying potential mitigations and supporting processes, allowing offshore wind to contribute towards meeting the UK Government's Net Zero target without degrading the nation's AD surveillance capability.

134. The AD&OW Strategy and Implementation Plan (S&IP) sets the direction for this collaboration by identifying, assessing and deploying solutions that will enable the co-existence of AD&OW operations such that neither is unduly nor excessively compromised. The S&IP may lead to significant changes to current AD PSR characteristics and capabilities that in turn affect the potential impact that either Project may have.

135. In support of the S&IP, in March 2020 the MOD Defence and Security Accelerator (DASA) and BEIS launched an Innovation Challenge to reduce and remove the impact of wind farms on the UK's AD surveillance systems by seeking technological proposals in four areas:

- Alternatives to radar;
- Technologies applied to the wind turbine or installation;
- Technologies applied to the radar, its transmission or return; and
- Technological mitigations not covered by the above.

136. Phase 1 identified mitigations such as new radar signal processing methods or radar absorbing treatments applied to wind turbines and recommended a hybrid approach involving changes to both radar and wind turbine design to solve the problem in the long term.

137. Phase 2 of the competition was launched in April 2021[2] seeking proposals to address four main subject areas:

- Reduction of clutter or the impact of clutter;
- Ensuring efficient detection and tracking time;

[2] Windfarm Mitigation for UK Air Defence - GOV.UK (www.gov.uk)

- Technologies to mitigate against larger turbine blades and wider turbine spacing development; and
- Alternate methods of surveillance.

138. Of twenty submitted proposals, contracts for seven proposals were awarded in September 2021 and completed by March 2023.

139. DASA and DESNZ launched Stream 1 of Windfarm Mitigation for UK Air Defence; Phase 3 in February 2023, building upon Phases 1 and 2 to advance innovative technologies in radar signal processing, wind turbine materials and alternative tracking approaches.

140. In August 2023, funding was awarded for two projects: a project developing passive air defence sensors to address clutter from wind turbine blades, and another project developing stealth materials for next-generation wind turbine blades. At the same time, Phase 3 Stream 2 was launched to find solutions for the modelling and testing of different mitigation technologies.

141. The ultimate aim of the S&IP is to have mitigations in place to support offshore wind developments by Q2 2025, and therefore it is expected that such mitigation will be available before the start of construction of either Project.

142. Engagement with the MOD will continue throughout the examination and post-consent periods to agree a suitable mitigation for the impact of DBS West on Staxton Wold PSR prior to operation. Notwithstanding the S&IP, the LTR-25 radar is described by the manufacturer, Indra, as being "*exceptionally effective in mitigating the effects of electronic warfare and wind farms*", so there may be scope for configuring Staxton Wold PSR to mitigate the effects of wind turbines within the DBS West Array Area, depending on the final design of the Project.

143. Following the application of additional mitigation to DBS West only, the residual significance of the effect is assessed to be **Not Significant**.

15.6.2.1.6 Mitigation and Residual Significance of Effect – DBS East and DBS West Together

144. Engagement with the MOD may be necessary to agree a suitable mitigation prior to operation for the potential impact of DBS West on Staxton Wold PSR (subject to final design).

145. Following the application of additional mitigation, the residual significance of the effect is assessed to be **Not Significant**.

15.6.2.2 Impact 2: Creation of an Aviation Obstacle Environment

15.6.2.2.1 DBS East or DBS West In Isolation

146. During the operational lifetime of either Project the infrastructure outlined in **Table 15-1** would be present within either the DBS East or the DBS West Array Area. This could pose a physical obstruction to aircraft utilising the airspace in the vicinity of either Project. An offshore platform may be located mid-way along the Offshore Export Cable Corridor, but the height of this structure is not expected to be sufficient to have an aviation impact. Depending on the final height of the platform, aviation lighting and marking, and notification to the CAA may be required for compliance with ANO legislation.

147. Specifically, permanent or temporary obstacles could increase collision risk for:

- General military low flying training and operations;
- Helicopter traffic transiting to and from offshore oil and gas helidecks;
- Helicopters utilising HMRI 8 (DBS East only); and
- Other offshore fixed-wing and helicopter operations, including those undertaking SAR missions over the southern North Sea.

15.6.2.2.2 DBS East and DBS West Together

148. The impact would be similar to a Project in isolation but over a larger area and if the DBS East and West Array Areas were constructed sequentially the operational lifetime would extend by a maximum of an additional two years, to up to 32 years.

15.6.2.2.3 Significance of Effect – DBS East or DBS West In Isolation

149. Embedded mitigation in the form of compliance with international and national requirements with respect to notification, charting, marking and lighting is summarised in **Table 15-3**. This would make pilots aware of the addition of infrastructure to the Array Area, and it is assumed that pilots would comply with aviation regulatory requirements, as detailed in section 15.6.1.2.3.

150. An ERCoP would be developed and implemented for all phases of the Projects.

151. Considering embedded mitigation and assuming compliance with aviation regulatory requirements, the significance of effect has been assessed to be **Moderate Significant**.

15.6.2.2.4 Significance of Effect – DBS East and DBS West Together

152. Considering embedded mitigation and assuming compliance with aviation regulatory requirements, the significance of effect has been assessed to be **Moderate Significant**.

15.6.2.2.5 Mitigation and Residual Significance of Effect – DBS East or DBS West In Isolation

153. **Volume 7, Appendix 15-3 (application ref: 7.15.15.3)** assesses the impact of the Projects on helicopter access to adjacent oil and gas infrastructure.

154. For the Cygnus A and B platforms neither DBS East or DBS West would have an impact on helicopter access, however in icing conditions helicopters transiting to the Cygnus fields from Norwich Airport would have to extend routings around the Projects' Array Areas to avoid flying over wind turbines. This would marginally increase the cost of the flights.

155. If decommissioning work on Cavendish is still required, then only day VMC helicopter access would be available due to the proximity of the DBS East Array Area. Available daytime access would be an average of 93.8%, therefore this would be unlikely to impair decommissioning operations.

156. If decommissioning work on Munro is still required, then both VMC and IMC access would still be available.

157. Consultation with relevant platform operators and offshore helicopter operators is ongoing to determine whether additional mitigation plans are required to safeguard offshore oil and gas helicopter operations in the vicinity of either Projects Array Area.

158. Engagement will continue with relevant offshore stakeholders to obtain required approvals of pre-construction plans and documentation once the final design is known, including any appropriate mitigation where required, in addition to the embedded mitigation. Embedded mitigation together with any required additional mitigation would likely mean that the residual effect significance will be **Not Significant**.

15.6.2.2.6 Mitigation and Residual Significance of Effect – DBS East and DBS West Together

159. Engagement will continue with relevant stakeholders throughout the consenting process to agree any appropriate mitigation where required in addition to the embedded mitigation. Embedded mitigation together with any required additional mitigation would likely mean that the residual effect significance will be **Not Significant**.

15.6.2.3 Impact 3: Increased Air Traffic in the Area Related to Wind Farm Support Activities

15.6.2.3.1 DBS East or DBS West In Isolation

160. A maximum of 20 helicopter return trips per year associated with support activities are envisaged during the operation phase. The possible increase in air traffic would bring with it the potential increased risk of aircraft collision in the airspace around either Project.

15.6.2.3.2 DBS East and DBS West Together

161. The impact would be similar to a Project in isolation but over a larger area and if the DBS East and West Array Areas were constructed sequentially the operational lifetime would extend an additional two years, up to thirty-two years.

15.6.2.3.3 Significance of Effect – DBS East or DBS West In Isolation

162. The safety of aircraft operating in Uncontrolled Airspace ultimately resides with the aircrew who would be expected to operate in accordance with regulatory requirements and who may request the provision of an ATS that would be provided in accordance with national procedures.

163. Due to the predicted low number of movements during the operation phase of either Project and assuming compliance with regulatory requirements and national procedures, the effect on aircraft operators in the vicinity of either Project is considered to be **Not Significant**.

15.6.2.3.4 Significance of Effect – DBS East and DBS West Together

164. Due to the predicted low number of movements during the operation phase of the Projects and assuming compliance with regulatory requirements and national procedures, the effect on aircraft operators in the vicinity of the Projects is considered to be **Not Significant**.

15.6.3 Potential Effects During Decommissioning

15.6.3.1 Impact 1: Impacts on Staxton Wold PSR due to Cranes and Partially Dismantled Structures

15.6.3.1.1 DBS East or DBS West In-isolation

165. During the gradual decommissioning of above sea level infrastructure within the DBS West Array Area any impact on Staxton Wold PSR would be removed. Firstly, wind turbines would be made inoperative, and the blades of wind turbines would cease rotating, before being removed from the Array Area. In addition, the mitigation applied for the operation phase would remain in place during the decommissioning phase until such time as all wind turbine blades were removed to ensure no impact on Staxton Wold PSR.

15.6.3.1.2 DBS East and DBS West Together

166. The mitigation applied for the operation phase would remain in place during the decommissioning phase until such time as all wind turbine blades were removed to ensure no impact on Staxton Wold PSR.

15.6.3.1.3 Significance of Effect – DBS East or DBS West In Isolation

167. The significance of effect is considered to be **No Change** during the decommissioning phase as either of the Project Array Areas returns to pre-development conditions.

15.6.3.1.4 Significance of Effect – DBS East and DBS West Together

168. The significance of effect is considered to be **No Change** during the decommissioning phase as the Project Array Areas return to pre-development conditions.

15.6.3.2 Impact 2: Removal of an Aviation Obstacle Environment

15.6.3.2.1 DBS East or DBS West In Isolation

169. During the decommissioning phase, the above sea level infrastructure outlined in **Table 15-1** would be removed. This would gradually reduce the physical obstruction to aircraft utilising the airspace in the vicinity of either DBS East or DBS West.

170. Specifically, permanent or temporary obstacles could increase collision risk for:

- General military low flying training and operations;
- Helicopter traffic transiting to and from offshore oil and gas helidecks;
- Helicopters utilising HMRI 8 (DBS East only); and

- Other offshore fixed-wing and helicopter operations, including those undertaking SAR missions over the southern North Sea.

15.6.3.2.2 DBS East and DBS West Together

171. The impact would be similar but over a larger area.

15.6.3.2.3 Significance of Effect – DBS East or DBS West In Isolation

172. Embedded mitigation in the form of compliance with international and national requirements with respect to notification, charting, marking, and lighting, as summarised in **Table 15-3**, would be retained until decommissioning was completed.

173. An ERCoP would be developed and implemented for all phases of either Project.

174. Any additional mitigation plans required to safeguard offshore oil and gas helicopter operations would remain in place during the decommissioning phase.

175. The effect on the aviation sector during the decommissioning phase would be reduced to pre-development conditions.

176. The significance of effect has been assessed to be **No Change** for the decommissioning phase.

15.6.3.2.4 Significance of Effect – DBS East and DBS West Together

177. Considering embedded mitigation and the retention of any required additional mitigation plans, the significance of effect has been assessed to be **No Change**.

15.6.3.3 Impact 3: Increased Air Traffic in the Area Related to Wind Farm Decommissioning Activities

15.6.3.3.1 DBS East or DBS West In Isolation

178. Up to one helicopter return trip per day during the decommissioning phase is anticipated. The possible increase in air traffic would bring with it the potential increased risk of aircraft collision in the airspace around either Project.

15.6.3.3.2 DBS East and DBS West Together

179. Up to two helicopter return trips per day during the decommissioning phase are anticipated. The impact would be similar to a Project in isolation but over a larger area and if the DBS East and West Array Areas were decommissioned sequentially the decommissioning phase would extend by an additional two years to seven years.

15.6.3.3.3 Significance of Effect – DBS East or DBS West In Isolation

180. The safety of aircraft operating in Uncontrolled Airspace ultimately resides with the aircrew who would be expected to operate in accordance with regulatory requirements and who may request the provision of an ATS that would be provided in accordance with national procedures.

181. Assuming compliance with regulatory requirements and national procedures, the effect on aircraft operators in the vicinity of either Project is considered to be **Not Significant**.

15.6.3.3.4 Significance of Effect – DBS East and DBS West Together

182. Assuming compliance with regulatory requirements and national procedures, the significance of effect on aircraft operators in the vicinity of the Projects is considered to be **Not Significant**.

15.7 Potential Monitoring Requirements

183. Monitoring requirements would be described in the **In-Principle Monitoring Plan (IPMP) (application ref: 8.22)** submitted alongside the DCO application and further developed and agreed with stakeholders prior to construction based on the IPMP and taking account of the final detailed design of the Projects. It is not anticipated, however, that any monitoring specific to aviation and radar would be required for the Projects.

15.8 Cumulative Effects Assessment

15.8.1 Screening for Cumulative Effects

184. Cumulative effects can be defined as incremental effects on that same receptor from other proposed and reasonably foreseeable schemes and developments in combination with the Projects. This includes all schemes that result in a comparative effect that is not intrinsically considered as part of the existing environment and is not limited to offshore wind projects.

185. The overarching method followed in identifying and assessing potential Cumulative Effects is set out in **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)** and **Volume 7, Appendix 6-2 Offshore CEA Methodology (application ref: 7.6.6.2)**. The overall approach is based upon the Planning Inspectorate Advice Note Seventeen: Cumulative Effects Assessment (CEA) (PINS, 2017) and Phase III Best Practice by Natural England and DEFRA (Parker et al., 2022). The approach to the CEA is intended to be specific to the Projects and takes account of the available knowledge or the environment and other activities around the Offshore Development Area.

186. The CEA has followed a four-stage approach developed from the Planning Inspectorate Advice Note Seventeen. These stages are set out in Table 1-1 of **Volume 7, Appendix 6-2 Offshore CEA Methodology (application ref: 7.6.6.2)**. Stage four of this process, the CEA assessment is undertaken in two phases. The first step in the CEA is the identification of which residual impacts assessed for the Projects on their own have the potential for a Cumulative Impact with other schemes and activities. This information is set out in **Table 15-9** which sets out the potential impacts assessed in this chapter and identifies the potential for Cumulative Effects to arise, providing a rationale for such determinations. Only potential impacts assessed in section 15.6 where the potential for Cumulative Effects has been identified (not significant, moderate significant or major significant) have been taken forward to the final CEA (i.e. those assessed as 'no change' are not taken forward, as there is no potential for them to contribute to a cumulative effect). Each project has been considered on a case by case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial / temporal scales involved.

Table 15-9 Potential Cumulative Impacts

Impact	Potential for Cumulative Effect	Data Confidence	Rationale
Construction			
Impact 1: Impacts on Staxton Wold PSR due to high construction vessels / cranes and partially complete structures	No	High	There would be no impact on Staxton Wold PSR during the construction phase, and therefore there is no potential for Cumulative Effects.
Impact 2: Creation of an aviation obstacle environment	Yes	High	Wind turbines and high construction vessels / cranes associated with other developments create aviation obstacles, restricting the available airspace.
Impact 3: Increased air traffic in the area related to wind farm construction activities	Yes	High	Air traffic activities associated with other developments have the potential to cumulatively increase the risk of aircraft collision.
Operation			
Impact 1: Wind turbines causing permanent interference on Staxton Wold PSR	Yes	High	Other wind farm projects could impact Staxton Wold PSR, increasing the area of effects.
Impact 2: Creation of an aviation obstacle environment	Yes	High	Wind turbines associated with other developments create aviation obstacles, restricting the available airspace.
Impact 3: Increased air traffic in the area related to wind farm support activities	Yes	High	Air traffic activities associated with other developments have the potential to cumulatively increase the risk of aircraft collision.

Impact	Potential for Cumulative Effect	Data Confidence	Rationale
Decommissioning			
Impact 1: Impacts on Staxton Wold PSR due to cranes and partially dismantled structures	No	High	Any mitigations required in the operation phase would remain in place until all wind turbine blades were removed. Cranes and static structures would have no impact on Staxton Wold PSR.
Impact 2: Removal of an aviation obstacle environment	No	High	Embedded mitigation and any additional mitigation would be retained until decommissioning was completed.
Impact 3: Increased air traffic in the area related to wind farm decommissioning activities	Yes	High	Air traffic activities associated with other developments have the potential to cumulatively increase the risk of aircraft collision.

15.8.2 Schemes Considered for Cumulative Effects

187. The second phase of the CEA is a project specific assessment of the potential for any significant Cumulative Effects to arise due to the construction and / or operation and maintenance of the Projects. To do this, a short-list of schemes for the CEA has been produced relevant to aviation and radar following the approach outlined in **Volume 7, Appendix 6-2 CEA Methodology (application ref: 7.6.6.2)**. The second phase of this assessment is only undertaken if the first phase identifies that Cumulative Effects are possible.

188. The CEA has been based on information available on each relevant scheme as of January 2024. It is noted that further information regarding the identified schemes may become available in the period up to construction or may not be available in detail at all prior to construction. The assessment presented here is therefore considered to be conservative, with the level of impacts expected to be reduced compared to those presented here.

189. Schemes have been assigned a tier, based on information used within the CEA. A seven tier system, based on the guidance issued by Natural England and Defra (Parker et al., 2022), has been employed as presented in **Volume 7, Appendix 6-2 Offshore CEA Methodology (application ref: 7.6.6.2)**.

190. This approach has been agreed via EIA Scoping and consultation with technical working groups and follows advice from Natural England. Further information on the methodology can be found in **Volume 7, Chapter 6 EIA Methodology (application ref: 7.6)**.

191. Types of schemes that could potentially be considered for the cumulative assessment of aviation and radar include:

- Other offshore wind farms; and
- Oil and gas platforms.

192. With respect to these types of schemes, for those that are fully operational (i.e. Tier 1 schemes) at the time of this assessment, the cumulative assessment methodology considers them to be part of the baseline conditions for the surrounding area (and assumes that any residual effect has been captured within the baseline). As such, it is not expected that the Projects would contribute to Cumulative Effects with these existing activities and, therefore, these have not been the subject of further assessment.

193. For schemes that are not currently fully operational, i.e. those in planning / pre-construction stages, or even where construction may have commenced but not yet be complete, these are screened in for further assessment in the final cumulative assessment.

194. Schemes screened in for assessment in the CEA, and their distance to the Array Areas and Offshore Export Cable Corridor for the Projects are provided below in **Table 15-10**.

Table 15-10 List of Schemes Screened for Further Assessment in the CEA

Tier	Scheme Name	Closest Distance to (km):	
		Export Cable Corridor	Array Areas
Other Offshore Wind Farms			
2	Dogger Bank A	20	8
2	Dogger Bank B	20	17
2	Sofia	49	35

Tier	Scheme Name	Closest Distance to (km):	
		Export Cable Corridor	Array Areas
2	Dogger Bank C	73	56
6	Dogger Bank D	11 (estimated)	68 (estimated)
3	Hornsea Project Four	30	41
3	Hornsea Project Three	62	45
5	Outer Dowsing	79	81

15.8.3 Assessment of Cumulative Effects

15.8.3.1 Impact 1: Wind Turbines Causing Permanent Interference on Staxton Wold PSR (Operation)

195. There is potential for a cumulative effect where radars detect the rotating blades of wind turbines from multiple offshore wind developments that are in their operational phase. This could result in a significant increase in clutter being generated on radar displays over a larger area.

196. With no mitigation in place the potential cumulative effect is assessed to be **Major Significant**.

197. However, all offshore wind farms must have any necessary radar mitigations in place before becoming operational, and any potential radar impacts from DBS West would be similarly mitigated. With such mitigations implemented the potential for Cumulative Effects on Staxton Wold PSR is assessed to be **Not Significant**.

15.8.3.2 Impact 2: Creation of an Aviation Obstacle Environment (Construction and Operation)

198. Construction of the Projects would involve the installation of infrastructure above sea level which could pose a physical obstruction to military low flying and offshore fixed wing and helicopter operations, including helicopters transiting to and from offshore oil and gas platform helidecks and helicopters engaged in SAR missions. There is potential for Cumulative Effects when also considering the infrastructure associated with other offshore schemes.

199. Specifically, any additional mitigation plans agreed with offshore platform operators and offshore helicopter operators before construction of the Projects commences should account for other operational and future developments within 9nm (16.7km) of the relevant platforms.

200. The potential cumulative effect of maritime and aviation obstacle lighting creating confusing lighting configurations to both sectors has been addressed and CAA guidance has been subject to coordination with maritime agencies. There should be no Cumulative Effects on aviation operations as compliant markings and lighting would be provided.

201. Through the use of embedded mitigation measures such as effective lighting, additional agreed mitigation plans, reliance on pilots who are required to avoid any obstacle by legislated minimum distances, and consideration of charted obstacles, the significance of the cumulative effect during the construction phase from the creation of an obstacle environment is considered to be **Not Significant**.

202. Embedded mitigations and any agreed additional mitigations would be equally applicable in the operation phase. The significance of the cumulative effect would still be **Not Significant**.

15.8.3.3 Impact 3: Increased Air Traffic in the Area Related to Wind Farm Activities (Construction, Operation and Decommissioning)

203. During the construction, operation and maintenance and decommissioning phases of the Projects there is likely to be an increase in helicopter air traffic over the current baseline levels due to the use of helicopters in the provision of support in the airspace around the Projects.

204. The predicted number of daily helicopter movements is considered to be low, however the cumulative effect of this activity and similar activities associated with the other projects included in the assessment would create a greater potential risk of mid-air collision between aircraft engaged in such operations and / or aircraft in transit across the study area.

205. The increase in air traffic would be managed by the existing ATS infrastructure, provided in accordance with national procedures, and pilots would be expected to operate in accordance with civil and military regulatory requirements. The significance of the cumulative effect is therefore considered to be **Not Significant** in EIA terms in all phases.

15.8.4 Summary of Cumulative Effects

206. The CEA for aviation and radar has not identified any schemes where significant cumulative effects could arise.

15.9 Transboundary effects

207. The Offshore Development Area would not be sited in proximity to any international aviation boundaries. CAP 764 advises wind turbine developers to contact the CAA for specific guidance when developments are likely to approach the limits of the UK FIR, and uses the existing East Anglia ONE development, which straddles the UK and Dutch FIR boundaries, as an example. The nearest international airspace boundary is 134km south-east of the Projects' Array Areas. Some UK airspace is delegated to the Netherlands, as described in section 0, but this area is approximately 41km east of the Projects' Array Areas, which is beyond the aviation and radar study area. Although airspace is used by international civil aviation, all aircraft operating in the vicinity of the Projects' Array Areas will be within UK airspace and subject to UK air traffic regulations.

208. The Projects' Array Areas would be significantly beyond the operational range of any non-UK radars, therefore wind turbines would not have any transboundary radar impacts.

209. For the above reasons, and due to the localised nature of potential impacts, significant transboundary effects on aviation and radar would not exist.

15.10 Interactions

210. The effects identified and assessed in this chapter have the potential to interact with each other. The areas of potential interaction between effects are presented in **Table 15-11**. This provides a screening tool for which effects have the potential to interact. **Table 15-12** provides an assessment for each receptor (or receptor group) as related to these impacts.

211. Within **Table 15-12** the effects are assessed relative to each development phase to see if multiple effects could increase the significance of the effect upon a receptor. Following this a lifetime assessment is undertaken which considers the potential for effect to affect receptors across all development phases.

Table 15-11 Interactions Between Impacts - Screening

Potential Interactions between Impacts			
Construction			
	Impact 1: Impacts on Staxton Wold PSR due to high construction vessels / cranes and partially complete structures	Impact 2: Creation of an aviation obstacle environment	Impact 3: Increased air traffic in the area related to wind farm construction activities
Impact 1: Impacts on Staxton Wold PSR due to high construction vessels / cranes and partially complete structures		No	No
Impact 2: Creation of an aviation obstacle environment	No		Yes
Impact 3: Increased air traffic in the area related to wind farm construction activities	No	Yes	
Operation			
	Impact 1: Wind turbines causing permanent interference on Staxton Wold PSR	Impact 2: Creation of an aviation obstacle environment	Impact 3: Increased air traffic in the area related to wind farm support activities
Impact 1: Wind turbines causing permanent interference on Staxton Wold PSR		No	No
Impact 2: Creation of an aviation obstacle environment	No		Yes
Impact 3: Increased air traffic in the area related to wind farm support activities	No	Yes	
Decommissioning			
	Impact 1: Impacts on Staxton Wold PSR due to cranes and partially dismantled structures	Impact 2: Removal of an aviation obstacle environment	Impact 3: Increased air traffic in the area related to wind farm decommissioning activities
Impact 1: Impacts on Staxton Wold PSR due to cranes and partially dismantled structures		No	No
Impact 2: Removal of an aviation obstacle environment	No		Yes
Impact 3: Increased air traffic in the area related to wind farm decommissioning activities	No	Yes	

Table 15-12 Interaction Between Impacts - Phase and Lifetime Assessment

Receptor	Highest Significance Level				
	Construction	**Operation**	**Decommissioning**	**Phase Assessment**	**Lifetime Assessment**
MOD (Staxton Wold PSR)	No Change	Not Significant	No Change	No greater than individually assessed impact. The impact on Staxton Wold PSR from wind turbines in the operation phase is the only impact identified, therefore no potential interactions between impacts exist.	No greater than individually assessed impact. The impact on Staxton Wold PSR is restricted to the operation phase, therefore no potential interactions between phases exist.
Military low flying	Not Significant	Not Significant	Not Significant	No greater than individually assessed impact. There is potential interaction between impacts identified in each phase, however all potential effects are not significant and localised in nature.	No greater than individually assessed impact. All potential effects are not significant and localised in nature, limiting the potential for different impacts to interact across the different phases.
Helicopter traffic transiting to and from offshore oil and gas helidecks	Not Significant	Not Significant	Not Significant	No greater than individually assessed impact. There is potential interaction between impacts identified in each phase, however all potential effects are not significant and localised in nature.	No greater than individually assessed impact. All potential effects are not significant and localised in nature, limiting the potential for different impacts to interact across the different phases.
Helicopters utilising HMRI 8	Not Significant	Not Significant	Not Significant	No greater than individually assessed impact. There is potential interaction between impacts identified in each phase, however all potential effects are not significant and localised in nature.	No greater than individually assessed impact. All potential effects are not significant and localised in nature, limiting the potential for different impacts to interact across the different phases.
Other offshore fixed-wing and helicopter operations, including SAR	Not Significant	Not Significant	Not Significant	No greater than individually assessed impact. There is potential interaction between impacts identified in each phase, however all potential effects are not significant and localised in nature.	No greater than individually assessed impact. All potential effects are not significant and localised in nature, limiting the potential for different impacts to interact across the different phases.

15.11 Inter-relationships

212. For Aviation and Radar potential inter-relationships between other topics assessed within this ES include Infrastructure and Other Users, Landscape and Visual Impact Assessment, and Shipping and Navigation. A summary of the potential inter-relationships is provided in **Table 15-13**.

Table 15-13 Aviation and Radar Inter-relationships

Topic and Description	Related Chapter	Where Addressed in this Chapter	Rationale
Operation			
Aviation lighting fitted to offshore wind turbines.	**Volume 7, Chapter 14 Shipping and Navigation (application ref: 7.14)** **Volume 7, Chapter 23 Landscape and Visual Impact Assessment (application ref: 7.23)**	Section 15.3.3.	Potential concerns from the maritime community and visual effects associated with lighting.
Creation of an aviation obstacle environment. Increased air traffic in the area related to wind farm activities.	**Volume 7, Chapter 14 Shipping and Navigation (application ref: 7.14)** **Volume 7, Chapter 16 Infrastructure and Other Users (application ref: 7.16)**	Sections 15.6.2.2 and 15.6.2.3.	Impacts on helicopter traffic associated with oil and gas and SAR operations.

15.12 Summary

213. This chapter has provided a characterisation of the existing environment for aviation and radar based on existing publicly available data. The desk-based assessment has considered effects with respect to impacts on radar and UK airspace predicted due to the physical presence of the Projects and associated air traffic during the construction, operation and decommissioning phases. Potential impacts are physical obstruction to aircraft, increased air traffic in the area related to wind farm activities, and interference on radars caused by rotating wind turbine blades.

214. Potentially affected aviation stakeholders include military radar facilities, and offshore fixed-wing and helicopter flights such as military low flying, SAR operations, and helicopter support for the oil and gas industry.

215. A range of mitigation measures will be embedded in the Projects' design to reduce potential aviation effects. These include the development of an ERCoP to mitigate the effects on SAR operations, notification to aviation stakeholders of the location and height of all structures during construction of the wind farms, and an aviation obstacle lighting scheme agreed with the relevant authorities.

216. Consultation is ongoing with aviation stakeholders to agree additional appropriate mitigations to safeguard offshore oil and gas helicopter operations.

217. Potential technical mitigation solutions for AD radar interference are being sought and such solutions will be discussed and agreed with the MOD.

218. No other significant effects on aviation and radar have been identified.

219. **Table 15-14** presents a summary of the effects assessment undertaken with respect to the Projects in relation to Aviation and Radar.

Table 15-14 Summary of Potential Likely Significant Effects on Aviation and Radar

Potential Impact	Receptor	Pre-mitigation Effect	Mitigation Measures Proposed	Residual Effect	Residual Cumulative Effect
Construction					
Impact 1: Impacts on Staxton Wold PSR due to high construction vessels / cranes and partially complete structures.	MOD	No Change	N/A	No Change	No Change
Impact 2: Creation of an aviation obstacle environment.	Military low flying Helicopter traffic transiting to and from offshore oil and gas helidecks Helicopters utilising HMRI 8 Other offshore fixed-wing and helicopter operations, including SAR	Moderate Significant	Consultation with offshore platform and helicopter operators to agree appropriate mitigation to safeguard oil and gas helicopter operations.	Not Significant	Not Significant
Impact 3: Increased air traffic in the area related to wind farm construction activities.	Military low flying Helicopter traffic transiting to and from offshore oil and gas helidecks Helicopters utilising HMRI 8 Other offshore fixed-wing and helicopter operations, including SAR	Not Significant	N/A	Not Significant	Not Significant
Operation					
Impact 1: Wind turbines causing permanent interference on Staxton Wold PSR	MOD	Major Significant	Technical mitigation solution to be agreed with MOD.	Not Significant	Not Significant
Impact 2: Creation of an aviation obstacle environment.	Military low flying Helicopter traffic transiting to and from offshore oil and gas helidecks Helicopters utilising HMRI 8 Other offshore fixed-wing and helicopter operations, including SAR	Moderate Significant	Consultation with offshore platform and helicopter operators to agree appropriate mitigation to safeguard oil and gas helicopter operations.	Not Significant	Not Significant

Potential Impact	Receptor	Pre-mitigation Effect	Mitigation Measures Proposed	Residual Effect	Residual Cumulative Effect
Impact 3: Increased air traffic in the area related to wind farm support activities.	Military low flying Helicopter traffic transiting to and from offshore oil and gas helidecks Helicopters utilising HMRI 8 Other offshore fixed-wing and helicopter operations, including SAR	Not Significant	N/A	Not Significant	Not Significant
Decommissioning					
Impact 1: Impacts on Staxton Wold PSR due to cranes and partially dismantled structures.	MOD	No Change	N/A	No Change	No Change
Impact 2: Removal of an aviation obstacle environment.	Military low flying Helicopter traffic transiting to and from offshore oil and gas helidecks Helicopters utilising HMRI 8 Other offshore fixed-wing and helicopter operations, including SAR	No Change	N/A	No Change	No Change
Impact 3: Increased air traffic in the area related to wind farm decommissioning activities.	Military low flying Helicopter traffic transiting to and from offshore oil and gas helidecks Helicopters utilising HMRI 8 Other offshore fixed-wing and helicopter operations, including SAR	Not Significant	N/A	Not Significant	Not Significant

References

CAA (2022a) CAP 168: Licensing of Aerodromes. Available at: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=6114 (Accessed: 21 November 2023).

CAA (2023a) CAP 032: UK Aeronautical Information Publication. Available at: https://nats-uk.ead-it.com/cms-nats/opencms/en/Publications/AIP/ (Accessed: 21 November 2023).

CAA (2023b) CAP 437: Standards for offshore helicopter landing areas. Available at: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=523 (Accessed: 21 November 2023).

CAA (2019) CAP 670: Air Traffic Services Safety Requirements. Available at: https://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=9124 (Accessed: 21 November 2023).

CAA (2016) CAP 764: Policy and Guidelines on Wind Turbines. Available at: https://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=5609 (Accessed: 21 November 2023).

CAA (2021a) CAP1616: Airspace change. Available at: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8127 (Accessed: 21 November 2023).

CAA (2022b) Air Navigation Order 2016/765. Available at: https://www.caa.co.uk/uk-regulations/aviation-safety/civil-aviation-act-1982-the-ano-2016-the-rules-of-the-air-2015-and-the-dg-regulations-2002/the-civil-aviation-air-navigation-order-2016/ (Accessed: 21 November 2023).

CAA (2021b) ORS4 No. 1496: Standardised European Rules of the Air – Exceptions to the Minimum Height Requirements. Available at: http://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=10504 (Accessed: 21 November 2023).

DECC (2011a) Overarching National Policy Statement for Energy (EN-1). Presented to Parliament pursuant to Section 5(9) of the Planning Act 2008. The Stationary Office, London. Available at: https://assets.publishing.service.gov.uk/media/5a79522de5274a2acd18bd53/1938-overarching-nps-for-energy-en1.pdf (Accessed: 21 November 2023).

DECC (2011b) National Policy Statement for Renewable Energy Infrastructure (EN-3). Presented to Parliament pursuant to Section 5(9) of the Planning Act 2008. The Stationary Office, London. Available at: https://assets.publishing.service.gov.uk/media/5a79c422e5274a684690bf53/1940-nps-renewable-energy-en3.pdf (Accessed: 21 November 2023).

DECC (2011c) National Policy Statement for Electricity Networks Infrastructure (EN-5). Presented to Parliament pursuant to Section 5(9) of the Planning Act 2008. The Stationary Office, London. Available at:

https://assets.publishing.service.gov.uk/media/5a74877840f0b61938c7e2d9/1942-national-policy-statement-electricity-networks.pdf (Accessed: 21 November 2023).

DESNZ (2023a). Overarching National Policy Statement for Energy (EN-1). Available at: <https://assets.publishing.service.gov.uk/media/655dc190d03a8d001207fe33/overarching-nps-for-energy-en1.pdf>.

DESNZ (2023b). National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: <https://assets.publishing.service.gov.uk/media/655dc352d03a8d001207fe37/nps-renewable-energy-infrastructure-en3.pdf>.

DESNZ (2023c). National Policy Statement for Electricity Networks (EN-5). Available at: < https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf>.

ICAO (2022) Annex 14 - Aerodromes - Volume I - Aerodromes Design and Operations. Available at: https://store.icao.int/en/annex-14-aerodromes (Accessed: 21 November 2023).

Lepic, B. (2020). Green light to Ineos for Cavendish field decommissioning plan. *Offshore Energy*. [Online]. Available at: https://www.offshore-energy.biz/green-light-to-ineos-for-cavendish-field-decommissioning-plan/ [Accessed 8 January 2024].

MOD (2023) UK Military Aeronautical Information Publication. Available at: https://www.aidu.mod.uk/aip/aipVolumes.html (Accessed: 21 November 2023).

MOD (2020) MOD Obstruction Lighting Guidance. Available at: https://cdn.ymaws.com/www.renewableuk.com/resource/collection/0B792CF1-8B8A-474B-95B6-17886BF724A7/20190002-Windfarm_lighting_review__002_.pdf (Accessed: 21 November 2023).

MCA (2021a) MGN 654 Safety of navigation: OREIs – Guidance on UK navigational practice, safety and emergency response. Available at: https://www.gov.uk/government/publications/mgn-654-mf-offshore-renewable-energy-installations-orei-safety-response (Accessed: 21 November 2023).

MCA (2021b) Offshore Renewable Energy Installations: Requirements, guidance and operational considerations for SAR and Emergency Response. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1034158/OREI_SAR_Requirements_v3.pdf (Accessed: 21 November 2023).

RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Windmill Hill Business Park
Whitehill Way
Swindon
Wiltshire, SN5 6PB