Morecambe Offshore Windfarm: Generation Assets

Environmental Statement

Volume 5

Chapter 16 Civil and Military Aviation and Radar

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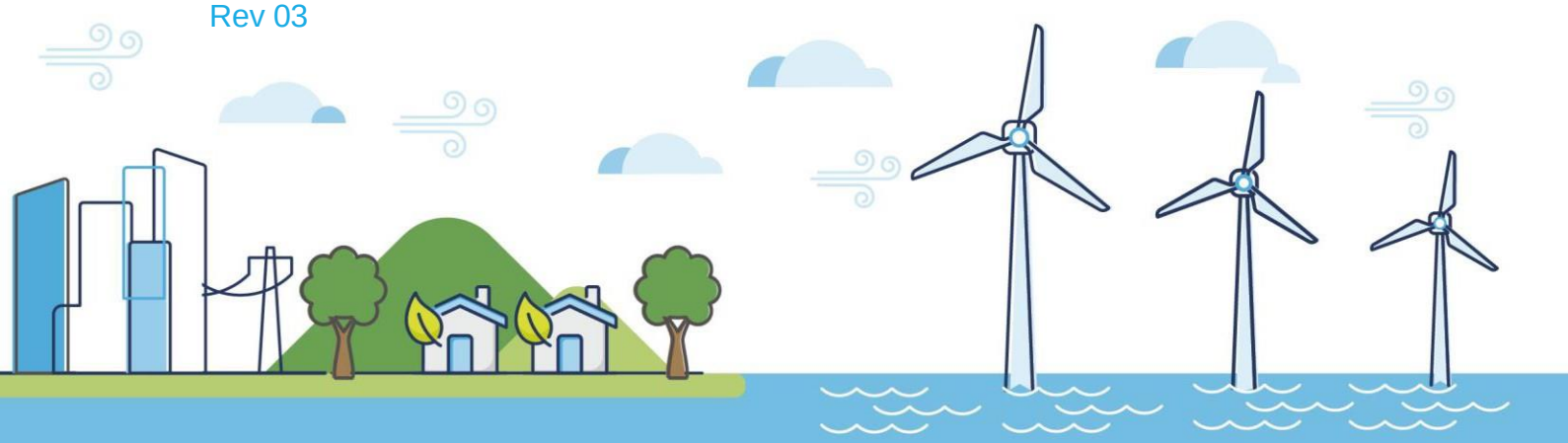

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Glossary of Acronyms

ADR	Air Defence Radar
AIC	Aeronautical Information Circulars
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Service
AMA	Area Minimum Altitudes
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
AyM	Awel y Môr
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAT	Commercial Air Transport
CEA	Cumulative Effect Assessment
CNS	Communications, Navigation and Surveillance
CTA	Control Area
DA	Danger Area
DCO	Development Consent Order
DESNZ	Department for Energy Security and Net Zero
DGC	Defence Geographic Centre
EEA	European Economic Area
EIA	Environmental Impact Assessment
EMF	Electro-Magnetic Field
ERCoP	Emergency Response Cooperation Plan
ES	Environmental Statement
FIR	Flight Information Region
GASCo	General Aviation Safety Council
HAT	Highest Astronomical Tide
HRA	Habitats Regulations Assessment
HTZ	Helicopter Traffic Zone
IAA	Irish Aviation Authority
ICAO	International Civil Aviation Organisation

IFP	Instrument Flight Procedures
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
LMP	Lighting Management Plan
LSE	Likely Significance Effect
MAA	Military Aviation Authority
MCA	Maritime and Coastguard Agency
MGN	Marine Guidance Note
MOD	Ministry of Defence
MSA	Minimum Sector Altitudes
NATS	National Air Traffic Services
NOTAM	Notice to Airmen
NPS	National Policy Statement
NRA	Navigation Risk Assessment
NSIP	Nationally Significant Infrastructure Project
OLS	Obstacle Limitation Surfaces
OREI	Offshore Renewable Energy Installations
OSP	Offshore substation platform(s)
PDE	Project Design Envelope
PEIR	Preliminary Environmental Information Report
PEXA	Practice and Exercise Areas
PINS	Planning Inspectorate
PSR	Primary Surveillance Radar
RAF	Royal Air Force
REWS	Radar Early Warning Systems
RLoS	Radar Line of Sight
RNP	Required Navigation Performance
SAR	Search and Rescue
SARP	Standards and Recommended Practices
SLVIA	Seascape, Landscape and Visual Impact Assessment
SMAA	Surveillance Minimum Altitude Area
SMS	Safety Management System
SSR	Secondary Surveillance Radars
TAA	Terminal Arrival Altitudes
TAP	Terminal Approach Procedures
TMZ	Transponder Mandatory Zone

TOPA	Technical and Operational Assessment
TRA	Temporary Reserved Area
UK	United Kingdom
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WTG	Wind turbine generator

Glossary of Unit Terms

ft	feet
km	kilometre
m	metre
nm	nautical mile

Glossary of Terminology

Air Navigation Service Provider (ANSP)	A public or private entity managing air traffic on behalf of a company, region or country. National Air Traffic Services (NATS) is the main ANSP in the UK.
Applicant	Morecambe Offshore Windfarm Ltd
Application	This refers to the Applicant's application for a Development Consent Order (DCO). An application consists of a series of documents and plans which are published on the Planning Inspectorate's (PINS) website.
Controlled airspace	Controlled airspace is airspace of defined dimensions within which pilots must follow Air Traffic Control (ATC) instructions implicitly. In the UK, Class A, C, D and E are areas of controlled airspace.
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.
Generation Assets (the Project)	Generation assets associated with the Morecambe Offshore Windfarm. This is infrastructure in connection with electricity production, namely the fixed foundation wind turbine generators (WTGs), inter-array cables, offshore substation platform(s) (OSP(s)) and possible platform link cables to connect OSP(s).
Instrument Flight Procedure (IFP)	An IFP is a published procedure used by aircraft flying in accordance with Instrument Flight Rules and is designed to facilitate safe and efficient aircraft operations. It is a description of a series of predetermined flight manoeuvres by reference to flight instruments, published by electronic and/or printed means.
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) (weather conditions that require pilots to fly primarily by reference to flight instruments)
Inter-array cables	Cables which link the wind turbine generators to each other and the OSP(s).
Landfall	Where the offshore export cables would come ashore.
Likely Significant Effect (LSE)	Meaning that there may be (as opposed to is likely to be) a significant effect of a proposal on the integrity of the site and its conservation objectives.

Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The transmission assets for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. This includes the OSP(s)[1], interconnector cables, Morgan offshore booster station, offshore export cables, landfall site, onshore export cables, onshore substations, 400kV cables and associated grid connection infrastructure such as circuit breaker infrastructure. Also referred to in this chapter as the Transmission Assets, for ease of reading.
Nacelle	The part of the turbine that houses all of the generating components.
Offshore substation platform(s)	A fixed structure located within the windfarm site, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Platform link cable	An electrical cable which links one or more OSP(s).
Primary Surveillance Radar (PSR)	A radar system that measures the bearing and distance of targets using the detected reflections of radio signals.
Radar Line of Sight (RLoS)	RLoS is the direct path from a radar to a target. Radio signals are generally bent or refracted downward in the earth's atmosphere, extending the radar horizon beyond the optical horizon. RLoS calculations account for refraction by assuming a 4/3 effective earth radius.
Secondary Surveillance Radar (SSR)	A radar system that transmits interrogation pulses and receives transmitted responses from suitably equipped targets.
Study area	This is an area which is defined for each Environmental Impact Assessment (EIA) topic which includes the windfarm site as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each EIA topic is intended to cover the area within which an effect can be reasonably expected. For this topic, the study area includes the windfarm site and the airspace between the windfarm site and the UK mainland and the Isle of Man. The study area extends to the radar facilities at Lowther Hill to the north, Brizlee Wood to the northeast, Staxton Wold to the east, Neatishead to the southeast, Clee Hill to the south, Valley to the southwest, Isle of Man to the west and West Freugh to the northwest.

[1] At the time of writing the Environmental Statement (ES), a decision had been taken that the offshore substation platforms (OSP(s)) would remain solely within the Generation Assets application and would not be included within the Development Consent Order application for the Transmission Assets. This decision post-dated the Preliminary Environmental Information Report (PEIR) that was prepared for the Transmission Assets. The OSP(s) are still included in the description of the Transmission Assets for the purposes of this ES as the cumulative effects assessment carried out in respect of the Generation/Transmission Assets is based on the information available from the Transmission Assets PEIR.

Technical stakeholders	Technical stakeholders are considered to be organisations with detailed knowledge or experience of the area within which the Project is located and/or receptors which are considered in the EIA and Habitats Regulations Assessment (HRA). Examples of technical stakeholders include Marine Management Organisation, local authorities, Natural England, Royal Society for the Protection of Birds, Civil Aviation Authority (CAA), National Air Traffic Services (NATS) and Ministry of Defence (MOD).
Transponder mandatory zone (TMZ)	An airspace of defined dimensions wherein the carriage and operation of pressure-altitude reporting transponders is mandatory.
Unconstrained Areas	Areas within the windfarm site where WTGs or OSP(s) would be located, used when developing layout scenarios within the windfarm site and secured in the DCO by Protective Provisions in favour of the affected platform owner.
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 (represent the weather conditions that permit pilots to operate an aircraft primarily using visual navigation techniques)
Wind turbine generator (WTG)	A fixed structure located within the windfarm site that converts the kinetic energy of wind into electrical energy.
Windfarm site	The area within which the WTGs, inter-array cables, OSP(s) and platform link cables would be present.

MORECAMBE

16

The future of renewable energy

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16 Civil and Military Aviation and Radar

16.1 Introduction

16.1 This chapter of the Environmental Statement (ES) considers the potential effects of the proposed Morecambe Offshore Windfarm Generation Assets (the Project) on civil and military aviation and radar. This chapter provides an overview of the existing environment, followed by an assessment of the potential effects and associated mitigation, where identified, for the construction, operation and maintenance and decommissioning phases.

16.2 The Project includes the Generation Assets to be located within the windfarm site (wind turbine generators (WTGs), inter-array cables, offshore substation platform(s) (OSP(s)) and possible platform link cables to connect offshore substations). The Environmental Impact Assessment (EIA) of the Morgan and Morecambe Offshore Wind Farms: Transmission Assets, including offshore export cables to landfall and onshore infrastructure, is part of a separate Development Consent Order (DCO) application as outlined in **Chapter 1 Introduction** (Document Reference 5.1.1).

16.3 This assessment has been undertaken with specific reference to the relevant legislation and guidance, of which the primary sources are the National Policy Statements (NPS). Details of these and the methodology used for the EIA and Cumulative Effect Assessment (CEA) are presented in **Chapter 6 EIA Methodology** (Document Reference 5.1.6) and **Section 16.7** of this chapter.

16.4 This assessment should be read in conjunction with the following linked ES chapters and supporting documentation:

- **Chapter 14 Shipping and Navigation** (Document Reference 5.1.14) - due to the potential obstacle to vessels operating/navigating and marine activities associated with Search and Rescue (SAR) operations
- **Chapter 17 Infrastructure and Other Users** (Document Reference 5.1.17) - which considers oil and gas activities
- **Appendix 17.1 Helicopter Access Study** (Document Reference 5.2.17.1) - assesses the potential effects the Project could have on adjacent gas production infrastructure by identifying the baseline helicopter access and any potential changes to access with the Project in place
- **Chapter 18 Seascape, Landscape and Visual Impact Assessment (SLVIA)** (Document Reference 5.1.18) - due to the effect of aviation lighting
- **Chapter 12 Offshore Ornithology** (Document Reference 5.1.12) - due to the effect of aviation lighting

16.5 Inter-relationships with these chapters are further described in **Section 16.9**.

16.6 Additional information to support the civil and military aviation and radar assessment includes:

- **Appendix 16.1 Airspace Analysis and Radar Modelling** (Document Reference 5.2.16.1)
- **Appendix 16.2 Blackpool Instrument Flight Procedure Safeguarding Report** (Document Reference 5.2.16.2)
- **Appendix 16.3 Other Instrument Flight Procedure Assessments** (Document Reference 5.2.16.3)

16.7 **Appendix 16.1** identifies the radars liable to detect the Project and gives details of the Radar Line of Sight (RLoS) analyses undertaken. It also sets out a detailed analysis of the airspace occupied by the windfarm site and summarises the effects that the Project is likely to have on aviation activities in the vicinity.

16.8 **Appendix 16.2** assesses the potential effects the Project could have on Blackpool Airport's published IFPs.

16.9 **Appendix 16.3** assesses the potential effects the Project could have on published IFPs for Isle of Man, Liverpool, Manchester, Royal Air Force (RAF) Valley, Walney, Warton and RAF Woodvale aerodromes.

16.2 Consultation

16.10 Consultation in regard to civil and military aviation and radar has been undertaken in line with the general process described in **Chapter 6 EIA Methodology**. The key consultation elements to date have included scoping (Scoping Opinion from the Planning Inspectorate (PINS) received on the 2nd August 2022), comments received on the Preliminary Environmental Impact Report (PEIR) which was published for statutory consultation in April 2023 and targeted consultation with interested parties, including oil and gas operators, the Civil Aviation Authority (CAA), National Air Traffic Services (NATS), the Ministry of Defence (MOD) and civil airports.

16.11 The feedback received throughout this consultation process has been considered in preparing the ES. The key elements pertinent to this chapter are shown in **Table 16.1**, alongside details of how the Project team has had regard to the comments received and how these have been addressed within this chapter.

16.12 Relevant consultation is also provided in **Chapter 14 Shipping and Navigation** and **Chapter 17 Infrastructure and Other Users.**

16.13 The consultation process is described further in **Chapter 6 EIA Methodology**. Full details of the consultation undertaken throughout the EIA process is

presented in the Consultation Report (Document Reference 4.1) which is submitted with the DCO Application.

Table 16.1 Consultation responses received in relation to civil and military aviation and radar and how these have been addressed in the ES

Consultee	Date	Comment	Response/where addressed in the ES
Pre Scoping Consultation			
Spirit Energy and Harbour Energy	Regular meetings, initiated in 2019	The location of the Project windfarm site was selected with coordination and coexistence with other activities, developers and operators in mind. The Project has been engaging with Spirit Energy and Harbour Energy since 2019.	Assessments of impacts to oil and gas infrastructure are assessed in detail in **Chapter 17 Infrastructure and Other Users and Chapter 14 Shipping and Navigation**, with impacts to helicopter operations also considered in this chapter. Full details of meetings are detailed in the Consultation Report submitted as part of the DCO Application.
MOD	31st March 2022 Pre-Scoping Response Ref DIO10054567	The turbines will be 39.7km from and detectable by the Air Traffic Control (ATC) radar at Warton Aerodrome.	Detectability from the ATC radar at Warton was noted. However, in subsequent consultation responses (see comments from MOD under 'Statutory consultation feedback on the PEIR' and 'Targeted consultation post -Scoping/PEIR consultation' below), the MOD has since stated that the Project would not have an operational impact on Warton Primary Surveillance Radar (PSR) so further assessment of the receptor is considered unnecessary.
		The turbines will be 117.1km from and detectable by the ATC radar at Great Dun Fell which provides a data feed to the ATC Radar at Warton Aerodrome.	Noted. However, in its subsequent consultation response (see comment from MOD under 'Statutory consultation feedback on the PEIR' below), MOD has stated that it does not anticipate that the Project would have an operational impact on Warton PSR so further assessment of the receptor is considered unnecessary.
		The proposed windfarm development has the potential to present an obstacle to military vessels operating/navigating within this area. Therefore, the MOD has concerns.	Potential impacts to military vessels operating in the area are considered in relation to impacts on communications, radar and positioning in **Appendix 14.1 Navigation Risk Assessment** (NRA) (Document

Consultee	Date	Comment	Response/where addressed in the ES
			Reference 5.2.14.1) as part of **Chapter 14 Shipping and Navigation**.
		Fixed wing military low flying training takes place throughout the United Kingdom down to a height of 250ft above ground level and in certain designated areas down to a height of 100ft above ground level. A turbine development of the height and at the location you propose may have an impact on low flying operations. We have produced a map which indicates areas in the UK where the MOD is more likely or less likely to object to wind turbine planning applications on the grounds of interference with low flying operations.	Noted. Obstruction impacts during the three Project phases are discussed in **Sections 16.6.2.2, 16.6.3.2** and **16.6.4.2** (as well as cumulatively in **Section 16.7**).
		Regardless of whether we object to your proposal, it is probable the MOD will request the turbines be fitted with MOD accredited visible or infrared aviation safety lighting.	Noted. Included within embedded mitigation outlined in **Section 16.3.3.**
		The Met Office is now a statutory consultee for planning relating to their technical infrastructure, therefore the MOD has not informed the Met Office of this pre-application. If your development falls within any of the Met Office safeguarded zones you will need to contact the Met Office directly.	Noted. The windfarm site is outside all Met Office consultation zones.

Consultee	Date	Comment	Response/where addressed in the ES
Scoping Opinion responses			
NATS	19th July 2022 Scoping Response supplied to PINS	Following a preliminary assessment, NATS anticipates an unacceptable impact from the proposal. Accordingly, it wishes to raise the Applicant's awareness in respect of identifying and assessing the potential impact on Aviation in its supporting documentation and planning application.	Noted and continued consultation has been undertaken. NATS has confirmed that a radar mitigation solution is available, as described in this table below.
		NATS remains at the Applicant's and the Inspectorate's disposal in respect of providing further advice. To this effect it also recommends a windfarm pre-planning assessment is undertaken so that NATS's position can be confirmed.	Noted. Pre-planning advice was requested and NATS provided a Technical and Operational Assessment (TOPA) for the Project on 10th March 2023 as detailed below in this table.
MOD	21st July 2022 Scoping Response supplied to PINS Ref: DIO10054567	The use of airspace in the vicinity of the proposed development for defence purposes has been appropriately identified. The Scoping Report highlights the aviation and radar systems that may be affected by the proposed windfarm and the MOD is identified as a relevant receptor in Section 8.10 Civil and military aviation of the Scoping Report.	Noted.
		The report correctly identifies that the proposed turbines will be detectable to PSR at Warton Aerodrome and has been scoped in. The report also notes that the development would have no impact on the operation and capability of any Air	Noted. However, in subsequent consultation responses (see comments from MOD under 'Statutory consultation feedback on the PEIR' and 'Targeted consultation Post Scoping/PEIR Consultation' below), the MOD has since stated that the Project would not have an operational impact on Warton PSR so further

Consultee	Date	Comment	Response/where addressed in the ES
		Defence Radars (ADR), this has also been scoped out.	assessment of the receptor is considered unnecessary.
		Impact on military low flying has been scoped in and the applicant states in the Scoping Report that they are committed to lighting and charting the turbines. In the interests of air safety, the MOD would request that the development be fitted with MOD accredited aviation safety lighting in accordance with the Civil Aviation Authority, Air Navigation Order 2016.	Noted, included within embedded mitigation outlined in **Section 16.3.3.**
PINS	2nd August 2022	The Scoping Report seeks to scope out impacts to Secondary Surveillance Radar (SSR) systems, on the basis that the wind turbine generators would be located 33km away from the nearest SSR facility at St Annes. However, given the concerns raised by NATS (see Appendix 2 of this Opinion), the Inspectorate does not consider that it has enough information to scope out this matter at present. Accordingly, the ES should include an assessment of this matter or information demonstrating agreement with the relevant consultation bodies and the absence of likely significant effect (LSE).	WTG effects on Secondary Surveillance Radars (SSRs) is discussed at **Section 16.5**. The windfarm site is outside the NATS recommended 28km SSR safeguarded zone, and the NATS TOPA does not predict any impacts on SSR facilities.
		The Scoping Report seeks to scope out transboundary impacts on the grounds that the effects on aviation are expected to be localised. The distance between the Proposed Development and the Shannon Flight Information Region (FIR) boundary	Noted.

Consultee	Date	Comment	Response/where addressed in the ES
		is 119km which puts it beyond the responsibility of the Irish Aviation Authority. As such the Applicant considers there would be no transboundary effects. The Inspectorate agrees that this matter can be scoped out of further assessment.	
		The Scoping Report does not describe the study area used to assess the effects on civil and military aviation receptors. The ES must clearly describe the study area(s) and explain why it is sufficient in extent to support the identification of LSE. The Applicant should seek to agree the study area and receptors with relevant consultation bodies. The ES should include figures to identify the final study area and location of any receptors considered in the assessment.	The study area is defined in **Section 16.3.1**. No comment has been received on the study area through the pre-application consultation process.
		It is noted that the measures listed include implementing aids to navigation such as lighting as advised by various consultees including the MOD. Unless otherwise agreed with relevant stakeholders, including the MOD, the ES should explain how the Proposed Development would be fitted with MOD accredited aviation safety lighting in accordance with the Civil Aviation Authority Air Navigation Order 2016.	Noted, included within embedded mitigation (**Section 16.3.3**). Lighting and marking would be agreed post-consent.

Consultee	Date	Comment	Response/where addressed in the ES
Statutory consultation feedback on the PEIR			
Isle of Man Airport	2nd June 2023	As an airport, we take the safety and security of our passengers, employees, and aircraft very seriously, and we understand that the development of offshore wind farm can potentially impact aviation safety. To ensure the safety of aircraft operating in the vicinity of offshore wind farms, it is essential that appropriate mitigation measures are put in place to ensure that any potential impacts on aviation safety are identified and addressed. This includes conducting thorough impact assessments, technical safeguarding assessments of aerodrome navigation systems, developing appropriate mitigation measures, and regularly monitoring the wind farm's impact on aviation safety to ensure that these measures remain effective.	Impact on Isle of Man PSR considered in **Section 16.5.2.5** and discussed in **Section 16.6.3.1** and **Section 16.7**. Consultation is ongoing with the Airport noting the airport's main concern is the potential technical impact of WTGs from a number of projects on the radar's processing capacity.
Barrow Offshore Wind Farm (Ørsted)	2nd June 2023	Helicopter activity: It is difficult to quantify the level of impact helicopter usage during the construction and operation of the Morecambe Offshore Wind Project. No heliport site(s) or transit route(s) have been identified within the PEIR documentation. We would appreciate if more information on this could be provided so we can properly understand and respond to the	The maximum number of helicopter return trips during the three Project phases is detailed in **Table 16.2**. Helicopter operations would be conducted in Class G (uncontrolled) airspace in Visual Meteorological Conditions (VMC) and pilots would follow the principle of 'see and avoid'. It is anticipated that during the construction and operation and maintenance phases helicopters would route from Blackpool Airport or Liverpool Airport,

Consultee	Date	Comment	Response/where addressed in the ES
		potential impacts and mitigations being proposed.	however this is indicative at this stage and subject to change. A meeting was held between Ørsted and the Applicant on the 25th October 2023 noting that further information can be provided in relation to planned helicopter support operations when known, noting full details would be developed post-consent.
		Emergency response We would be happy to discuss with you appropriate communication and collaboration between Barrow, Morecambe Offshore Wind Project, and other nearby offshore wind developments in circumstances where emergency responses are required, for example in the event of accidents or pollution spills.	Noted. An Emergency Response and Cooperation Plan (ERCoP) would be drafted post-consent and lines of communications have been established with the Applicant and existing operational windfarms in the region.
Burbo Bank Offshore Wind Farm (Ørsted)	2nd June 2023	Helicopter activity It is difficult to quantify the level of impact helicopter usage during the construction and operation of the Morecambe Offshore Wind Project. No heliport site(s) or transit route(s) have been identified within the PEIR documentation. We would appreciate if more information on this could be provided so we can properly understand and respond to the potential impacts and mitigations being proposed.	The maximum number of helicopter return trips during the three Project phases is detailed in **Table 16.2**. Helicopter operations would be conducted in Class G (uncontrolled) airspace in VMC and pilots would follow the principle of 'see and avoid'. It is anticipated that during the construction and operation and maintenance phases helicopters would route from Blackpool Airport or Liverpool Airport, however this is indicative at this stage and subject to change. A meeting was held between Ørsted and the Applicant on the 25th October 2023 noting that further information can be provided in relation to planned helicopter support operations when known, noting full details would be developed post-consent.

Consultee	Date	Comment	Response/where addressed in the ES
		Emergency response We would be happy to discuss with you appropriate communication and collaboration between Burbo Bank, Morecambe Offshore Wind Project, and other nearby offshore wind developments in circumstances where emergency responses are required, for example in the event of accidents or pollution spills.	Noted. An ERCoP would be drafted post-consent and lines of communications have been established with the Applicant and existing operational windfarms in the region.
Burbo Bank Extension Offshore Wind Farm (Ørsted, PKA, Kirkbi)	2nd June 2023	Helicopter activity It is difficult to quantify the level of impact helicopter usage during the construction and operation of the Morecambe Offshore Wind Project. No heliport site(s) or transit route(s) have been identified within the PEIR documentation. We would appreciate if more information on this could be provided so we can properly understand and respond to the potential impacts and mitigations being proposed.	The maximum number of helicopter return trips during the three Project phases is detailed in **Table 16.2.** Helicopter operations would be conducted in Class G (uncontrolled) airspace in VMC and pilots would follow the principle of 'see and avoid'. It is anticipated that during the construction and operation and maintenance phases helicopters would route from Blackpool Airport or Liverpool Airport, however this is indicative at this stage and subject to change. A meeting was held between Ørsted and the Applicant on the 25th October 2023 noting that further information can be provided in relation to planned helicopter support operations when known, noting full details would be developed post-consent.
		Emergency response We would be happy to discuss with you appropriate communication and collaboration between Burbo Bank Extension, Morecambe Offshore Wind Project, and other nearby offshore wind developments in circumstances where emergency responses are required, for	Noted. An ERCoP would be drafted post-consent and lines of communications have been established with the Applicant and existing operational windfarms in the region.

Consultee	Date	Comment	Response/where addressed in the ES
		example in the event of accidents or pollution spills.	
		Radar We would like to understand better from you your proposed radar mitigation solutions to ensure that they do not adversely affect the solutions currently in place for Burbo Bank Extension.	Proposed radar mitigation solutions, as they are further detailed, would consider the possibility of potential adverse effects on existing solutions (as identified in **Section 16.5**).
Walney 1 and 2 Offshore Wind Farm (Ørsted)	2nd June 2023	Helicopter activity It is difficult to quantify the level of impact helicopter usage during the construction and operation of the Morecambe Offshore Wind Project. No heliport site(s) or transit route(s) have been identified within the PEIR documentation. We would appreciate if more information on this could be provided so we can properly understand and respond to the potential impacts and mitigations being proposed.	The maximum number of helicopter return trips during the three Project phases is detailed in **Table 16.2**. Helicopter operations would be conducted in Class G (uncontrolled) airspace in VMC and pilots would follow the principle of 'see and avoid'. It is anticipated that during the construction and operation and maintenance phases helicopters would route from Blackpool Airport or Liverpool Airport, however this is indicative at this stage and subject to change. A meeting was held between Ørsted and the Applicant on the 25th October 2023 noting that further information can be provided in relation to planned helicopter support operations when known, noting full details would be developed post-consent.
		Emergency response We would be happy to discuss with you appropriate communication and collaboration between Walney 1 and 2, Morecambe Offshore Wind Project, and other nearby offshore wind developments in circumstances where emergency responses are required, for example in the event of accidents or pollution spills.	Noted. An ERCoP would be drafted post-consent and lines of communications have been established with the Applicant and existing operational windfarms in the region.

Consultee	Date	Comment	Response/where addressed in the ES
Walney 3 and 4 Offshore Wind Farm (Ørsted)	2nd June 2023	Helicopter activity It is difficult to quantify the level of impact helicopter usage during the construction and operation of the Morecambe Offshore Wind Project. No heliport site(s) or transit route(s) have been identified within the PEIR documentation. We would appreciate if more information on this could be provided so we can properly understand and respond to the potential impacts and mitigations being proposed.	The maximum number of helicopter return trips during the three Project phases is detailed in **Table 16.2**. Helicopter operations would be conducted in Class G (uncontrolled) airspace in VMC and pilots would follow the principle of 'see and avoid'. It is anticipated that during the construction and operation and maintenance phases helicopters would route from Blackpool Airport or Liverpool Airport, however this is indicative at this stage and subject to change. A meeting was held between Ørsted and the Applicant on the 25th October 2023 noting that further information can be provided in relation to planned helicopter support operations when known, noting full details would be developed post-consent.
		Emergency response We would be happy to discuss with you appropriate communication and collaboration between Walney 3 and 4, Morecambe Offshore Wind Project, and other nearby offshore wind developments in circumstances where emergency responses are required, for example in the event of accidents or pollution spills.	Noted. An ERCoP would be drafted post-consent and lines of communications have been established with the Applicant and existing operational windfarms in the region.
		Radar We would like to understand better from you your proposed radar mitigation solutions to ensure that they do not adversely affect the solutions currently in place for Walney 3 and 4.	Proposed radar mitigation solutions, as they are further detailed, would consider the possibility of potential adverse effects on existing solutions (as identified in **Section 16.5**).

Consultee	Date	Comment	Response/where addressed in the ES
West of Duddon Sands (Scottish Power Renewables and Ørsted)	2nd June 2023	Helicopter activity It is difficult to quantify the level of impact helicopter usage during the construction and operation of the Morecambe Offshore Wind Project. It is noted that the PEIR highlights that there may be 2 helicopter supports completing 365 return trips during installation works. No heliport site(s) or transit route(s) have been identified within the PEIR documentation. We would appreciate if more information on this could be provided so we can properly understand and respond to the potential impacts and mitigations being proposed.	The maximum number of helicopter return trips during the three Project phases is detailed in **Table 16.2**. Helicopter operations would be conducted in Class G (uncontrolled) airspace in VMC and pilots would follow the principle of 'see and avoid'. It is anticipated that during the construction and operation and maintenance phases helicopters would route from Blackpool Airport or Liverpool Airport, however this is indicative at this stage and subject to change. A meeting was held between Ørsted and Scottish Power Renewables on the Applicant on the 8th November 2023 noting that further information can be provided in relation to planned helicopter support operations when known, noting full details would be developed post-consent.
		Emergency response We would be happy to discuss with you appropriate communication and collaboration between West of Duddon Sands, Morecambe Offshore Wind Project, and other nearby offshore wind developments in circumstances where emergency responses are required, for example in the event of accidents or pollution spills.	Noted. An ERCoP would be drafted post-consent and lines of communications have been established with the Applicant and existing operational windfarms in the region.
CAA	16th June 2023	Aviation Obstacle Notification The CAA requires notification of a change to aviation obstacles if it or they are 100 metres or more above sea level, in accordance with Article 225A of the Air Navigation Order (2016).	CAA requirements for aviation obstacle notification are included in the embedded mitigation summarised in **Section 16.3.3**.

Consultee	Date	Comment	Response/where addressed in the ES
		Additional consideration of the aviation obstacle environment may be required during the initial build phase and the temporary use of cranes that may extend above a height of 100 metres or in the case of pre-built turbines being towed from shore to final generating position.	This consideration is noted in **Section 16.3.3**.
		Aeronautical Obstacle Lighting and Marking A Lighting Management Plan (LMP) must be agreed and implemented in consultation with the CAA in order for the UK to meet its international obligations under the Chicago Convention. The CAA uses requirements set out in Article 223 of the Air Navigation Order (2016) as the basis for its requirements.	Lighting requirements are summarised in **Section 16.3.3.3** and would be agreed upon through consultation with CAA, MOD, Maritime and Coastguard Agency (MCA) and Trinity House.
		Instrument Flight Procedures An Instrument Flight Procedure (IFP) is a set of instructions regarding navigation around aerodromes. Within the design of IFPs, rules are set out regarding obstacle clearance, to ensure the necessary safeguarding. The protected areas for IFPs are complex as it is necessary to consider where the obstacle is in relation to multiple stages of multiple flight paths for multiple types of aircraft. This may be relevant for windfarms built within 30 nautical miles (~55km) of an aerodrome or	Potential impacts on IFPs are considered in **Sections 16.5.2.2** and **16.5.3.1** and assessed in **Section 16.6.2.2** and **Section 16.6.3.2**.

Consultee	Date	Comment	Response/where addressed in the ES
		pre-built turbines being towed from shore to final generating position.	
		Impacts on civil aviation monitoring systems. Wind turbines located within the line-of-sight of surveillance systems (in particular, primary radar) can cause clutter and interference and can result in performance degradation. Radar line-of-sight analysis is theoretical; operationally there are other factors such as signal refraction, diffraction, attenuation and anomalous propagation within a given radar environment that can influence the probability of an operational wind turbine being detected.	Potential impacts on PSRs are considered in **Sections 16.5.2.4**, **16.5.2.5**, **16.5.3.2** and **16.5.3.3** and assessed in **Section 16.6.3.1**.
		The CAA ensures that air navigation service providers undertake appropriate safeguarding activities in respect of their systems and equipment used for the provision of services, that changes to the operating environment are fully considered within their Safety Management Systems and that the operational systems and equipment are functional and being used safely.	Noted.
		We recommend that engagement with all potentially affected aviation stakeholders is undertaken and appropriate mitigation schemes developed.	Noted. Consultation with potentially affected stakeholders is summarised in this table. The Applicant would maintain engagement with stakeholders as required through the Project development phase.

Consultee	Date	Comment	Response/where addressed in the ES
		Helicopter Operations This covers two aspects: (1) potential helicopter support for operations and maintenance of the wind farm itself; and (2) impact on offshore helicopter operations to existing platforms and installations.	Helicopter requirements for the Project are set out in **Table 16.2**. Offshore helicopter operations are discussed in **Section 16.5.2.6** and assessed in **Sections 16.6.2**, **16.6.3** and **16.6.4**. **Appendix 17.1** provides a detailed helicopter access study regarding oil and gas platforms.
		Requirements for winching operations should be discussed with appropriate helicopter operators well in advance. Where such operations are undertaken, additional platform design criteria, lighting on the wind turbines, obstacle clearance and marking of the blades may be required. This is detailed in CAA Publication (CAP) 437 – Standards for Offshore Helicopter Landing areas.	Lighting and marking is detailed in **Section 16.3.3.3** and the Project would follow Civil Aviation Publication (CAP) 437 guidance as appropriate.
		All offshore helicopters operate with limited icing clearances which means that they must be able to descend to warmer air near the sea surface at any point on the route. Operation through a wind farm corridor is highly unlikely and it might be that they would have to route around the wind farm. This may impact fuel burn and load capacity. In addition, where wind turbines are located in the vicinity of existing platforms and installations that offshore helicopters operate to/from, consideration must be given to approach	Icing is only relevant in Instrument Meteorological Conditions (IMC). VMC helicopter operations can route through corridors, as is current practice. Amendments to the windfarm site boundary have been made since PEIR to increase the distance between oil and gas platforms and the windfarm site boundary. Consultation with relevant platform operators has been undertaken. In relation to logistical impacts to operations resulting from potential for access restrictions at certain times, engagement is ongoing with Harbour Energy and Spirit Energy on the terms of suitable cooperation and coexistence agreements, with protective provisions which make provision for

Consultee	Date	Comment	Response/where addressed in the ES
		and take off, including in abnormal situations (e.g. one engine inoperative). Engagement with operators and duty holders as appropriate should be undertaken.	additional costs if required included in the draft DCO for completeness (as further discussed in **Chapter 17 Infrastructure and Other Users**).
MOD	21st June 2023	I write to confirm the safeguarding position of the Ministry of Defence (MOD) in relation to the request made by the applicant for comment on Preliminary Environmental Information Report (PEIR).	Noted.
		The PEIR recognises the principal defence issues that could be impacted by the progression of the proposed development. In Chapter 16: Civil and Military Aviation and Radar (22/03/2023) of the PEIR, the developer reflects the content of a previous MOD response to consultation dated 31 March 2022.	Noted.
		The use of airspace in the vicinity of the proposed development for defence purposes has been appropriately identified and considered, the requirement to supply sufficient information to allow accurate charting of the development and for the installation of appropriate aviation safety lighting is addressed in section 16.3.3.3 Marking and Lighting. The mandatory requirements set out in Civil Aviation Authority publication CAP 393 for aviation safety lighting are specifically referenced.	Noted. The mandatory marking and lighting requirements are set out as embedded mitigation in **Section 16.3.3.3**.

Consultee	Date	Comment	Response/where addressed in the ES
		The PEIR details the potential for radar systems to be affected by the proposed wind farm, highlighting the potential for the development to be within radar line of sight (RLoS) of radar systems at Warton and Great Dun Fell. I can confirm that we do not anticipate that the development would have an operational impact on either of the identified radars.	Noted. Furthermore, in subsequent consultation responses (below in this table), the MOD has confirmed that the Project would not have an operational impact on Warton PSR so further assessment of the receptor is considered unnecessary. The impact on Great Dun Fell PSR (**Section 16.6.3.1**) would have an effect on civil ATS, but the absence of operational impact on MOD receptors is noted.
		An assessment of the location of the offshore element of the development has confirmed that the proposed development area does not overlap with any military danger areas or Practice and Exercise Areas (PEXA). We do not therefore anticipate there to be any concerns relating to military maritime activities.	Noted.
Harbour Energy	2nd June 2023	PEIR Ref Table 17.2 Realistic worst-case scenarios for infrastructure and other users, Table 17.3 Embedded mitigation measures, Section 17.50 To maintain access to the Calder platform to support operational activities and future decommissioning activities, the Calder platform requires an aviation access sector free from any wind turbine generators (including rotors) comprising of: 1. A radius of 6.1km (3.3nm) around the Calder platform; and	Amendments to the windfarm site boundary have been made since PEIR which means that the Calder platform now lies outside of the windfarm site. The Calder platform is 0.9km (ca. 0.5nm) from the western boundary of the windfarm site and located 1.5nm from the Morecambe Unconstrained Areas (areas where WTGs or OSPs can be located, as per embedded mitigation set out in **Section 16.3.3**) as secured in the draft DCO. The impacts around platform access are assessed in **Section 16.6**, **Appendix 17.1 Helicopter Access Study**, as well as **Chapter 17 Infrastructure and Other Users**. The Helicopte r Access Study (**Appendix 17.1**) shows that future Commercial Air Transport (CAT) access to

Consultee	Date	Comment	Response/where addressed in the ES
		2. A 3.7km (2nm) wide corridor oriented into the prevailing wind and extending from the centre of the platform to a distance of 13.0km (7nm). Within the PEIR there are numerous references to a 1.5nm helicopter traffic zone. However, any windfarm layout that has wind turbine generators within 6.1km (3.3nm) of the Calder platform would result in a significant reduction in flight availability and would create a restriction on operational activities by way of impeding our emergency response capabilities. Harbour Energy intends to discuss this matter further with the Morecambe Wind Farm project team in the spirit of developing solutions for coexistence.	the Calder platform would be restricted to day VMC by the presence of WTGs. Whilst this would be a logistical impact on the operator, SAR access would remain unaffected, as identified in **Appendix 17.1**. Engagement is ongoing with Harbour Energy on the terms of a suitable cooperation and coexistence agreement, with protective provisions which make provision for additional costs if required included in the draft DCO for completeness (these are not expected to be required in the current form in addition to the cooperation agreement) (as further discussed in **Chapter 17 Infrastructure and Other Users**). An ERCoP would be drafted post-consent, and the Applicant will liaise on these matters with other operators in the region including Harbour Energy.
Spirit Energy	2nd June 2023	Spirit is required to undertake helicopter operations between the CPP1 platform and the nearby Normally Unmanned Installations to maintain operations on a daily basis requiring flights to operate in all environmental conditions and at all times between onshore heliport and the offshore installations, and flights between offshore installations. Further work will be required by OWL, Spirit and Harbour Energy to determine airspace requirements to ensure safe Morecambe Hub asset operations and future decommissioning aviation	Amendments to the windfarm site boundary have been made since PEIR which means that the Calder platform now lies outside of the windfarm site. The Calder platform is 0.9km (ca. 0.5nm) from the western boundary of the windfarm site and located 1.5nm from the Morecambe Unconstrained Areas (areas where WTGs or OSPs can be located, as per embedded mitigation set out in **Section 16.3.3**) as secured in the draft DCO. The South Morecambe Central Processing Complex (CPC), including CPP1, is 1.6km (ca.0.9nm) to the north of the windfarm site and 1.5nm from the Morecambe Unconstrained Areas.

Consultee	Date	Comment	Response/where addressed in the ES
		requirements and whether these can be upheld with the introduction of obstacles in the area of the OWL windfarm array. As plans develop and further information becomes available to Spirit, this will require ongoing careful consideration to assess operational risks including in respect of the requirement for 24-hour emergency access and ensure additional hazards are not introduced to the existing area infrastructure.	The impacts around platform access are assessed in **Section 16.6**, **Appendix 17.1**, as well as **Chapter 17 Infrastructure and Other Users**. The Helicopter Access Study (**Appendix 17.1**) shows that future CAT access to the Calder and South Morecambe (CPC-1/DP1) platforms would be restricted to day VMC by the presence of WTGs. Whilst this would be a logistical impact on the operator, SAR access would remain unaffected, as identified in **Appendix 17.1**. Engagement is ongoing with Spirit Energy on the terms of a suitable cooperation and coexistence agreement, with protective provisions which make provision for additional costs if required included in the draft DCO for completeness (these are not expected to be required in the current form in addition to the cooperation agreement) (as further discussed in **Chapter 17 Infrastructure and Other Users**). An ERCoP would be drafted post-consent, and the Applicant will liaise on these matters with other operators in the region including Spirit Energy.
Spirit Energy	2nd June 2023	Spirit has shared minimum requirements that must be given consideration prior to finalising development plans and that further studies will be required to determine impact on the Radar Early Warning System, marine movements, and aviation. Minimum requirements shared to date;	The Applicant has undertaken a Radar Early Warning Systems (REWS) assessment which is provided in **Appendix 17.2**, noting the effects are assessed as low and manageable without the need for mitigation measures beyond those embedded. Embedded mitigation (**Section 16.3.3**) describes the separation/exclusion distances proposed in relation to oil and gas infrastructure, with vessel access further

Consultee	Date	Comment	Response/where addressed in the ES
		- 500m exclusion zone around all oil and gas production platforms - 500m either side of pipelines/cables to inspect and repair - Vessel passing distance/transit corridor of at least 1 nautical mile from each facility - 1 nautical mile corridor East/West of each platform to allow PSV and ERRV access and a 1 nautical mile corridor between Calder and CPP1. - Decommissioning vessels and rigs require a minimum of 1 nautical mile corridor to access the platforms, an approach from both East and West of the CPP1 platform and a minimum of 1.5 nautical mile radius around each platform to allow to manoeuvre into position.	described in **Chapter 14 Shipping and Navigation** and **Chapter 17 Infrastructure and Other Users**.
Stena Line	2nd June 2023	Radar (a) Stena Line has some concerns arising out of the PEIR Submissions made in respect to the effect of high densities of high Wind Turbine Generators ("WTGs") on Marine Radar. PIANC WG 161 ('Interaction between offshore wind farms and maritime navigation') written by the Maritime Navigation Commission of the World Association for Waterborne Transport Infrastructure identifies potential radar interference from navigating in proximity to high density windfarms. Stena	Effects on vessels are discussed in **Chapter 14 Shipping and Navigation**. Aviation lighting is discussed in **Section 16.3.3.3**. The requirement for lighting to comply with Trinity House requirements, as appropriate, is embedded in the Project design and an Aids to Navigation Management plan would be agreed across aviation and marine navigation stakeholders.

Consultee	Date	Comment	Response/where addressed in the ES
		Line has additionally accessed pictures showing the effect on the radar of the P&O ferry MV Norbay caused by multipath echoes caused by the North Hoyle windfarm off the North Wales coast. (b) Morecambe PEIR Chapter 16 at paragraph 16.202 states: “Aviation lighting fitted to offshore WTGs could cause confusion to the maritime community as the specification for the lighting to be displayed below the horizontal plane of the light filament itself could cause mariners some confusion. This confusion could result in WTGs with conflicting warning lighting representing a collision risk to maritime surface vessels.” (emphasis added) (c) Firstly, it is noted that this observation was not made in the corresponding Mona or Morgan Offshore Generation Assets PEIR Submissions, which creates concern as to whether the Mona and Morgan Offshore Wind Farms have taken this problem into consideration (and are therefore taking steps to mitigate the risks involved). (d) Secondly, Stena Line notes that any confusion as to the identity/purpose of a warning light poses a serious navigational risk to all marine traffic, including Stena Line's vessels. It is paramount that a full consultation in respect of the use of lights	

Consultee	Date	Comment	Response/where addressed in the ES
		on the WTGs is sought however, it is not clear as to who (if anyone) has been consulted on this point. More details are needed for Stena Line and the wider maritime community to provide input as to the safety of the new proposed aviation lighting. While it is acknowledged that the second round of Navigation Simulation exercises in May 2023 attempted to simulate the night-time visual effect of such an array of red warning lights, Stena Line notes that it would be unrealistic to expect any simulator to be able to provide a true visualisation of what this may look like in a real-world scenario. (e) Thirdly, Stena Line is concerned that navigation lights on the wind turbines may risk interfering with vessels' ability to identify other navigation lights and impact their ability to manoeuvre safely. The difficulty posed by background lights when navigating vessels at night is recognised by COLREGs Rule 6(iv).	
Targeted consultation post-Scoping/PEIR consultation			
Spirit Energy and Harbour Energy	Regular meetings, initiated in 2019	Ongoing meetings regarding impacts to oil and gas platforms	Assessments of impacts to oil and gas infrastructure are assessed in detail in **Chapter 17 Infrastructure and Other Users**, with impacts to helicopter operations also considered in this chapter.
Hawarden Airport	20th September 2023 to 15th February 2024 -	Potential impact on Hawarden Airport's ATC PSR operations or IFPs.	Consultation has been undertaken by the Applicant throughout the pre application process. Hawarden Airport confirmed by email on 15th February 2024 that the proposed development would not cause any

Consultee	Date	Comment	Response/where addressed in the ES
	Email correspondence		negative operational impacts to aircraft or ATC operations; and therefore, has no objection to the proposed development. Further detail on Hawarden Airport is provided in **Section 16.5.2.5**, **Appendix 16.1** and **Appendix 16.3.**
Isle of Man Airport	25th August 2023 to 9th April 2024 - Email correspondence and online meeting	Potential impact on Isle of Man Airport's ATC PSR operations.	Consultation has been undertaken by the Applicant throughout the pre application process. The Isle of Man Airport responded by email on 16th February 2024 and 28th March 2024 and this was followed up with a Teams meeting on 9th April 2024. Isle of Man Airport re-iterated their concerns over the proliferation of wind farm applications in the Irish Sea and the potential for these developments to create processor overload issues on their ATC PSR. The Applicant has commenced discussions with Isle of Man Airport regarding any potential impact and would continue to engage with the airport to provide an agreed route to mitigation if needed. Further detail is provided in **Sections 16.5.2.5** and **16.6.3.1** and **Section 16.7.**
Manchester Airport	14th September 2023 to 11th March 2024 - Email correspondence pre application	Potential impact on Manchester Airport's ATC PSR operations or IFPs.	Consultation has been undertaken by the Applicant throughout the pre application process. Manchester Airport confirmed by email on 11th March 2024 that the proposed development would not impact on aerodrome safeguarding procedures or ATC PSR operations; and therefore, has no objection to the proposed development. Further detail on Manchester Airport is provided in **Section 16.5.2.5**, **Appendix 16.1** and **Appendix 16.3.**
Liverpool Airport	25th August 2023 to 19th April 2024 - Email correspondence	Potential impact on Liverpool Airport's ATC PSR operations or IFPs.	Consultation has been undertaken by the Applicant throughout the pre application process. Liverpool Airport was requested to confirm whether they agree with the findings of **Appendix 16.1** and **Appendix 16.3**

Consultee	Date	Comment	Response/where addressed in the ES
			which identified that there would be no adverse impact on the airport's IFPs or ATC PSR. Liverpool Airport responded on 19th April 2024 confirming that they have no objections to the proposed development. Further detail on Liverpool Airport is provided in **Section 16.5.2.5**, **Appendix 16.1** and **Appendix 16.3.**
Walney Aerodrome	2nd August 2023 to 7th March 2024 - Email correspondence	Potential impact on Walney Aerodrome's IFPs.	Consultation has been undertaken by the Applicant throughout the pre application process. Walney Aerodrome has been requested to confirm whether they agree with the findings of **Appendix 16.3** within which adverse impact on two airport IFPs was identified. It was also identified that the affected procedures could be amended in order to mitigate any adverse impact. It is anticipated that Walney Aerodrome will accept the identified mitigation however, at the time of writing, their response is awaited. The mitigation options are discussed in **Sections 16.5.2.2** and **16.6.2.2** and set out in detail in **Appendix 16.3.**
Blackpool Airport	18th August 2022 to 19th April 2024 Online meetings and email correspondence	Potential impact of WTGs on Blackpool Airport's published IFPs outlined to consultee. Airport asked if equipment used during construction phase would be higher than WTGs.	Construction heights would be below the maximum tip heights of the WTGs. Consultation has been undertaken by the Applicant throughout the pre application process regarding impacts to Blackpool Airport's IFPs and the mitigation required. It has been agreed that the impact identified in **Appendix 16.2** can be mitigated by amending the current IFPs and, on 19th April 2024, Blackpool Airport provided the Applicant with a draft Statement of Intent outlining this agreement and the steps that the Applicant would have to complete in order that the mitigation can be implemented ahead of the construction phase of the proposed development. The

Consultee	Date	Comment	Response/where addressed in the ES
			Applicant continues to work with Blackpool Airport to finalise the Statement of Intent. The impacts on Blackpool Airport's IFPs are discussed in **Sections 16.5.2.2** and **16.6.2.2** and set out in detail in **Appendix 16.2.**
MOD	10th to 11th August 2023 - Email correspondence	Potential impact on Warton PSR	Further consultation was undertaken by the Applicant to confirm that a detailed operational assessment had been carried out regarding potential impact on the Warton PSR. MoD responded by email on the 11th August 2023 confirming that an operational assessment had been carried out and that there would be no operational impact on the Warton PSR. As a result, no further assessment of the receptor is considered necessary.
MOD	27th July 2023 to 7th March 2024 - Email correspondence	Potential impact on Warton and RAF Valley IFPs.	Consultation has been undertaken by the Applicant throughout the pre application process. MOD has been requested to confirm whether they agree with the findings of **Appendix 16.3** within which adverse impact on Warton and RAF Valley IFPs was identified. It was also identified that the affected procedures could be amended in order to mitigate any adverse impact. It is anticipated that MOD will accept the identified mitigation however, at the time of writing, their response is awaited. The mitigation options are discussed in **Sections 16.5.3.1**and **16.6.2.2** and set out in detail in **Appendix 16.3**.
NATS	10th March 2023 Technical and Operational Assessment	Predicted Impact on Lowther Hill RADAR Predicted Impact on Great Dun Fell RADAR Predicted Impact on St Annes RADAR	Impact on Lowther Hill, Great Dun Fell and St Annes PSRs is confirmed in **Section 16.5.2.4** and discussed in **Section 16.6.3.1** (as well as cumulatively in **Section 16.7**).

Consultee	Date	Comment	Response/where addressed in the ES
	(Conducted by NATS based on a 350m tip height, NATS ref: SG34902 Issue 1).	Using the theory as described in Appendix A and development specific propagation profile it has been determined that the terrain screening available will not adequately attenuate the signal, and therefore this development is likely to cause false primary plots to be generated. A reduction in the RADAR's probability of detection, for real aircraft, is also anticipated.	NATS has confirmed that a radar mitigation solution is available (with a draft requirement secured in the draft DCO).
		No impact is anticipated on NATS' navigation aids. No impact is anticipated on NATS' radio communications infrastructure.	Noted.
	25th January 2024	Potential impact on NATS ATC PSR operations (Great Dun Fell, Lowther Hill and St Annes).	NATS confirmed by email on 25th January 2024 that a mitigation solution had been identified to mitigate any adverse impact on the Great Dun Fell, Lowther Hill and St Annes PSRs. The Applicant has commenced discussions with NATS concerning implementation of the solution (with a draft requirement secured in the draft DCO). Further detail on NATS operations is provided in **Sections 16.5.2.5, 16.6.3.1** and **Appendix 16.1.**
ENI	Meeting in April 2024	Meeting to discuss the Applicants assessment of impacts to oil and gas infrastructure.	The impacts around platform access are assessed in **Section 16.7** and in **Appendix 17.1**.

16.3 Scope

16.3.1 Study area

16.14 The windfarm site (encompassing all Project infrastructure) is located in the Eastern Irish Sea and encompasses a seabed area of 87km^2. The windfarm is approximately 30km from the Lancashire coast.

16.15 The study area for civil and military aviation and radar is shown in **Figure 16.1** and has been defined on the basis of the potential for WTGs within the windfarm site 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 and 60 nautical miles (nm). All radar equipped airfields within 60nm of the windfarm site are therefore included in the study area. En-route radars operated by NATS and military ADRs are required to provide coverage at ranges in excess of 60nm and all such radars with potential RLoS of WTGs within the windfarm site are also included in the study area.

16.16 The study area includes the windfarm site and the airspace between the windfarm site and the United Kingdom (UK) mainland and the Isle of Man. The study area extends to the radar facilities at Lowther Hill to the north, Brizlee Wood to the northeast, Staxton Wold to the east, Neatishead to the southeast, Clee Hill to the south, Valley to the southwest, Isle of Man to the west and West Freugh to the northwest.

16.17 The criteria used to identify receptors within the study area are detailed in the following sections.

16.3.1.1 Civil aerodromes

16.18 CAP764: 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 within 30km
- Non-radar equipped licensed aerodromes with a runway of more than 1,100m within 17km
- Licensed aerodromes where the WTGs would lie within airspace coincidental with any published IFP
- Unlicensed aerodromes with runways of more than 800m within 4km
- Unlicensed aerodromes with runways of less than 800m within 3km
- Gliding sites within 10km

- Other aviation activity such as parachute sites and microlight sites within 3km

16.19 CAP764 goes on to state that these distances are for guidance purposes only and do not represent ranges beyond which all WTG developments will be approved or within which they will always be objected to. For example, aerodromes may utilise their radars at ranges considerably in excess of 30km.

16.20 As well as examining the technical impact of WTGs on ATC facilities, it is also necessary to consider the physical safeguarding of ATC operations using the criteria laid down in CAP168: Licensing of Aerodromes (CAA, 2019) to determine whether the Project would breach obstacle clearance criteria.

16.3.1.2 MOD

16.21 It is necessary to consider the aviation and air defence activities of the MOD. This includes radars with potential RLoS:

- MOD airfields, both radar and non-radar equipped
- MOD ADRs
- MOD Danger Areas (DAs)

16.3.1.3 NATS facilities

16.22 It is necessary to consider the possible effects of WTGs upon NATS radar systems (a network of primary and secondary radars and navigation facilities around the country) with potential RLoS.

16.3.1.4 Other aviation activities

16.23 Other aviation activities of relevance include:

- General military low flying training operations
- Military and civilian ‘off-route’ fixed wing and helicopter operations, including SAR missions, offshore helicopter operations in support of the oil and gas industry, and helicopter traffic related to windfarm activities
- Offshore helidecks within 9nm of the windfarm site

16.3.2 Realistic worst-case scenario

16.24 The final design of the Project would be confirmed through detailed engineering design studies that would be undertaken post-consent to enable the commencement of construction. To provide a precautionary but robust impact assessment at this stage of the development process, realistic worst-case scenarios have been defined. The realistic worst-case scenario (having

the most impact) for each individual impact is derived from the Project Design Envelope (PDE) to ensure that all other design scenarios would have less or the same impact. Further details are provided in **Chapter 6 EIA Methodology**. This approach is common practice for developments of this nature, as set out in PINS Advice Note Nine: Rochdale Envelope (PINS, 2018).

16.25 The realistic worst-case scenarios for the civil and military aviation and radar assessment are summarised in **Table 16.2**. These are based on the Project parameters described in **Chapter 5 Project Description** (Document Reference 5.1.5), which also provides details regarding specific activities and their durations. The envelope presented has been refined as much as possible between PEIR and ES, presenting a Project description with design flexibility only where it is needed.

Table 16.2 Realistic worst-case scenarios for civil and military aviation and radar

Impact	Worst-case scenario	Notes and rationale
Construction phase		
Impact 1: Impacts on civil and military PSR systems due to tall construction vessels/cranes and partially complete structures.	▪ Up to 30 WTGs with a maximum blade tip height of 310m above Highest Astronomical Tide (HAT), or ▪ Up to 35 WTGs with a maximum blade tip height of 290m above HAT ▪ High crane installation vessels.	Considers the tallest WTGs and the maximum number of lowest height WTGs for the Project (either of these scenarios could be worst-case and both have been assessed for all impacts). ATC may be unable to provide an effective surveillance service due to interference on radar displays. UK ADR detection capability and therefore national security could be compromised. Construction period estimated as 2.5 years.
Impact 2: Creation of an aviation obstacle environment.	▪ Up to 30 WTGs with a maximum blade tip height of 310m above HAT, or ▪ Up to 35 WTGs with a maximum blade tip height of 290m above HAT ▪ Maximum of two OSPs, highest topside point, including lightning protection and ancillary structures, 70m above HAT. ▪ High crane installation vessels.	Considers the tallest WTGs and the maximum number of lowest height WTGs for the Project (either of these scenarios could be worst-case and both have been assessed for all impacts). Maximum physical obstruction to aviation operations due to size and number of above sea level infrastructure within the windfarm site. Construction period estimated as 2.5 years.
Impact 3: Increased air traffic in the area related to windfarm construction and installation activities.	It is estimated that a total number of 800 helicopter return trips would be needed over the construction period.	Helicopter trips as a result of being engaged in works on the Project causing increased risk of aircraft-to-aircraft collision.

Impact	Worst-case scenario	Notes and rationale
Operation and maintenance phase		
Impact 1: WTGs causing permanent interference on civil and military PSRs.	▪ Up to 30 WTGs with a maximum blade tip height of 310m above HAT, or ▪ Up to 35 WTGs with a maximum blade tip height of 290m above HAT	Considers the tallest WTGs and the maximum number of lowest height WTGs for the Project (either of these scenarios could be worst-case and both have been assessed for all impacts). ATC may be unable to provide an effective surveillance service due to interference on radar displays. UK ADR detection capability and therefore national security could be compromised.
Impact 2: Creation of an aviation obstacle environment.	▪ Up to 30 WTGs with a maximum blade tip height of 310m above HAT, or ▪ Up to 35 WTGs with a maximum blade tip height of 290m above HAT ▪ Maximum of two OSPs, highest topside point, including lightning protection and ancillary structures, 70m above HAT	Considers the tallest WTGs and the maximum number of lowest height WTGs for the Project (either of these scenarios could be worst-case and both have been assessed for all impacts). Maximum physical obstruction to aviation operations due to size and number of above sea level infrastructure within the windfarm site.
Impact 3: Increased air traffic in the area related to windfarm activities.	Helicopters are not envisaged as the primary means of access for offshore operations and maintenance activities, and are anticipated to be used only in exceptional circumstances.	Helicopter trips as a result of being engaged in works on the Project causing increased risk of aircraft-to-aircraft collision.

Impact	Worst-case scenario	Notes and rationale
Decommissioning phase		
Impact 1: WTGs causing interference on civil and military PSRs.	▪ Up to 30 WTGs with a maximum blade tip height of 310m above HAT, or ▪ Up to 35 WTGs with a maximum blade tip height of 290m above HAT	Considers the tallest WTGs and the maximum number of lowest height WTGs for the Project (either of these scenarios could be worst-case and both have been assessed for all impacts). ATC may be unable to provide an effective surveillance service due to interference on radar displays. UK ADR detection capability and therefore national security could be compromised. Impact starting from a point of full presence of infrastructure to zero presence over the decommissioning period.
Impact 2: Removal of aviation obstacle environment.	▪ Up to 30 WTGs with a maximum blade tip height of 310m above HAT, or ▪ Up to 35 WTGs with a maximum blade tip height of 290m above HAT ▪ Maximum of two OSPs, highest topside point, including lightning protection and ancillary structures, 70m above HAT ▪ Use of high crane vessel for decommissioning activities	Considers the tallest WTGs and the maximum number of lowest height WTGs for the Project (either of these scenarios could be worst-case and both have been assessed for all impacts). Maximum physical obstruction to aviation operations due to size and number of above sea level infrastructure within the windfarm site. Impact starting from a point of full presence of infrastructure to zero presence over the decommissioning period.
Impact 3: Increased air traffic in the area related to windfarm decommissioning activities.	Assumed as per the construction phase, however a Decommissioning Programme would be produced to further define the requirement.	Helicopter trips as a result of being engaged in works on the Project causing increased risk of aircraft-to-aircraft collision.

16.3.3 Summary of mitigation embedded in the design

16.26 This section outlines the embedded mitigation relevant to the civil and military aviation and radar assessment, which has been incorporated into the design of the Project (as summarised in **Table 16.3**). Where additional mitigation measures are proposed, these are detailed in the impact assessment (**Sections 16.6** and **16.7**).

16.3.3.1 Layout - WTGs and OSP(s) separation from oil and gas platforms

16.27 WTGs and OSP(s) would be separated (using a 1.5nm radius buffer zone) from operating oil and gas platforms with a helicopter deck, unless agreed otherwise. This mitigation, as described further in **Appendix 17.1** considers approach and take off distances in VMC, providing a greater distance than required to ensure no impact on current VMC access. This is secured in protective provisions included in the draft DCO (Document Reference 3.1) for the benefit of Spirit Energy and Harbour and Energy which restrict WTGs and platforms within 1.5nm of platforms.

16.3.3.2 Information, notifications and charting

16.28 The Project 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.

16.29 Measures would be adopted at the commencement of work on the Project to ensure that aviation stakeholders are made aware of the creation of a further aviation obstacle environment in the Eastern Irish Sea. These temporary measures during construction or maintenance periods include issuing Notices to Airmen (NOTAMs) and Aeronautical Information Circulars (AICs), warning of the establishment of obstacles within the windfarm site and publicity in such aviation publications as the General Aviation Safety Council (GASCo) Flight Safety magazine. Obstacle considerations may include temporary cranes and WTG/OSP components being towed from shore to the windfarm site.

16.30 In accordance with The Air Navigation Order (ANO) 2016/765 (CAA, 2022a) Article 225A, at least eight weeks before construction commences details of the position, height (above mean sea level (AMSL)) and lighting of each of the Project's structures (and equipment) 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. Permanent information would replace the short-term NOTAMs that would be continued to be issued to cover the Project until construction has been completed.

16.3.3.3 Marking and lighting

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

- "a wind turbine shall be marked and/or lighted if it is determined to be an obstacle."
- "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."

16.32 Mandated requirements for the lighting of WTGs within UK territorial waters include:

- ICAO Annex 14 – Aerodrome Design and Operations, July 2022, Chapter 6, paragraph 6.2.4
- CAA The ANO 2016/765, April 2022, Articles 222 and 223. Article 223 requires that offshore wind turbine obstacles have to be lit when they exceed 60m above HAT
- CAA CAP764 – CAA Policy and Guidelines on Wind Turbines, 6th edition, February 2016, Chapter 3, paragraphs 3.14 to 3.29
- MCA Marine Guidance Note (MGN) 654 – Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response, April, 2021
- MCA document: Offshore Renewable Energy Installations: Requirements, Guidance and Operational Considerations for SAR and Emergency Response. Forms part of MGN654 Annex 5, MCA, 2024
- MOD Obstruction Lighting Guidance details MOD requirements for the lighting of offshore developments (Low Flying Operations Flight, 2020)
- CAA CAP437 – Standards for offshore helicopter landing areas, Edition 9, February 2023

16.33 UK regulations adopt ICAO Annex 14's stipulated requirements as to lighting of WTGs, but do not require that WTGs follow the ICAO recommendation as to paint colour, although CAP764 does set out the ICAO recommendation by way of guidance. In terms of marking the WTGs, in keeping with recent practice for offshore windfarms, it is anticipated that Trinity House would require all structures to be painted yellow (colour code RAL 1023) from the level of HAT to a height directed by Trinity House (at least 15m), and above

the yellow section all WTGs would be painted white (RAL 9010) or light grey (colour code RAL 7035).

16.34 The Project would be lit in accordance with the ANO as required. 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 WTGs, 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 WTGs are so lit. CAP764 states that the CAA will permit that only WTGs on the periphery of any windfarm need to be equipped with aviation warning lighting and such lighting, where achievable, shall be spaced at longitudinal intervals not exceeding 900m (it is noted that given the WTG sizes for the Project and minimum spacing separation would not be achievable at 900m). There is no current routine requirement for offshore obstacles to be fitted with intermediate vertically spaced aviation lighting.

16.35 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.

16.36 The MCA is seeking that WTG blade tips are marked in red (colour code RAL 3020), together with markings down the blade, to provide a SAR helicopter pilot with a hover reference point as set out in MGN654 Annex 5. The MCA also seeks a lighting scheme comprising 200cd red/infra-red lights on the nacelles of non-Article 223 WTGs, to be operated on demand during SAR operations and a WTG shutdown protocol to be applied during rescue situations. An ERCoP would be developed, agreed and implemented for all phases of the Project, based upon the MCA’s standard template. Appropriate lighting would be utilised to facilitate heli-hoisting if undertaken within the windfarm site, as outlined in CAP437.

16.37 To satisfy MOD requirements, the WTGs 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 WTGs required to be lit under ANO Article 223, this satisfies the MOD operational requirement.

16.3.3.4 Regulatory requirements

16.38 When construction is complete, given that the windfarm site would occupy uncontrolled (Class G) airspace[2] (below approximately 19,500ft AMSL), 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 WTGs and any other obstacles, laterally or vertically, by the legislated standard minimum separation distance. This is outlined in CAA Official Record Series 4 No. 1496: (UK) Standardised European Rules of the Air – Exceptions to the Minimum Height Requirements (CAA, 2021), 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 WTGs and any other structure.

16.39 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 windfarm site. The charting and lighting of the Project should also be taken into account by MOD low flying units and SAR operators.

16.40 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 Project.

16.41 A summary of embedded mitigation is given in **Table 16.3**.

Table 16.3 Summary of embedded mitigation measures related to civil and military aviation and radar

Parameter	Mitigation measures embedded into the design of the Project
Layout	Compliance as necessary and applicable with MGN654 Safety of Navigation OREIs - Guidance on UK Navigational Practice, Safety and Emergency Response. WTGs and OSPs would be separated (using a 1.5nm radius buffer zone) from operating oil and gas platforms with a helicopter deck, unless agreed otherwise
Information, notifications and charting	Aviation stakeholders would be made aware of the Project via NOTAMs and 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. An ERCoP would be agreed with MCA and implemented for all phases of the Project

[2] UK Airspace classifications are described in **Section 16.5.2**.

Parameter	Mitigation measures embedded into the design of the Project
Marking and lighting	Marking and lighting of obstacles would be in accordance with Article 223, MCA (MGN654) and MOD requirements as appropriate.
Regulatory requirements	Aviation stakeholders would adhere to all relevant CAA and MOD safety guidance to ensure safe operations for all users of the airspace above the windfarm site.

16.4 Impact assessment methodology

16.4.1 Policy, legislation and guidance

16.4.1.1 National Policy Statements

16.42 The assessment of potential effects on civil and military aviation and radar has been made with specific reference to the relevant NPS. These are the principal decision-making documents for Nationally Significant Infrastructure Projects (NSIPs). Those relevant to the Project are:

- Overarching NPS for Energy (EN-1) (Department of Energy and Climate Change (DESNZ), 2023a)
- NPS for Renewable Energy Infrastructure (EN-3) (DESNZ, 2023b)

16.43 The specific assessment requirements for civil and military aviation and radar, as detailed in the NPS, are summarised in **Table 16.4**, together with an indication of the section of the ES chapter where each is addressed.

Table 16.4 NPS assessment requirements

NPS requirement	NPS reference	ES reference
NPS for Energy (EN-1)		
Aerodromes that are officially safeguarded will have officially produced plans that show the Obstacle Limitation Surfaces (OLS). Care must be taken to ensure that new developments do not infringe these protected OLS except where an aerodrome operator has considered the development and either determined there to be no adverse impact or agreed an acceptable mitigation can be put in place, as these encompass the critical airspace within which key air traffic associated with the aerodrome operates.	Paragraph 5.5.11	Potential impacts of the Project are assessed in **Section 16.6**. Cumulative effects are assessed in **Section 16.7**. Potential effects on civil and military aerodromes are addressed in **Sections 16.6.2** and **16.6.3**. Consultation has been undertaken with the affected stakeholders to determine acceptable mitigations. Consultation undertaken to date is detailed in **Table 16.1**.
New energy infrastructure may cause obstructions in MOD low flying areas. A balance must be struck between defence and energy needs in these areas.	Paragraph 5.5.19	Engagement with the MOD has been established and would continue as the Project design progresses. The MOD has requested that, in the interests of air safety, the development be fitted with MOD accredited aviation safety lighting in accordance with the CAA, ANO 2016. Marking and lighting statutory requirements are established as embedded mitigation, as discussed in **Section 16.3.3**.
The joint industry and government Air Defence and Offshore Wind Mitigation Task Force was set up to enable the coexistence of UK Air Defence and offshore wind. The Strategy and Implementation Plan sets the direction for that collaboration. The recommendations generated from this Task Force should be referred to by both defence and energy stakeholders.	Paragraph 5.5.36	Air Defence Radars (ADRs) are considered in **Section 16.5.3.2**.

NPS requirement	NPS reference	ES reference
Where the proposed development may affect the performance of civil or military aviation CNS[3] (Communications, Navigation and Surveillance), meteorological radars and/or other defence assets an assessment of potential effects should be set out in the ES.	Paragraph 5.5.37	Potential impacts of the Project are assessed in **Section 16.6**. The windfarm site is outside all Met Office meteorological radar consultation zones.
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 has been established and would continue as the Project design progresses. Consultation undertaken is detailed in **Table 16.1**. The Met Office has not been consulted as the windfarm site is outside all Met Office consultation zones.
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	Potential impacts of the Project are assessed in **Section 16.6**. Cumulative effects are assessed in **Section 16.7**. Impacts on meteorological interests have not been assessed as the windfarm site is outside all Met Office consultation zones.
If any relevant changes are made to proposals during the pre-application and determination period, it is the responsibility of the applicant to ensure that the relevant aviation, meteorological and defence	Paragraph 5.5.42	Refinement of the windfarm site boundary has been communicated to relevant consultees via updates to **Appendix 16.1**.

[3] Communications, Navigation and Surveillance

NPS requirement	NPS reference	ES reference
consultees are informed as soon as reasonably possible.		
The applicant should include appropriate mitigation measures as an integral part of the proposed development.	Paragraph 5.5.43	Embedded mitigation is detailed in **Section 16.3.3** and summarised in **Table 16.3**. Additional mitigation is detailed in **Section 16.6**. Measures are secured in the draft DCO.
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	The MOD has confirmed that the Project would not have an operational impact on either Great Dun Fell PSR or Warton PSR and does not anticipate any concerns relating to military maritime activities. Mitigations for Warton and RAF Valley IFPs have been identified in that the affected procedures could be amended in order to mitigate any adverse impact. Engagement with the MOD would continue as the Project progresses post DCO submission (**Section 16.2**).
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 decision maker should satisfy itself 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.	Paragraph 5.5.54	Marking and lighting statutory requirements are established as embedded mitigation, as discussed in **Section 16.3.3**. No lighting requirements beyond those set out in **Section 16.3.3.3** have been requested to date by relevant consultees. The visual impact of lighting is also assessed in **Chapter 18 SLVIA** and **Chapter 12 Offshore Ornithology.**

NPS requirement	NPS reference	ES reference
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 the effectiveness of aeronautical ground lighting and cannot be confused with aeronautical lighting.	Paragraph 5.5.55	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 WTG is more than 5km (**Section 16.3.3**).
Where, after reasonable mitigation, operational changes, obligations and requirements have been proposed, the Secretary of State should consider that: ▪ 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 National Severe Weather Warning Service (NSWWS), or flood warnings by the UKs flood agencies	Paragraphs 5.5.59 and 5.5.60	Potential effects on civil and military aerodromes are addressed in **Sections 16.6.2** and **16.6.3**. The Project has the potential to generate clutter on radar displays and thus have an impact on the safe and efficient provision of en-route air traffic control (ATC) services for civil aviation. However, mitigation options are available, as outlined in **Section 16.6.3.1** and set out in detail in **Appendix 16.1**. Consultation undertaken is detailed in **Table 16.1**.

NPS requirement	NPS reference	ES reference
Provided that the Secretary of State is satisfied that the impacts present risks to national security and physical safety, such that they outweigh the urgent need for an acceleration in the deployment of offshore wind, or other technology; and provided that the Secretary of State is satisfied that all efforts have been made by the parties to find an acceptable mitigation of the impact, and that such mitigation is not available, consent should not be granted.		
NPS for Renewable Energy Infrastructure (EN-3)		
The applicant will also need to consider impacts on civil and military radar and other aviation and defence interests (Section 5.5 of EN-1)	Paragraph 2.8.50	Potential impacts of the Project are assessed in **Section 16.6**.
The presence of the wind turbines can also have impacts on communication and shipborne and shore-based radar systems. See section 5.5 in EN-1 for further guidance.	Paragraph 2.8.186	The Applicant has undertaken a REWS assessment which is provided in **Chapter 17 Appendix 17.2**.
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 2.8.240	Lighting requirements are discussed in **Section 16.3.3**. 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 WTG is more than 5km. Lighting effects on bird receptors is assessed within **Chapter 12 Offshore Ornithology**.
Where a proposed offshore wind farm potentially affects other offshore infrastructure or activity, a pragmatic approach should be employed by the Secretary of State.	Paragraphs 2.8.342 to 2.8.344	Potential effects during the various phases are assessed in **Sections 16.6.2** to **16.6.4**. Negative impacts would be minimised and risks reduced through the embedded mitigation measures outlined in **Section 16.3.3**. Additional mitigation is detailed in **Section 16.6**. Measures are secured in the draft DCO.

NPS requirement	NPS reference	ES reference
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 and reduce risks to as low as reasonably practicable.		
As such, the Secretary of State should be satisfied that the site selection and site design of the proposed offshore wind farm 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 2.8.345 to 2.8.346	The windfarm site location is positioned to minimise effects to other industries, this includes shipping and navigation and commercial fisheries (**Chapter 14 Shipping and Navigation** and **Chapter 13 Commercial Fisheries**). Suitable mitigations have been identified for impacted aviation receptors, with no residual significant effects (**Section 16.6**)). Given the proximity to oil and gas platforms, potential effects on helicopter operations for these platforms are assessed in detail in **Section 16.6** and **Chapter 17 Infrastructure and Other Users** (**Appendix 17.1**), which following mitigation identified no significant effects. A number of embedded mitigation measures are proposed to reduce potential impacts, as outlined in **Section 16.3.3**. Separation with relevant oil and gas platforms is secured in protective provisions included in the draft DCO for the benefit of Spirit Energy and Harbour Energy which restrict location of WTGs/OPSs within 1.5nm of platforms with active helidecks. Additional mitigation is detailed in **Section 16.6**. The Helicopter Access Study (**Appendix 17.1**) shows that future CAT access to some platforms would be restricted to day VMC by the presence of WTGs. Whilst this would be a

NPS requirement	NPS reference	ES reference
		logistical impact on the operator, SAR access would remain unaffected, as identified in **Appendix 17.1**. In relation to the logistical impact resulting from potential IMC and night helicopter access restrictions, engagement is ongoing with Harbour Energy and Spirit Energy on the terms of suitable cooperation and coexistence agreements, with protective provisions which make provision for additional costs if required included in the draft DCO for completeness (as further discussed in **Chapter 17 Infrastructure and Other Users**). An ERCoP would be drafted post-consent, and lines of communication have been established with other operators in the region, including oil and gas operators.
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 2.8.261 to 2.8.262	A number of embedded mitigation measures are proposed to reduce potential impacts, as outlined in **Section 16.3.3**. Consultation undertaken to date is detailed in **Table 16.1**. The available mitigations have been discussed and well progressed/agreed with impacted aviation stakeholders. Where appliable, additional mitigation is detailed in **Section 16.6**. Measures are secured in the draft DCO, alongside continued engagement. In relation to oil and gas, see row above.

16.4.1.2 Additional relevant policy and guidance

16.44 In addition to the NPS, there are a number of pieces of legislation, policy and guidance applicable to the assessment of civil and military aviation and radar impacts. These include:

- CAP168: Licensing of Aerodromes sets out the standards required at UK licensed aerodromes relating to management systems, operational procedures, physical characteristics, assessment and treatment of obstacles and visual aids (CAA, 2022b)
- ANO 2016/765 sets out the Rules of the Air and includes the application of lighting to WTGs in UK territorial waters (Articles 222 and 223) and notifications relating to en-route obstacles (Article 225A) (CAA, 2022)
- CAP764: Policy and Guidelines on Wind Turbines details the CAA policy and guidelines associated with wind turbine impacts on aviation that aviation stakeholders and wind energy developers need to consider when assessing a development's viability (CAA, 2016)
- CAP670: Air Traffic Services Safety Requirements sets out the safety regulatory framework and highlights the requirements to be met by providers of civil air traffic services and other services in the UK in order to ensure that those services are safe for use by aircraft (CAA, 2019)
- CAP1616: Airspace Change explains the CAA's regulatory process for changes to airspace (CAA, 2021)
- CAP437: Standards for Offshore Helicopter Landing Areas provides the criteria applied by the CAA in assessing offshore helicopter landing areas for worldwide use by helicopters registered in the UK, and includes winching area 'best practice' design criteria for wind turbine platforms (CAA, 2023a)
- CAP032: UK AIP is the main resource for information on facilities, services and flight procedures at all licensed UK airports, as well as UK airspace rules, regulations and restrictions, en-route procedures, charts and other air navigation information (CAA, 2023b)
- UK Military AIP is the main resource for information and flight procedures at all military aerodromes (MOD, 2023)
- Military low flying in the United Kingdom: the essential facts (MOD, 2017)
- MOD Obstruction Lighting Guidance details MOD requirements for the lighting of offshore developments (MOD, 2020)
- MCA MGN654 Safety of Navigation: Offshore Renewable Energy Installations – Guidance on UK Navigational Practice, Safety and

Emergency Response highlights issues to consider when assessing navigational safety and emergency response, caused by OREI developments (MCA, 2021)

- MCA document: Offshore Renewable Energy Installations: Requirements, Guidance and Operational Considerations for SAR and Emergency Response. Forms part of MGN654 Annex 5 (MCA, 2021)
- ICAO Annex 14: Aerodrome Design and Operations includes recommendations for marking and lighting of wind turbines (ICAO, 2022)

16.4.2 Data and information sources

16.45 The data and information sources listed in **Table 16.5** have been used in undertaking the civil and military aviation and radar assessments.

16.46 Given the interconnected nature of the Project and the Transmission Assets, the environmental information of the Transmission Assets PEIR has also been used to inform this chapter (Morgan Offshore Wind Limited and Morecambe Offshore Windfarm Ltd, 2023).

Table 16.5 Existing data sources used in this chapter

Data source	Date	Data contents
CAP032: UK AIP (CAA, 2023)	September 2022	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)	September 2022	The main resource for information and flight procedures at all military aerodromes.

16.4.3 Impact assessment methodology

16.47 **Chapter 6 EIA Methodology** provides a summary of the general impact assessment methodology applied to the Project ES. The following section outlines the methodology used to assess the potential effects on civil and military aviation and radar.

16.4.3.1 Significance of effect

16.48 In assessing the significance of the effects from the Project it was 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, CAP670), 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. 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 16.6**. This represents a deviation from the standard methodology presented within **Chapter 6 EIA Methodology**.

Table 16.6 Definition of significance

Significance	Definition
Major Significant	Receptor unable to continue safe operations or safe provision of air navigation services (radar) or effective air defence surveillance in the presence of the WTGs. Impact on air defence surveillance could affect national security. Technical or operational mitigation of the impact is required.
Moderate Significant	Receptor able to continue safe operations but with some restrictions or non-standard mitigation measures in place.
Not Significant	The Project would have little effect on the aviation stakeholder, or the level of effect would be acceptable to the aviation stakeholder.
No Change	The Project would have no effect on the aviation stakeholder and would be acceptable to the aviation stakeholder.

16.4.4 Cumulative effects assessment methodology

16.49 The CEA considers other plans, projects and activities that may impact cumulatively with the Project. As part of this process, the assessment considers which of the residual impacts assessed for the Project on its own have the potential to contribute to a cumulative effect. **Chapter 6 EIA Methodology** provides further details of the general framework and approach to the CEA.

16.50 For civil and military aviation and radar, the potential cumulative activities include other offshore and onshore windfarms. Cumulative effects have been considered with respect to obstacles and increase in air traffic, and with regards to the extent of radar visibility at WTG heights (**Section 16.7**).

16.51 As described in **Chapter 1 Introduction,** the Transmission Assets associated with the Project are undergoing a separate consent process as part of the Transmission Assets project. To enable impacts from the Project and the Transmission Assets to be considered together, a combined assessment is

made within the cumulative assessment to identify any key interactions and additive effects (**Section 16.7.3.1**).

16.4.5 Transboundary effects assessment methodology

16.52 **Chapter 6 EIA Methodology** provides details of the general framework and approach to the assessment of transboundary effects.

16.53 For civil and military 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 (**Section 16.231**).

16.4.6 Assumptions and limitations

16.54 No overarching assumptions or limitations have been identified that apply to the assessment for civil and military aviation and radar. Where routine assumptions have been made in the course of undertaking the assessment, these are noted in **Sections 16.6** to **16.231**.

16.5 Existing environment

16.55 An initial desktop study was undertaken to determine those aviation stakeholders that were likely to be affected by the Project including all radar systems within operational range.

16.56 CAP764 advises that WTG effects on SSRs can be caused due to the physical blanking and diffracting effects of the WTG towers, depending on the size of the WTGs and the windfarm. However, CAP764 goes on to say that these effects are only a consideration when the WTGs 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 (St Annes) is 33km from the windfarm site. As all known SSRs are outside the stipulated parameters by a significant margin they should not be affected by the WTGs. The NATS TOPA issued in March 2023 predicts an impact on the Lowther Hill, Great Dun Fell and St Annes PSRs but does not predict any impacts on SSR facilities.

16.57 Similarly, there would be no measurable effects upon other terrestrial based aviation CNS systems as the Project is considerably outside applicable safeguarding limits pertaining to such CNS infrastructure. Therefore, terrestrial CNS infrastructure (other than PSR) is not considered further, as no sites would be affected.

16.5.1 Radar modelling and airspace analysis

16.58 Computer modelling using a contemporary software modelling tool (HTZ communications) has been undertaken to predict if RLoS exists between PSRs and WTGs within the windfarm site, and the likelihood of the rotating

WTG blades being detected. This exercise identified those PSRs that could detect the WTGs and has been based on WTGs with a maximum tip height of between 295m and 315m AMSL[4]. The data obtained from the modelling has been analysed and provides a key input into establishing the degree to which aviation and operations in the area of the windfarm site could be affected and what additional mitigation processes could be employed. The outputs of this modelling are detailed in **Sections 16.5.2.4**, **16.5.2.5**, **16.5.3.2** and **16.5.3.3**.

16.59 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.

16.60 **Appendix 16.1** details the computer modelling undertaken and uses the outputs of the modelling to determine potential mitigation strategies for inclusion in this document. Where appropriate, final mitigations would be agreed and implemented with aviation and radar stakeholders.

16.61 Ongoing consultation with stakeholders would continue as part of the design process for the Project. **Appendix 16.1** also provides further details of the airspace analysis undertaken and is summarised in the following sections.

16.5.2 Civil aviation

16.62 The Project windfarm site is within the London Flight Information Region (FIR) for ATC, and the airspace is regulated by the UK CAA. The boundary between the London FIR and the adjacent Shannon FIR, regulated by the Irish Aviation Authority (IAA), lies 119km to the west of the windfarm site at its closest point.

16.63 Airspace is classified as either controlled or uncontrolled and is divided into a number of classes depending on what kind of Air Traffic Service (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.

[4] Radar modelling was based on maximum tip heights AMSL as opposed to above HAT. Within the windfarm site HAT is 4.82m AMSL, therefore a tip height of between 295m and 315m AMSL incorporates an additional precautionary height buffer above the maximum tip height range of between 290m and 310m above HAT.

16.64 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 VMC and is conducted with visual reference to the natural horizon. Aircraft must be flown under IFR when weather restricts visibility, known as IMC. IFR flight requires reference solely to aircraft instrumentation.

16.65 The windfarm site lies within uncontrolled class G airspace extending from sea level to approximately 19,500ft AMSL. This airspace is predominantly used for low-level flight operations, generally under VFR. Pilots are required to maintain minimum distances from notified obstacles, including WTGs, and may only fly within the minimum weather and visibility criteria.

16.66 Above the Class G airspace that is above the windfarm site, is Class C controlled airspace in the form of a Temporary Reserved Area (TRA). This airspace, TRA 004, has an upper vertical limit of approximately 24,500ft AMSL and is available to both military and civil aircraft, though its main use is to accommodate VFR military flying activity.

16.67 5km southwest of the windfarm site is further Class C airspace known as the Holyhead Control Area (CTA). The CTA has vertical limits between approximately 4,500ft AMSL and 19,500ft AMSL and encompasses multiple ATS routes connecting the Manchester, Birmingham and London regions with the Isle of Man and Northern Ireland (Figure 2 in **Appendix 16.1**).

16.68 Approximately 11km north of the windfarm site is the Walney Transponder Mandatory Zone (TMZ). Within a TMZ the carriage and operation of aircraft transponder equipment is mandatory. This enables such aircraft to be detected and tracked by SSR systems while transiting the Zone. The Walney TMZ is established around the existing Walney, Walney Extension and West of Duddon Sands offshore windfarms and is used to mitigate the impact of the associated WTGs on Warton PSR (Figure 5 in **Appendix 16.1**).

16.69 A further TMZ is established approximately 25km south of the windfarm site. The Burbo Bank TMZ is used to mitigate the impact of the Burbo Bank and Burbo Bank Extensions WTGs on Warton PSR (Figure 5 in **Appendix 16.1**).

16.5.2.1 Flight procedures and ATC provided

16.70 In Class G (uncontrolled) airspace, aircraft are not obliged to be in receipt of an ATS. Pilots may however 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.

16.71 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 then must 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.

16.72 Flight procedures in the vicinity of the Project are conducted in accordance with national UK CAA and MOD Standards and Recommended Practices (SARPs) as promulgated in the UK AIP.

16.73 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 in the vicinity of the Project.

16.5.2.2 Minimum sector altitudes

16.74 Airports with published IFPs have associated Minimum Sector Altitudes (MSAs). An MSA defines the minimum safe altitude an aircraft can descend to within a sector of radius 25nm, (approximately 46km). These Sectors provide obstacle clearance protection of at least 300m to aircraft within that area. This allows pilots of aircraft flying under IFR the reassurance of properly designated obstacle and terrain clearance protection whilst making an approach and landing at an airport in poor weather.

16.75 Blackpool Airport is the nearest UK civil airport to the windfarm site at 31km to the east, with two runways (namely 10 and 28). The Blackpool Airport MSA is divided into four sectors. The lowest minimum safe altitude is 2,000ft AMSL in the southwestern sector, which extends across the southern boundary of the windfarm site (Figure 7 in **Appendix 16.1**). Each sector has a 5nm buffer around it which is applied when validating the MSA against the highest known obstacles. The 5nm buffer for the southwestern sector extends the area over the majority of the windfarm site.

16.76 A Required Navigation Performance (RNP) IFP is published for runway 28 at Blackpool Airport. Terminal Arrival Altitudes (TAAs) are associated with RNP approaches and provide the same 300m vertical obstacle clearance as MSAs but are more specific to the ‘entry’ points into an RNP procedure. The southwestern TAA is 1,900ft AMSL and, similarly to MSAs, has a 5nm buffer which extends over the eastern boundary of the windfarm site (Figure 8 in **Appendix 16.1**).

16.77 Walney Aerodrome is a private airport owned by BAE Systems which lies 37km northeast of the windfarm site. The Aerodrome has IFPs published in the AIP with an associated 25nm radius MSA. The southwestern sector of the MSA, along with its 5nm buffer, extends across the whole windfarm site with a minimum safe altitude of 1,800ft AMSL (Figure 9 in **Appendix 16.1**).

16.78 An RNP procedure for runway 35 at Walney Aerodrome has an associated TAA with a minimum safe altitude of 1,900ft AMSL. The 5nm obstacle buffer for this TAA element extends across the northeastern boundary of the windfarm site (Figure 10 in **Appendix 16.1**).

16.5.2.3 Area minimum altitudes

16.79 A chart of Area Minimum Altitudes (AMAs) across the London and Scottish FIRs is published in the AIP. An AMA provides a minimum obstacle clearance of 300m within a specified area in the same way as an MSA. The specified areas are formed by lines of latitude and longitude in half degree steps. The windfarm site is within two AMA areas of 1,700ft AMSL (Figure 12 in **Appendix 16.1**).

16.5.2.4 NATS PSRs

16.80 NATS provides en-route civil air traffic services within the London FIR from the London Area Control Centre at Swanwick, near Southampton. NATS' closest radars are at St Annes 33km to the east, Great Dun Fell 117km to the northeast, Clee Hill 162km to the south, and Lowther Hill 172km to the north of the windfarm site.

16.81 RLoS modelling detailed in Section 3.4 in **Appendix 16.1** indicates that all WTGs in the windfarm site are highly likely to be detected by St Annes PSR, irrespective of blade tip height.

16.82 WTGs within the southeastern extent of the windfarm site are highly likely to be detected by Great Dun Fell PSR, irrespective of blade tip height.

16.83 Clee Hill PSR is highly unlikely to detect any WTGs within the windfarm site.

16.84 WTGs with a blade tip height of 315m AMSL are highly likely to be detected by Lowther Hill PSR in one very small area of the windfarm site to the northwest. WTGs with a blade tip height of 295m AMSL within the windfarm site would not be in RLoS of Lowther Hill PSR.

16.5.2.5 Civil ATC PSRs

16.85 The nearest civil ATC PSRs are at the Isle of Man 70km to the northwest; Liverpool, 63km to the southeast; Hawarden, 73km to the southeast; and Manchester, 93km to the southeast of the windfarm site.

16.86 RLoS modelling detailed in Section 3.2 of **Appendix 16.1** indicates that all WTGs in the windfarm site are highly likely to be detected by the Isle of Man PSR, irrespective of blade tip height.

16.87 For WTGs with tip heights of between 295m and 315m AMSL, RLoS coverage of the Liverpool PSR does not infringe the windfarm site. Liverpool PSR is unlikely to detect any WTGs within the windfarm site and so further assessment of this receptor is considered unnecessary.

16.88 Hawarden Airport has an ATC PSR and a second PSR facility used as part of the WTG mitigation solution for the Frodsham onshore windfarm to the northeast of the Airport.

16.89 WTGs with a tip height of 315m AMSL are highly likely to be detected by the Hawarden ATC PSR in the southwestern extent of the windfarm site, and within a smaller area to the southeast. With a tip height of 295m AMSL, WTGs are highly likely to be detected by the Hawarden ATC PSR in the southwestern extent.

16.90 The Hawarden mitigation PSR may detect 315m WTGs in a small area of the windfarm site to the southwest. 295m WTGs within the windfarm site would not be in RLoS of the Hawarden mitigation PSR.

16.91 RLoS modelling indicates that WTGs within the windfarm site with blade tip heights of between 295m and 315m AMSL are unlikely to be detected by Manchester PSR, and so further assessment of this receptor is considered unnecessary.

16.5.2.6 Offshore helidecks

16.92 To help achieve a safe operating environment, CAP764 requires a 9nm consultation zone for planned obstacles exists around offshore helicopter destinations. Within 9nm, obstacles such as WTGs can potentially impact upon the feasibility of helicopters to safely fly low visibility procedures or missed approaches at the associated helideck site. There are nine offshore helidecks within 9nm of the windfarm site. Four helidecks (CPC-1, DP-1, DP-6, and DP8) are associated with platforms within the Morecambe South gas field, two are associated with platforms within the Liverpool Bay gas field (Hamilton North, Offshore Storage Installation) and the other three helidecks are on the Calder CA1, Conwy, and DPPA (Morecambe North) platforms. The Morecambe South DP3 platform was previously located inside the windfarm site boundary, however the final decommissioning and jacket structure removal of this platform was completed in 2023.

16.93 CAP764 states that the 9nm zone does not prohibit development but is a trigger for consultation with 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. All operators in the 9nm mile zone have been consulted by the Applicant.

16.94 Helicopter Traffic Zones (HTZs) known as the Morecambe Bay Gas Field HTZ, the Liverpool Bay Gas Field HTZ and the Conwy HTZ are established around the platforms to notify of helicopters engaged in platform approaches, departures, and inter-platform transits. The HTZ airspace is from sea level to 2,000ft AMSL and extends to 1.5nm from the platform helidecks. (See AIP ENR 1.6 paragraph 4.5.1.4.4).

16.95 Bi-directional routes are established for helicopter support flights from Blackpool Airport to these HTZs, with a normal operating height of 1,000ft AMSL. The routes, shown in Figure 6 of **Appendix 16.1**, have no airspace status and assume the background airspace classification within which they lie, in this case Class G, and are used by the Air Navigation Service Provider (ANSP) and helicopter operators for flight planning and management purposes. Whilst these routes have no official classification in airspace terms, they are published on aeronautical charts to alert other airspace users to the potential for frequent low-level helicopter traffic.

16.96 The routes have no promulgated lateral dimensions, although CAP764 states that planned obstacles within 2nm of the route centrelines should be consulted upon with helicopter operators and the ANSP. 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. The windfarm site boundary is beyond 2nm from the route centrelines.

16.5.2.7 Search and rescue

16.97 SAR operations are a highly specialised undertaking involving not only aviation assets, but also small boats, ships, and shore-based personnel (as detailed in **Chapter 14 Shipping and Navigation**). SAR operations are generally carried out in extremely challenging conditions and at all times of the day and night and are not subject to the same weather and obstacle limitations as commercial flights to gas platforms. There are 10 helicopter SAR bases, incorporating 22 aircraft, around the UK with Bristow Helicopters providing helicopters and aircrew.

16.98 The nearest SAR base is at Caernarfon Aerodrome, approximately 87km southwest of the windfarm site, and its helicopters provide rescue services throughout the northwest region. SAR helicopters in the region may also be tasked from Prestwick Airport, 197km to the north northwest.

16.99 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.

16.5.3 Military aviation

16.100 The windfarm site is within the Warton Advisory Radio Area which has vertical limits from approximately 9,500ft AMSL to 19,000ft AMSL (Figure 3 in **Appendix 16.1**). Test flight activity within this airspace requires pilots to fly profiles which limit their ability to manoeuvre their aircraft in compliance with the Rules of the Air. Such flights will receive a radar service from Warton.

16.101 To the north of the windfarm site are the Eskmeals DAs which extend from the surface up to 50,000ft AMSL (Figure 4 in **Appendix 16.1**). Ordnance, munitions and explosives, unmanned aircraft and balloon activities take place in this airspace as well as electronic/optical hazards. At more than 30km away, it is considered unlikely that the Project would have any impact on these activities.

16.102 An Air-to-Air Refuelling Area, Area 13, is 18km northwest of the windfarm site. This airspace has vertical limits from approximately 15,000ft AMSL to 24,000ft AMSL, and within it, tanker aircraft transfer fuel to receiver aircraft under the control of military ATC based at Swanwick near Southampton.

16.5.3.1 Minimum Sector Altitudes

16.103 Warton Aerodrome is a private airport owned by BAE Systems which lies 40km east of the windfarm site. The aerodrome has Terminal Approach Procedures (TAPs) published in the UK Military AIP with associated 25nm MSAs.

16.104 The southwestern MSA sector has the lowest minimum safe altitude of 1,800ft AMSL, and the 5nm obstacle buffer for this sector extends across most of the windfarm site (Figure 11 in **Appendix 16.1**).

16.105 RAF Valley is a military station 81km southwest of the windfarm site. The station has an ATC Surveillance Minimum Altitude Area (SMAA) published in the UK Military AIP that extends to 50nm from the station.

16.106 The windfarm site is within the confines of the SMAA in an area where the lowest minimum safe altitude is 1,500ft AMSL.

16.107 RAF Woodvale is a military station 35km southeast of the windfarm site. The station currently does not have any TAPs published in the UK Military AIP and so this receptor is not considered further.

16.5.3.2 Air Defence Radars

16.108 The MOD safeguard a network of long range high powered ADRs used to provide the UK with airspace surveillance and security and to fulfil national and international obligations. The closest ADRs to the windfarm site are located at Staxton Wold 205km to the east, Brizlee Wood 209km to the northeast, and Neatishead 351km to the southeast of the windfarm site.

16.109 RLoS modelling detailed in Section 3.5 in **Appendix 16.1** confirms that no WTGs within the windfarm area would be detected by any ADRs, irrespective of blade tip height.

16.5.3.3 Military ATC PSRs

16.110 The nearest military ATC PSRs are at Warton 40km to the east; Valley 81km to the southwest; and at West Freugh, 143km to the northwest of the windfarm site.

16.111 RLoS modelling detailed in Section 3.3 in **Appendix 16.1** indicates that all WTGs in the windfarm site are highly likely to be detected by Warton PSR, irrespective of blade tip height. However, in its consultation response, **Table 16.1**, MOD has stated that the Project would not have an operational impact on the Warton PSR. For this reason, further assessment of this receptor is considered unnecessary.

16.112 It is highly unlikely that any WTGs within the windfarm site would be detected by Valley PSR or West Freugh PSR, irrespective of the blade tip height.

16.5.4 Future trends

16.113 There is no expected significant change to airspace or airspace users and the baseline is considered robust for the assessment of effects at this time. It is noted that oil and gas fields (and associated helicopter support) are expected to be decommissioned in the future.

16.114 The baseline area would likely experience new renewable activities and possibly carbon capture projects.

16.6 Assessment of effects

16.6.1 Impact receptors

16.115 The principal receptors with respect to civil and military aviation and radar are aerodromes, PSRs and offshore helicopter operations.

16.116 The specific features defined within these receptors as requiring further assessment are listed in **Table 16.7**.

Table 16.7 Civil and military aviation and radar receptors relevant to the Project

Receptor group	Receptor	Relevant features	Closest distance from Project (km)
Civil aerodromes	Blackpool Airport	WTG infringement of published IFPs	31
	Walney Aerodrome	WTG infringement of published IFPs	37
	Hawarden Airport	WTGs detected by Hawarden ATC and Mitigation PSRs	73
	Isle of Man Airport	WTGs detected by Isle of Man ATC PSR	70
MOD facilities	Warton Aerodrome	WTG infringement of published IFPs	40
	RAF Valley	WTG infringement of published IFPs	81
NATS facilities	Great Dun Fell radar	WTGs detected by Great Dun Fell PSR	117
	Lowther Hill radar	WTGs detected by Lowther Hill PSR	172
	St Annes radar	WTGs detected by St Annes PSR	33
Other aviation activities	SAR helicopters	Windfarm obstacle environment impeding SAR operations	Within windfarm site
	Helicopters transiting to offshore platform helidecks	Windfarm obstacle environment potentially impeding helicopter access to the nine helidecks on offshore platforms within 9nm of the windfarm site	Platforms within 9nm of the windfarm site.
	Helicopter traffic engaged in Project support activities	Increase in overall level of air traffic in the Project windfarm vicinity	Within windfarm site

16.6.2 Potential effects during construction

16.6.2.1 Impact 1: Impacts on civil and military PSR systems due to tall construction vessels/cranes and partially complete structures

16.117 WTGs 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. As a general rule, controllers are required to provide 5nm lateral separation between traffic receiving an ATS and 'unknown' primary radar returns in class G airspace.

16.118 To discriminate wanted aircraft targets from unwanted clutter, PSRs ignore static objects and only display moving targets. The rotating blades of WTGs 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'.

16.119 Until such time as WTG blades are allowed to rotate at operational speeds, PSRs would not detect the partially completed structures. In the same way, tall construction vessels and cranes that are in RLoS would not be moving fast enough to generate PSR clutter.

Significance of effect

16.120 As a result of non-detection of obstacles during the construction phase, the significance of effect has been assessed as **no change** and not significant in EIA terms.

16.6.2.2 Impact 2: Creation of an aviation obstacle environment

16.121 Construction of the windfarm involves the installation of infrastructure above sea level which could pose a physical obstruction to aircraft utilising the airspace in the vicinity of the windfarm site.

16.122 From a starting point of no infrastructure within the windfarm site, the infrastructure outlined in **Table 16.2** would gradually be installed over an estimated period of two and a half years.

16.123 Specifically, permanent or temporary obstacles can increase collision risk to:

- General military low flying training and operations
- Helicopter traffic transiting to and from offshore oil and gas platform helidecks

- Helicopters engaged in SAR missions in the Eastern Irish Sea

16.124 Given the WTG worst-case scenario tip height of 315m AMSL (310m above HAT[5] as set out in **Section 16.3.2**), published IFPs at Blackpool Airport, Walney Aerodrome, Warton Aerodrome, and RAF Valley would require revision to maintain the necessary 300m obstacle clearance protection above WTGs, as detailed below and in **Appendix 16.1**, **Appendix 16.2** and **Appendix 16.3**.

16.125 Should WTG maximum tip height exceed 309.6m AMSL within the southwestern sector of Blackpool Airport's MSA and 5nm buffer, the published minimum safe altitude would require to be increased to maintain the necessary 300m obstacle clearance protection.

16.126 Should WTG maximum tip height exceed 279.1m AMSL within the 5nm buffer of Blackpool Airport's southwestern TAA for runway 28, the published minimum safe altitude would require to be increased to maintain the necessary 300m obstacle clearance protection. Further impacts to Blackpool IFPs are detailed in **Appendix 16.2**.

16.127 Should WTG maximum tip height exceed 248.6m AMSL within the southwestern sector and 5nm buffer of the Walney Aerodrome MSA, the published altitude would require to be increased to maintain the necessary 300m obstacle clearance protection.

16.128 Should WTG maximum tip height exceed 279.1m AMSL within the 5nm buffer of the Walney Aerodrome TAA for runway 35, the published altitude would require to be increased to maintain the necessary obstacle clearance protection.

16.129 Should WTG maximum tip height exceed 248.6m AMSL within the 5nm buffer of the southwestern sector of the Warton Aerodrome MSA, the published minimum safe altitude would require to be increased to maintain the necessary 300m obstacle clearance protection.

16.130 Should WTG maximum tip height exceed 157.2m AMSL within the ATC SMAA at RAF Valley, the published minimum safe altitude would require to be increased to maintain the necessary obstacle clearance protection.

16.131 In addition to the above aerodrome impacts, the windfarm site is within two AMA areas of 1,700ft AMSL. Should WTG maximum tip height exceed 218.1m AMSL, the two 1,700ft AMAs would require to be increased to maintain the necessary 300m obstacle clearance protection.

[5] Within the windfarm site HAT is 4.82m AMSL

16.132 The Helicopter Access Study (**Appendix 17.1**) assesses the impact of the Project on helicopter access to gas platform helidecks. All potential impacts would be of a logistical nature and SAR access would remain unaffected, as further discussed in **Chapter 17 Infrastructure and Other Users**.

16.133 The 1.5nm radius buffer zone from WTGs and OSP(s) as secured in protective provisions in the draft DCO, would allow helicopter access to the Calder CA1 and South Morecambe (CPC-1/DP-1) platforms, but would be restricted to day VMC (meteorological conditions equal to or better than specified minima) with average day VMC access in 94.2% of daylight conditions.

16.134 DP-6 would also be limited to day VMC only once the Project is in place (only under the rule change the CAA is currently consulting on).

16.135 The DP3 and DP4 platforms have been decommissioned and removed.

16.136 Other platforms within 9nm of the windfarm site would be unaffected by the Project.

16.137 Full SAR emergency helicopter access to gas platforms adjacent to the windfarm site would still be available as SAR helicopters are not constrained by CAT meteorological limits and the layout of WTGs would comply with MGN 654 Annex 5 requirements. Therefore, any reduction in CAT helicopter access to offshore gas platforms would be a logistical impact.

Significance of effect

16.138 Embedded mitigation including notification, charting, marking and lighting is outlined in **Section 16.3.3**. This would make pilots aware of the addition of infrastructure to the windfarm site, and it is assumed that pilots will always comply with aviation regulatory requirements and use the principle of ‘see and avoid’.

16.139 An ERCoP would be developed, agreed and implemented for all phases of the Project.

16.140 Considering embedded mitigation, the significance of effect has been assessed to be **moderate significant** (significant in EIA terms).

Additional mitigation and residual effect

16.141 Consultation has been initiated with relevant aviation stakeholders, as detailed in **Table 16.1**, to make them aware of potential obstacle infringements of IFPs and operational effects, and progress has been made with stakeholders in identifying mitigation solutions. Before construction commences, final details of WTG locations and blade tip heights would be provided to aviation stakeholders to enable the revisions to IFPs to be made, with appropriate requirements detailed in the draft DCO.

16.142 Consultation with relevant platform owners and operators has been undertaken. In relation to logistical impacts to helicopter operations resulting from potential for IMC and night access restrictions, engagement is ongoing with Harbour Energy and Spirit Energy on the terms of suitable cooperation and coexistence agreements, with protective provisions which make provision for additional costs if required included in the draft DCO for completeness (as further discussed in **Chapter 17 Infrastructure and Other Users**). Once: (i) the required revisions to aerodrome IFPs are made; and (ii) coexistence agreements detailed with relevant oil and gas stakeholders or protective provisions secured in the DCO, residual effects would be reduced to **not significant** in EIA terms.

16.6.2.3 Impact 3: Increased air traffic in the area related to windfarm construction and installation activities

16.143 The use of helicopters to support construction activities for the Project could impact on existing air traffic in the vicinity. It is possible that helicopters could be used for transferring people or equipment to the windfarm site during the construction period.

16.144 The possible increase in air traffic associated with construction support activities brings with it a potential minor increased risk of aircraft collision in the airspace around the windfarm site.

Significance of effect

16.145 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.

16.146 Low level flights in the vicinity of the Project would be conducted under day VMC and pilots would follow the principle of ‘see and avoid’.

16.147 Assuming compliance with regulatory requirements and national procedures, the significance of effect to aircraft operators in the vicinity of the windfarm site has been assessed to be **not significant** in EIA terms.

16.6.3 Potential effects during operation and maintenance

16.6.3.1 Impact 1: WTGs causing permanent interference on civil and military PSRs

16.148 The windfarm site would be within the operational range of radar systems serving both civil and military agencies. Radar modelling detailed in **Appendix 16.1** shows that at least some WTGs with blade tip heights of between 295m and 315m AMSL within the windfarm site would be theoretically detectable by the NATS PSRs at Great Dun Fell, Lowther Hill and St Annes, and by the

PSRs at the Isle of Man, Hawarden and Warton (although the MOD has confirmed that there would be no operational impact on the Warton PSR). The final number of WTGs detected by these PSRs is dependent on the maximum tip heights of individual WTGs and the detailed windfarm configuration selected.

16.149 When operational (in other words, with blades fitted and rotating), WTGs 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 WTGs and aircraft. As a consequence, radar operators can be unable to distinguish between primary radar returns generated by WTGs and those generated by aircraft. As a general rule controllers are required to provide 5nm lateral separation between traffic receiving an ATS and 'unknown' primary radar returns in Class G airspace. This may therefore produce an adverse effect on the provision of safe and effective ATS by those ANSPs that utilise the impacted PSRs.

16.150 Additional mitigation would be required if both modelling of the windfarm design, based upon parameters outlined in **Table 16.2**, indicates that WTGs would be above the PSR system threshold levels that allow the WTG blades to be presented on PSR displays, and the airspace is operationally significant to the PSR operator. Mitigation should only be required for so long as PSRs do not have the inherent capability to distinguish WTG returns from aircraft returns: increasingly, "next generation" PSRs are looking to provide this functionality.

16.151 The interim (until PSRs are developed with inherent capability to distinguish WTGs from aircraft) additional mitigation that may be required for affected PSRs is discussed below.

Great Dun Fell PSR

16.152 Through consultation the MOD has stated that it does not anticipate that the Project would have an operational impact on Great Dun Fell PSR. However, interference would have an effect on NATS en-route operations.

16.153 Mitigation in respect of Great Dun Fell PSR may involve:

- Blanking (or not displaying radar data) in the relevant impacted areas of the windfarm site (either at the radar head or in the radar display system) so as to remove the PSR data containing the WTG returns from the radar data presented to controllers
- In addition to radar blanking, introducing a TMZ over the windfarm site which requires all aircraft that wish to transit the TMZ airspace to be equipped with SSR transponders to enable controllers to track aircraft through what would otherwise be a "black hole" in primary surveillance cover

- Using alternative PSRs (for example NATS' Clee Hill facility, or Lowther Hill) to provide infill coverage for the provision of ATS in the impacted windfarm site areas

Lowther Hill PSR

16.154 A new advanced 3D radar that can detect an aircraft position in elevation as well as azimuth has recently been installed at the Lowther Hill site. The upgraded PSR has the ability to use clutter mitigation techniques to filter out the false radar returns from WTGs. Re-configuration of the PSR may allow the impact of any detected WTGs within the Project windfarm site to be mitigated. Should this mitigation be available, then Lowther Hill PSR could then be used as an alternative source of infill data to mitigate other impacted PSRs, in the same way as Clee Hill PSR.

16.155 If re-configuration of Lowther Hill is not an effective mitigation solution, then the alternative mitigations proposed for Great Dun Fell PSR would also be available for Lowther Hill PSR.

St Annes PSR

16.156 The mitigation options proposed for Great Dun Fell PSR would also be applicable to St Annes PSR.

Isle of Man PSR

16.157 Although all WTGs within the windfarm site, irrespective of blade tip height, are highly likely to be detected by the Isle of Man PSR, it is understood that the PSR is only used by Isle of Man ATC to a range of 30nm[6]. At a minimum range of 35nm it is considered unlikely that ATC would be providing a radar control service for aircraft in the vicinity of the windfarm site. The effect on the Isle of Man PSR is therefore not considered to be operationally significant and no further mitigation is identified for the Project-alone. The stakeholder has since confirmed that the Isle of Man PSR has an operational range of 60nm; however, their concern is not so much that there would be an operational impact, but rather that there may be a technical impact with the processing capacity of the PSR affected by all the potential WTGs from a number of projects in RLoS. As such this is considered as a cumulative effect, **Section 16.7**.

Hawarden PSRs

16.158 Although the ATC PSR installed at Hawarden Airport would detect some WTGs within the windfarm site, and the mitigation PSR may detect 315m AMSL WTGs in a small area, the impacted airspace is unlikely to be

[6] Information from operational feedback within CAP 1773 Walney Transponder Mandatory Zone Post Implementation Review (CAA, 2019).

operationally significant as the windfarm site is significantly beyond Hawarden's area of control. The stakeholder has confirmed that the Project would have no impact on their operations, as detailed in **Table 16.1**.

Significance of effect

16.159 Without additional mitigation, the significance of effects on receptors receiving changes to their operational environment has been assessed to be **major significant**. This applies to Great Dun Fell PSR, Lowther Hill PSR and St Annes PSR.

16.160 The significance of effects on the Hawarden PSRs and Isle of Man PSR has been assessed to be **not significant**.

Additional mitigation and residual effect

16.161 CAP764 outlines other mitigation options which could be applied either singly or in combination to optimise the effectiveness of any mutually agreed solutions. Due to the promising developments currently being advanced by industry in this area of technology, consultation on technical measures would continue as a development might emerge that proves to be more suitable for adoption and implementation while the Project advances and matures.

16.162 It is anticipated that the potential risk posed to aviation operations can be wholly and successfully mitigated through various technical solutions applied to current generation PSRs.

16.163 NATS has confirmed that a mitigation solution for Great Dun Fell, Lowther Hill and St Annes PSRs has been identified (as detailed in **Table 16.1**) (the need for which is secured in the draft DCO).

16.164 Following the application of additional mitigation (as described above for the identified PSR receptors), the residual significance of effect on radars is anticipated to be **not significant** in EIA terms. It is also anticipated that, during the operational life of the Project, NATS will procure "next generation" PSRs which should not require the application of mitigation measures to allow them to provide an appropriate surveillance picture in the presence of WTGs.

16.6.3.2 Impact 2: Creation of an aviation obstacle environment

16.165 During the operation and maintenance phase of the Project, the infrastructure outlined in **Table 16.2** would be present within the windfarm site. This could pose a physical obstruction to aircraft utilising the airspace in the vicinity of the windfarm site.

16.166 Specifically, permanent or temporary obstacles can increase collision risk to:

- General military low flying training and operations

- Helicopter traffic transiting to and from offshore oil and gas platform helidecks
- Helicopters engaged in SAR missions in the Eastern Irish Sea

16.167 Published IFPs at Blackpool Airport, Walney Aerodrome, Warton Aerodrome, and RAF Valley would require revision to maintain necessary obstacle clearance protection above WTGs, as detailed in **Appendix 16.1**, **Appendix 16.2**, **Appendix 16.3** and **Section 16.6.2.2**.

16.168 The impact of WTGs on helicopter access to gas platform helidecks is detailed in the Helicopter Access Report (**Appendix 17.1**) and summarised below. Potential impacts would be of a logistical nature and SAR access would remain unaffected, as further discussed in **Chapter 17 Infrastructure and Other Users**.

16.169 The 1.5nm separation radius from WTGs and OSP(s), as secured in protective provisions, would allow helicopter access to the Calder CA1 and South Morecambe (CPC-1/DP-1) platforms, but would be restricted to day VMC (meteorological conditions equal to or better than specified minima) only, with average day VMC access in 94.2% of daylight conditions.

16.170 DP-6 would also be limited to day VMC only once the Project is in place (only under the rule change the CAA is currently consulting on).

16.171 The DP3 and DP4 platforms have been decommissioned and removed.

16.172 Other platforms within 9nm of the windfarm site would be unaffected by the Project.

16.173 Full SAR emergency helicopter access to gas platforms adjacent to the windfarm site would still be available as SAR helicopters are not constrained by CAT meteorological limits and the layout of WTGs would comply with MGN 654 Annex 5 requirements. Therefore, any reduction in CAT helicopter access to offshore gas platforms would be a logistical impact.

Significance of effect

16.174 Embedded mitigation in the form of compliance with international and national SARPs with respect to notification, charting, marking and lighting is outlined in **Section 16.3.3**. This would make pilots aware of the infrastructure within the windfarm site, and it is assumed that pilots will always comply with aviation regulatory requirements and use the principle of ‘see and avoid’.

16.175 An ERCoP would be developed, agreed and implemented for all phases of the Project.

16.176 Considering embedded mitigation, and the effects identified in above**,** the significance of effect has been assessed as **moderate significant** (significant in EIA terms).

Additional mitigation and residual effect

16.177 Consultation has been undertaken with relevant aviation stakeholders, as detailed in **Table 16.1**, to make them aware of potential obstacle infringements of IFPs, and progress mitigation solutions. Before construction commences, final details of WTG locations and blade tip heights would be provided to aviation stakeholders to enable the revisions to IFPs to be made, with appropriate requirements detailed in the draft DCO.

16.178 Consultation with relevant platform owners and operators has been undertaken. In relation to logistical impacts to helicopter operations resulting from potential for IMC and night access restrictions, engagement is ongoing with Harbour Energy and Spirit Energy on the terms of suitable cooperation and coexistence agreements, with protective provisions which make provision for additional costs if required included in the draft DCO for completeness (as further discussed in **Chapter 17 Infrastructure and Other Users**).

16.179 Once the required revisions to aerodrome IFPs are made and coexistence agreements detailed with relevant oil and gas stakeholders, residual effects would be reduced to **not significant** in EIA terms.

16.6.3.3 Impact 3: Increased air traffic in the area related to windfarm activities

16.180 The operational phase of the Project would likely see an increase in helicopter traffic above the current baseline level engaged in support operations in the area. Helicopters are not envisaged as the primary means of access for Project offshore operations and maintenance activities, however their use during heavy maintenance periods, or for fault clearance is possible.

16.181 The possible increase in air traffic associated with support activities brings with it a potential minor increased risk of aircraft collision in the airspace around the windfarm site.

Significance of effect

16.182 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. Low level flights in the vicinity of the Project would be conducted under day VMC and pilots would follow the principle of ‘see and avoid’.

16.183 Due to the predicted low number of movements during the operation and maintenance phase of the Project and assuming compliance with regulatory requirements and national procedures, the significance of effect to aircraft operators in the vicinity of the windfarm site is considered to be **not significant** in EIA terms.

16.6.4 Potential effects during decommissioning

16.184 The detail and scope of the decommissioning works would be determined by the relevant legislation and guidance at the time. However, it is expected that decommissioning would most likely involve removal of all the WTG components, OSP(s), part of the WTG/OSP foundations and sections of inter-array and platform link cables.

16.185 For the decommissioning phase, the implementation of standard aviation safety management processes would be applicable, and a risk assessment based on the appropriate aviation requirements pertinent at the time would be required.

16.6.4.1 Impact 1: WTGs causing interference on civil and military PSRs

16.186 During the gradual decommissioning of above sea level infrastructure within the windfarm site the impact on radar would be removed. Firstly, WTGs are made inoperative, and the blades of WTGs would cease rotating, before being removed from the site. In addition, all mitigations applicable during the operation and maintenance phase (to the extent they are still required) would remain in place during the decommissioning phase until such time as all WTG blades are removed.

Significance of effect

16.187 The significance of effect on radar during decommissioning has been assessed to be **no change** as the site is returned to pre-development conditions.

16.6.4.2 Impact 2: Removal of aviation obstacle environment

16.188 During the decommissioning phases, the above sea level infrastructure outlined in **Table 16.2** would be removed. This would gradually reduce the physical obstruction to aircraft utilising the airspace in the vicinity of the windfarm site.

16.189 Specifically, permanent or temporary obstacles can increase collision risk to:

- General military low flying training and operations
- Helicopter traffic transiting to and from offshore oil and gas platform helidecks
- Helicopters engaged in SAR missions in the Eastern Irish Sea

Significance of effect

16.190 Embedded mitigation in the form of compliance with international and national SARPs with respect to notification, charting, marking and lighting, as outlined

in **Section 16.3.3**, would be retained until decommissioning has been completed.

16.191 An ERCoP would be developed, agreed and implemented for all phases of the Project.

16.192 Engagement with offshore oil and gas operators would remain in place during the decommissioning phase.

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

16.194 The significance of effect has been assessed to be **no change** for decommissioning.

16.6.4.3 Impact 3: Increased air traffic in the area related to windfarm decommissioning activities

16.195 The use of helicopters during the decommissioning phase of the Project could impact on existing traffic in the area. It is possible that helicopters could be used for transferring people and/or equipment to the windfarm site on a daily basis during the decommissioning of site infrastructure.

16.196 The possible increase in air traffic associated with decommissioning support activities brings with it a potential minor increased risk of aircraft collision in the airspace around the windfarm site.

Significance of effect

16.197 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.

16.198 Assuming compliance with regulatory requirements and national procedures, the significance of the effect to aircraft operators in the vicinity of the windfarm site is considered to be **not significant**.

16.7 Cumulative effects

16.199 In order to undertake the CEA, and as per the PINS advice note (PINS, 2019), the potential for cumulative effects has been established considering each Project-alone effect (and the ZoI of each impact) alongside the list of other plans, projects and activities that could potentially interact. These stages are detailed below.

16.7.1 Identification of potential cumulative effects

16.200 Part of the cumulative assessment process is the identification of which individual impacts assessed for the Project have the potential for a cumulative effect on receptors (impact screening). This information is set out in **Table 16.8** below. Screening considers the impacts and the plans and projects identified in **Table 16.9**.

16.201 Impacts for which the residual significance of effect is assessed in the Project-alone assessment as 'not significant', or above, are considered in the CEA screening (i.e. only those assessed as 'no change' are not taken forward as there is no potential for them to contribute to a cumulative effect).

Table 16.8 Potential cumulative effects (impact screening)

Impact	'Project-alone' residual effect significance	Potential for cumulative effect	Rationale
Construction phase			
Impact 1: Impacts on civil and military PSR systems due to tall construction vessels/cranes and partially complete structures.	No change	No	No potential for significant cumulative effects as no change identified for the Project.
Impact 2: Creation of an aviation obstacle environment.	Not significant	Yes	WTGs associated with other developments create aviation obstacles, restricting the available airspace.
Impact 3: Increased air traffic in the area related to windfarm construction and installation activities.	Not significant	Yes	Air traffic activities associated with other developments have the potential to cumulatively increase the risk of aircraft collision.
Operation and maintenance phase			
Impact 1: WTGs causing permanent interference on civil and military radars.	Not significant	Yes	Other windfarm developments could impact radars over a larger area.
Impact 2: Creation of an aviation obstacle environment.	Not significant	Yes	WTGs associated with other developments create aviation obstacles, restricting the available airspace.
Impact 3: Increased air traffic in the area related to windfarm activities.	Not significant	Yes	Air traffic activities associated with other developments have the potential to cumulatively increase the risk of aircraft collision.

Impact	'Project-alone' residual effect significance	Potential for cumulative effect	Rationale
Decommissioning phase			
Impact 1: WTGs causing interference on civil and military PSRs.	No change	No	No potential for significant cumulative effects as no change identified for the Project.
Impact 2: Removal of aviation obstacle environment.	No change	No	No potential for significant cumulative effects as no change identified for the Project.
Impact 3: Increased air traffic in the area related to windfarm decommissioning activities.	Not significant	Yes	Air traffic activities associated with other developments have the potential to cumulatively increase the risk of aircraft collision.

16.7.2 Identification of other plans, projects and activities

16.202 The identification and review of the other plans, projects and activities that may result in cumulative effects for inclusion in the CEA (described as 'project screening') is undertaken alongside an understanding of Project-alone effects. For civil and military aviation and radar all plans and projects that could have overlapping impacts on the receptors impacted by the Project have been included and as such projects out to a distance of 100km have been included. 100km is the maximum range at which radar cumulative effects are considered to occur. The potential cumulative effect of radar impacts on ATC operations diminishes as the separation between windfarm sites increases, and a separation distance of 100km is considered to be a pragmatic range beyond which cumulative effects would be negligible.

16.203 Existing operational windfarms already have required mitigations in place, and thus are considered part of the baseline (noting that mitigations for the Project consider existing solutions).

16.204 The project screening information is set out in **Table 16.9**, including a consideration of the relevant details of each project, including current status (e.g. under construction), planned construction period, distance to the Project, status of available data, and rationale for including or excluding from the assessment.

16.205 All projects considered for CEA across all topics have been identified within **Appendix 6.1 CEA Project Long List** (Document Reference 5.2.6.1) which forms an exhaustive list of plans, projects and activities relevant to the Project. The types of projects that are relevant for the civil and military aviation and radar assessment are those with significant above water structures i.e. other offshore windfarms.

Table 16.9 Summary of projects considered for the CEA in relation to civil and military aviation and radar

Project	Status (at the time of assessment)	Construction period	Closest distance from the Project (km)	Screened into the CEA (Y/N)	Rationale
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	Pre-application stage. PEIR published in October 2023.	2026-2029	0 (adjacent)	Y	Construction of Transmission Assets and construction of Project WTGs could both cause impacts to the same receptors/operations.
Mona Offshore Wind Project	Pre-application stage. PEIR published 2023	2026 - 2029	10.0	Y	Proximity to the Project and potential for cumulative effects, in terms of physical obstructions to military low flying and offshore helicopters, increased risk of mid-air collision, and radar interference.
Morgan Offshore Wind Project Generation Assets	Pre-application stage. PEIR published 2023	2026 - 2029	16.7	Y	
Awel y Môr (AyM) Offshore Wind Farm	Consent granted 2023	2027 – 2030	28.9	Y	
Mooir Vannin Offshore Windfarm	Pre-application stage. Scoping Report submitted in 2023.	2030-2032	43.7	Y	

16.7.3 Assessment of cumulative effects

16.206 Having established the residual effects from the Project with the potential for a cumulative effect, along with the other relevant plans, projects and activities, the following sections provide an assessment of the level of cumulative effect that may arise. These are detailed per impact where the potential for cumulative effects have been identified (in line with **Table 16.8**).

16.207 Given the interconnected nature of the Project and the Morgan and Morecambe Offshore Wind Farms: Transmission Assets, a separate 'combined' assessment of these is provided within the CEA (**Section 16.7.3.1**). Thereafter, the cumulative assessment considers all plans, projects and activities screened into the CEA (**Section 16.7.3.2**).

16.7.3.1 Cumulative assessment – the Project and Transmission Assets (combined assessment)

16.208 While the Transmission Assets[7] are being considered in a separate ES as part of a separate DCO application (combined with the Morgan Offshore Wind Project transmission assets), given the functional link, a 'combined' assessment has been made considering both the Project and Transmission Assets for the purposes of cumulative assessment. This provides an assessment including impact interactions and additive effects and thus any change in the significance of effects as assessed separately.

16.209 The Transmission Assets PEIR (Morgan Offshore Wind Limited and Morecambe Offshore Windfarm Ltd, 2023) informs the assessment. The assessment was also undertaken in reference to the baseline presented in **Section 16.5**.

16.210 The infrastructure of the Transmission Assets which may interact cumulatively with the Project in creating an aviation obstacle environment, includes:

- Export cables adjoining the windfarm sites and making landfall south of Blackpool
- Booster station required for the Morgan Offshore Wind Project
- OSP(s) (for the Project and Morgan Offshore Wind Project Generation Assets)

[7] As the Transmission Assets includes infrastructure associated with both the Project and the Morgan Offshore Wind Project Generation Assets, it should be noted that the combined assessment considers the transmission infrastructure for both the Project and the Morgan Offshore Wind Project Generation Assets (and includes all infrastructure as described in the Transmission Assets PEIR).

- Onshore infrastructure - where construction/maintenance equipment have the potential to create obstacles to the same receptors as identified for the Project

16.211 The following aviation and radar impacts (Project-alone) were concluded in the Transmission Assets PEIR (Morgan Offshore Wind Limited and Morecambe Offshore Windfarm Ltd, 2023):

- Landfall and trenching activity and onshore substations (creation of an onshore obstacle) (all phases) – **minor adverse** effect (not significant in EIA terms)
- Electro-Magnetic Fields (EMF) associated with onshore cables and their proximity to Blackpool Airport navaids and St Annes PSR (operation and maintenance) – **minor adverse** effect (not significant in EIA terms)
- OSP(s) and Morgan offshore booster station (creation of an offshore obstacle) (all phases) – **minor adverse** effect (not significant in EIA terms)

16.212 A number of receptors are common to the Project and the Transmission Assets where potential effects have been identified. This includes Blackpool Airport, Warton Aerodrome, St. Annes PSR (relating to the creation of an onshore obstacle and EMF effects), and low flying aircraft and offshore helicopter operations (relating to the creation of an obstacle). While effects could be additive, mitigations and consultation in place for both projects means cumulative effects have not been considered to be beyond that assessed on an individual Project basis.

16.213 It is noted that onshore infrastructure as part of the Transmission Assets is proposed in the vicinity of Blackpool Airport. Potential obstacles include tall construction equipment such as cranes.

16.214 Airports have a series of protected OLS established around their runways in order to safeguard flying operations, and similarly have surfaces around airport ground-based navigation facilities to protect radio signal integrity. Obstacles that infringe these surfaces can adversely affect aircraft safety or interfere with critical radio signals used by aircraft for navigation.

16.215 Consultation has been established by the Transmission Assets Applicant to agree mitigation as required and as such no significant effects are identified.

Summary

16.216 Key interactions and additive effects between the Project and the Transmission Assets have been considered with no identified effects that would result in cumulative impacts of greater significance than assessed for either the Project or the Transmission Assets. A summary is provided in **Table 16.10** considering all effects from the Project and the Transmission Assets.

Table 16.10 Summary of impacts from the Project and Transmission Assets alone and combined (note: wording of impacts has been summarised to encompass both projects)

Impact	Transmission Assets significance of effect	Project significance of effect	Combined assessment
Construction/decommissioning phases			
Creation of an onshore obstacle	Minor adverse	N/A	As per Project-alone
Creation of an offshore obstacle	Minor adverse	Not significant	As per Project-alone
Operation and maintenance phase			
Creation of an onshore obstacle	Minor adverse	N/A	As per Project-alone
Creation of an offshore obstacle	Minor adverse	Not significant	As per Project-alone
EMF	Minor adverse	N/A	As per Project-alone

16.7.3.2 Cumulative assessment – all plans and projects

16.217 Based on the impacts (**Table 16.8**) and plans and projects (**Table 16.9**) identified where there is the potential for cumulative effects, a detailed cumulative assessment is undertaken considering all relevant information from the Project and other plans and projects (including the Transmission Assets).

WTGs causing permanent interference on civil and military radars

16.218 There is potential for a cumulative effect where radars detect the rotating blades of WTGs 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.

16.219 Additionally, noting the comments raised by the Isle of Man Airport regarding the potential for a technical impact to the processing capacity of the PSR affected by the WTGs of a number of projects in RLoS, an associated potential cumulative effect on the Isle of Man PSR is highlighted. Engagement with Isle of Man Airport is continuing to further understand any potential radar issues and mitigate these concerns.

16.220 With no mitigation in place the potential significance of the cumulative effect has been assessed as **major significant**.

16.221 However, future offshore windfarms must have all necessary radar mitigations in place before becoming operational, and any potential radar impacts from the Project would be similarly mitigated. For example, for AyM Offshore Wind Farm NATS have stated that radar mitigation must be implemented before the

installation of turbine blades. With such mitigation implemented the potential for cumulative effects on civil and military radars has been assessed as **not significant**.

16.222 Due to their proximity to the Project, the proposed Mona Offshore Wind Project and Morgan Offshore Wind Project Generation Assets developments may require similar radar mitigations to be considered. For example, mitigations may require the establishment of TMZ airspace. Careful coordination between projects may be necessary to achieve appropriate radar mitigation solutions. The Mooir Vannin Offshore Wind Farm is also in such proximity that effects could impact the same receptors and require similar mitigations, however there are no assessments at this stage for this Project. It would be expected that mitigations would be proposed as required for this Project as it progresses.

Creation of an aviation obstacle environment

16.223 The Project involves 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 projects.

16.224 Specifically, any additional mitigation plans agreed with offshore platform operators and offshore helicopter operators before construction of the Project commences should take into account other operational and future developments within 9nm of the relevant platforms. The Helicopter Access Study (**Appendix 17.1**) includes a cumulative assessment which considers whether installations already affected by the Project would have additional impacts from other proposed offshore developments. The assessment concluded that Mona Offshore Wind Project and Morgan Offshore Wind Project Generation Assets would have no cumulative impact on any installations affected by the Project.

16.225 The potential effects on aviation receptors in terms of aviation obstacles have been mitigated by existing projects and other planned projects would also need to agree suitable mitigations. Due to their proximity to the Project, and effects identified in their PEIR documents, the proposed Mona and Morgan offshore wind projects may require similar mitigations (revisions to IFPs) to be considered, so careful coordination between projects may be necessary to implement appropriate mitigation solutions.

16.226 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 as required.

16.227 Through the use of embedded mitigation measures such as effective lighting and the separation of WTGs and OSP(s) between oil and gas platforms with a helideck (as secured in the draft DCO), additional agreed mitigation plans (revisions to IFPs and coexistence agreements with oil and gas stakeholders/protective provisions), 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 from the creation of an obstacle environment has been assessed as **not significant**.

Increased air traffic in the area related to wind farm activities

16.228 During the construction, operation and maintenance and decommissioning phases of the Project 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 windfarm site.

16.229 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 projects included in the CEA 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.

16.230 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.

Summary

16.231 Potential cumulative effects have been considered for WTG impacts on PSRs in the operation and maintenance phase, aviation impacts from the creation of an offshore obstacle environment in the construction and operation and maintenance phases and impacts from increased air traffic activity in all phases. For all these impacts, the cumulative effect of all plans and projects has been assessed as **not significant**.

16.8 Transboundary effects

16.232 The airspace around the windfarm site is used by international civil aviation. However, the potential impacts of WTGs as obstacles to aviation are localised and confined to the windfarm site, and the distance between the windfarm site and the Shannon FIR boundary is 119km. The Project is beyond the 60nm (111km) range of Ireland's PSRs and is outside the IAA's area of

responsibility. As such, there are no transboundary effects. PINS agreed in the Scoping Opinion that transboundary effects can be scoped out of further assessment. It is noted that effects to the Isle of Man (not formally an European Economic Area (EEA) state but a self-governing British Crown Dependency) are assessed alongside similar receptors groups within **Section 16.6** and **Section 16.7**.

16.9 Inter-relationships

16.233 There are clear inter-relationships between the civil and military aviation and radar topic and several other topics that have been considered within this ES. **Table 16.11** provides a summary of the principal inter-relationships and sign-posts to the relevant chapters where those issues have been addressed.

16.234 The identified inter-relationships with this chapter are **Chapter 14 Shipping and Navigation**, **Chapter 17 Infrastructure and Other Users, Chapter 12 Ornithology** and **Chapter 18 SLVIA.**

16.235 To resolve concerns from the maritime community, work has been undertaken to develop an aviation warning lighting standard which is clearly distinguishable from maritime lighting. Where it is evident that the default aviation warning lighting standard may generate issues for the maritime community a developer can make a case, that is likely to receive CAA approval, for the use of a flashing red Morse Code Letter ‘W’ instead. See CAP764 paragraph 3.16.

Table 16.11 Civil and military aviation and radar inter-relationships

Topic and description	Related chapter	Where addressed in this chapter	Rationale
Operation and maintenance phase			
Aviation lighting fitted to offshore WTGs.	**Chapter 12 Offshore Ornithology** **Chapter 14 Shipping and Navigation** **Chapter 18 SLVIA**	**Section 16.3.3.3** identifies the lighting requirements	Potential confusion to the maritime community, visual effects and effects to birds associated with lighting.
Creation of an aviation obstacle environment and increased air traffic in the area related to windfarm activities	**Chapter 14 Shipping and Navigation** **Chapter 17 Infrastructure and Other Users**	**Sections 16.6.2, 16.6.3** and **16.6.4** assesses the impact on helicopter operations	Potential impacts on SAR operations discussed in **Chapter 14 Shipping and Navigation**. Impacts to helicopter operations assessed in this chapter and helicopter access impacts are detailed further in **Chapter 17 Infrastructure and Other Users**

16.10 Interactions

16.236 The impacts identified and assessed in this chapter have the potential to interact with each other. The worst-case impacts assessed within the civil and military aviation and radar chapter take these potential interactions into account within each impact assessed. For example, the impacts of the creation of an obstacle environment and increased air traffic due to windfarm activities may interact on helicopter/SAR traffic or military low flying, but the significance of the interaction is not considered to be any greater than the significance of the individual impacts. Therefore, there is no additional interaction to consider (as with ecological topics for example).

16.11 Potential monitoring requirements

16.237 No monitoring relevant to this chapter is anticipated, however any potential requirements, including monitoring the effectiveness of radar mitigations,

would be agreed with stakeholders prior to construction, taking into account the final detailed design of the Project.

16.12 Assessment summary

16.238 This desk-based assessment has considered effects with respect to impacts on radar and UK airspace predicted due to the physical presence of the Project and associated air traffic during the construction, operation and maintenance, and decommissioning phases. Potential impacts are physical obstruction to aircraft, increased air traffic in the area related to windfarm activities, and interference on radars caused by rotating WTG blades.

16.239 Potentially affected aviation stakeholders include civil and military aerodromes and 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.

16.240 A range of mitigation measures related to civil and military aviation and radar have been embedded in the Project design to reduce potential aviation effects. These include the development of an ERCoP to mitigate the effect on SAR operations, notification to aviation stakeholders during construction (and decommissioning) of the windfarm, and an aviation obstacle lighting scheme agreed with the relevant authorities.

16.241 Consultation has been advanced with aviation stakeholders to detail additional appropriate mitigations to safeguard airport operations, and offshore oil and gas helicopter operations as secured in the draft DCO.

16.242 It has been agreed with Blackpool Airport that the impact on its IFPs can be mitigated by amending them (as secured by a requirement in the draft DCO).

16.243 Adverse impact on Walney Aerodrome's IFPs can be mitigated by amendment of the IFPs (as secured by a requirement in the draft DCO). Similarly, adverse impact on Warton Aerodrome's and RAF Valley's IFPs can be mitigated by amendment of the IFPs (as secured by a requirement in the draft DCO).

16.244 Engagement with oil and gas stakeholders is ongoing to mitigate logistical impacts associated with helicopter access through coexistence agreements, with protective provisions included in the draft DCO for completeness.

16.245 Technical mitigation solutions are available for radar interference and such solutions are being further detailed with affected radar operators such as NATS (as secured by a requirement in the draft DCO).

16.246 NATS has confirmed that a mitigation solution has been identified to mitigate adverse impacts on Great Dun Fell, Lowther Hill and St Annes PSRs. The

Applicant has commenced discussions with NATS concerning implementation of the solution.

16.247 Engagement with Isle of Man Airport is continuing to further understand any potential cumulative radar issues and mitigate these concerns. If necessary, input from the Isle of Man PSR equipment manufacturer would be sought to assess the likely impact on processing capacity.

16.248 No residual significant effects on civil and military aviation and radar have been identified.

16.249 A summary of the assessment is presented in **Table 16.12**.

Table 16.12 Summary of potential effects on civil and military aviation and radar

Potential impact	Receptor	Significance of effects	Additional mitigation measures proposed	Residual effect	Cumulative residual effect
Construction phase					
Impact 1: Impacts on civil and military PSR systems due to tall construction vessels/cranes and partially complete structures.	NATS (Great Dun Fell, Lowther Hill and St Annes PSRs)	No change	N/A	No change	As per Project-alone
	Isle of Man Airport (Isle of Man PSR)				
	Hawarden Airport (Hawarden PSRs)				
	ATS (All impacted PSRs)				
Impact 2: Creation of an aviation obstacle environment.	Military low flying	Moderate significant	N/A – noting consultation with the MOD to agree the implementation of embedded mitigation.	Not significant	As per Project-alone
	Helicopters transiting to and from offshore oil and gas platform helidecks		Coexistence agreement/protective provisions		
	SAR helicopters		N/A – noting the WTG and OSP layout and SAR requirements would be agreed with the MCA and MMO post-consent		

Potential impact	Receptor	Significance of effects	Additional mitigation measures proposed	Residual effect	Cumulative residual effect
			(included in embedded mitigation)		
	Blackpool Airport		Revisions to IFPs as required, as secured by requirements in the draft DCO. It has been agreed with Blackpool Airport that impact can be mitigated by amending its IFPs, and it is anticipated that similar agreement would be reached with the other stakeholders.		
	Walney Aerodrome				
	Warton Aerodrome				
	RAF Valley				
Impact 3: Increased air traffic in the area related to windfarm construction and installation activities.	Military low flying	Not significant	N/A	Not significant	As per Project-alone
	Helicopters transiting to and from offshore oil and gas platform helidecks				
	SAR helicopters				

Potential impact	Receptor	Significance of effects	Additional mitigation measures proposed	Residual effect	Cumulative residual effect
Operation and maintenance phase					
Impact 1: WTGs causing permanent interference on civil and military PSRs.	NATS (Great Dun Fell, Lowther Hill and St Annes PSRs)	Major significant	Technical mitigation solution applied to impacted radars to be agreed with operators. NATS has confirmed that a mitigation solution has been identified to mitigate adverse impacts on Great Dun Fell, Lowther Hill and St Annes PSRs. The Applicant has commenced discussions with NATS concerning implementation of the solution, as secured in requirements as required in the draft DCO.	Not significant	As per Project-alone, noting that engagement with Isle of Man Airport is continuing to further understand any potential cumulative radar issues and mitigate these concerns.
	Isle of Man Airport (Isle of Man PSR)	Not significant		Not significant	
	Hawarden Airport (Hawarden PSRs)	Not significant		Not significant	
	ATS (All impacted PSRs)	Major significant		Not significant	

Potential impact	Receptor	Significance of effects	Additional mitigation measures proposed	Residual effect	Cumulative residual effect
Impact 2: Creation of an aviation obstacle environment	Military low flying	Moderate significant	N/A – noting consultation with the MOD to agree the implementation of embedded mitigation.	Not significant	As per Project-alone
	Helicopters transiting to and from offshore oil and gas platform helidecks		Coexistence agreements/protective provisions.	Not significant	
	SAR helicopters		N/A – noting the WTG and OSP layout and SAR requirements would be agreed with the MCA and MMO post-consent (included in embedded mitigation).	Not significant	
	Blackpool Airport		As identified in the construction phase, consultation and revisions to IFPs as required, as secured by requirements in the draft DCO. It has been agreed with Blackpool Airport that impact can be mitigated by amending its IFPs, and it is anticipated that similar agreement would be reached with the other stakeholders.	Not significant	
	Walney Aerodrome			Not significant	
	Warton Aerodrome			Not significant	
	RAF Valley			Not significant	

Potential impact	Receptor	Significance of effects	Additional mitigation measures proposed	Residual effect	Cumulative residual effect
Impact 3: Increased air traffic in the area related to windfarm activities.	Military low flying	Not significant	N/A	Not significant	As per Project-alone
	Helicopters transiting to and from offshore oil and gas platform helidecks				
	SAR helicopters				
Decommissioning phase					
Impact 1: WTGs causing interference on civil and military PSRs.	NATS (Great Dun Fell, Lowther Hill and St Annes PSRs)	No change	N/A	No change	As per Project-alone
	Isle of Man Airport (Isle of Man PSR)				
	Hawarden Airport (Hawarden PSRs)				
	ATS (All impacted PSRs)				
Impact 2: Removal of aviation obstacle environment.	Military low flying	No change	N/A	No change	As per Project-alone
	Helicopters transiting to and from offshore oil and gas platform helidecks				
	SAR helicopters				

Potential impact	Receptor	Significance of effects	Additional mitigation measures proposed	Residual effect	Cumulative residual effect
Impact 3: Increased air traffic in the area related to windfarm decommissioning activities.	Military low flying	Not significant	N/A	Not significant	As per Project-alone
	Helicopters transiting to and from offshore oil and gas platform helidecks				
	SAR helicopters				

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