

MONA OFFSHORE WIND PROJECT

Environmental Statement

Volume 4, Chapter 1: Aviation and radar (F02)

Deadline: 7

Application Reference: EN010137

Document Number: MOCNS-J3303-RPS-10061

Document Reference: F4.1 F02

14 January 2025

F02



Image of an offshore wind farm

MONA OFFSHORE WIND PROJECT

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
F01	Application	Osprey	Mona Offshore Wind Ltd	Mona Offshore Wind Ltd	Feb 2024
F02	Submission at D7	Osprey	Mona Offshore Wind Ltd	Mona Offshore Wind Ltd	14 Jan 2025

Prepared by:

Osprey

Prepared for:

Mona Offshore Wind Ltd.

MONA OFFSHORE WIND PROJECT

Errata

Document section	Description of errata
Tables 1.1, 1.2, 1.3 and 1.4	A cross-reference incorrectly states that the potential impacts of the Mona Offshore Wind Project during the construction, operations and maintenance, and decommissioning phases are considered in section 0. The potential impacts of the Mona Offshore Wind Project during the construction, operations and maintenance, and decommissioning phases are considered in section 1.4.

MONA OFFSHORE WIND PROJECT

Contents

1	AVIATION AND RADAR	1
1.1	Introduction	1
1.1.1	Overview	1
1.2	Legislative and policy context.....	1
1.2.1	Legislation	1
1.2.2	Planning policy context.....	1
1.2.3	National Policy Statements	2
1.2.4	Welsh National Marine Plan.....	6
1.3	Consultation.....	6
1.4	Baseline methodology	12
1.4.1	Relevant guidance.....	12
1.4.2	Scope of the assessment.....	13
1.4.3	Methodology to inform baseline	15
1.4.4	Study area	15
1.4.5	Desktop study.....	18
1.4.6	Site specific surveys.....	20
1.5	Baseline environment	20
1.5.1	Airspace and air traffic services	20
1.5.2	Future baseline scenario.....	22
1.5.3	Data limitations.....	23
1.6	Impact assessment methodology	23
1.6.1	Overview	23
1.6.2	Impact assessment criteria	24
1.7	Key parameters for assessment.....	25
1.7.1	Maximum Design Scenario	25
1.8	Measures adopted as part of the Mona Offshore Wind Project	26
1.9	Assessment of significant effects	29
1.9.1	Overview	29
1.9.2	Creation of a physical obstacle to aircraft operations	29
1.9.3	Wind turbines causing interference on civil PSR systems	37
1.9.4	Future monitoring	40
1.10	Cumulative effect assessment methodology.....	40
1.10.1	Methodology.....	40
1.10.2	Maximum Design Scenario	46
1.11	Cumulative effects assessment.....	47
1.11.1	Overview	47
1.11.2	Creation of a physical obstacle to aircraft operations	47
1.11.3	Wind turbines causing interference to civil PSR systems	50
1.11.4	Future monitoring	51
1.12	Transboundary effects.....	51
1.13	Inter-related effects.....	51
1.14	Summary of impacts, mitigation measures and monitoring.....	52
1.15	References	57

Tables

Table 1.1:	Summary of the NPS EN-1 and NPS EN-3 provisions relevant to aviation and radar.....	2
Table 1.2:	Summary of NPS EN-1 and NPS EN-3 policy on decision making relevant to aviation and radar.	4
Table 1.3:	Summary of NPS EN-5 policy on decision making relevant to aviation and radar.	6
Table 1.4:	Welsh National Marine Plan policies of relevant to aviation and radar.	6
Table 1.5:	Summary of key consultation issues raised during consultation activities undertaken for the Mona Offshore Wind Project relevant to aviation and radar.	6

MONA OFFSHORE WIND PROJECT

Table 1.6: Issues considered within this assessment.	13
Table 1.7: Impacts scoped out of the assessment for aviation and radar.	14
Table 1.8: Summary of key data sources and desktop reports.	18
Table 1.9: Qualitative definition of radar LoS.	19
Table 1.10: PSR systems within the Mona aviation and radar study area.	21
Table 1.11: Hydrocarbon infrastructure considered for helicopter access within 9 nm of the Mona Array Area.	22
Table 1.12: Definition of terms relating to the magnitude of an impact.	24
Table 1.13: Definition of terms relating to the sensitivity of the receptor.	24
Table 1.14: Matrix used for the assessment of the significance of the effect.	25
Table 1.15: MDS considered for the assessment of potential impacts on aviation and radar.	26
Table 1.16: Measures adopted as part of the Mona Offshore Wind Project.	27
Table 1.17: List of other projects, plans and activities considered within the CEA for aviation and radar.	42
Table 1.18: MDS considered for the assessment of potential cumulative effects on aviation and radar.	46
Table 1.19: Summary of potential environmental effects, mitigation and monitoring.	54
Table 1.20: Summary of potential cumulative environmental effects, mitigation and monitoring.	56

Figures

Figure 1.1: Aviation and radar study area.	17
Figure 1.2: Other projects, plans and activities screened into the cumulative effects assessment.	45

CONTENTS	III
-----------------------	------------

Annexes

Annex 1-1: Aviation and radar technical report.

MONA OFFSHORE WIND PROJECT

Glossary

Term	Meaning
Controlled Airspace (CAS)	Airspace in which Air Traffic Control exercises authority. In the UK, Class A, C, D and E airspace is controlled. Within controlled airspace flights are subject to air traffic control service with standard separation maintained between aircraft.
Helicopter Main Route Indicators (HMRI)	Routes which are established to facilitate safe helicopter flights in Instrument Flight Rules (IFR) conditions (i.e. when flight cannot be completed in visual conditions).
Instrument Approach	A procedure used by helicopters for low-visibility offshore approaches to offshore platforms which relies upon an aircraft's on-board weather radar for guidance and as a means of detecting obstacles in the approach path.
Instrument Flight Rules (IFR)	The rules governing procedures for flights conducted on instruments.
Instrument Meteorological Conditions (IMC)	Weather conditions which would preclude flight by the Visual Flight Rules (VFR) (i.e. conditions where the aircraft is in or close to cloud or flying in visibility less than a specified minimum).
Minimum Safe Altitude (MSA)	Under aviation flight rules, the altitude below which it is unsafe to fly in IMC owing to presence of terrain or obstacles within a specified area.
Multilateration (MLAT)	MLAT calculates the position of an aircraft using the time difference of the received signals from the SSR sensor and transponders on board the aircraft. The position of the aircraft is then determined by triangulation of information received from several MLAT sensors.
Radar shadow	A region shielded from radar illumination by an intervening object (e.g. a wind turbine).
Uncontrolled airspace (Class G)	Airspace in which Air Traffic Control does not exercise any executive authority but may provide basic information services to aircraft in radio contact. In the UK, Class G airspace is uncontrolled. Aircraft operating in uncontrolled airspace may be in receipt of an ATS; however, within this classification of airspace, pilots are ultimately responsible for their own terrain and obstacle clearance.
Visual Flight Rules (VFR)	The rules governing flight conducted in Visual Meteorological Conditions (VMC) utilising outside visual reference; maintaining separation from obstacles and other aircraft visually. Clouds, heavy precipitation, low visibility, and otherwise adverse weather conditions should be avoided under VFR.
Visual Meteorological Conditions	A flight category which allows flight to be conducted under Visual Flight Rules (VFR) in flight conditions where pilots have sufficient visibility to fly and maintain separation from the terrain and other aircraft (as opposed to exclusive reliance on flight instruments).

Acronyms

Acronym	Description
ACC	Area Control Centre
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Service
AMSL	Above Mean Sea Level
ANO	Air Navigation Order

MONA OFFSHORE WIND PROJECT

Acronym	Description
APDO	Approved Procedure Design Organisation
ARA	Airborne Radar Approach
ATC	Air Traffic Control
ATDI	Advanced Topographic Development and Imaging
ATE	Air Traffic Engineering
ATS	Air Traffic Service
BAES	British Aerospace Systems
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAS	Controlled Airspace
cd	Candela
CEA	Cumulative Effects Assessment
CNS	Communication, Navigation and Surveillance
DCO	Development Consent Order
DESNZ	Department for Energy Security and Net Zero
DGC	Defence Geographic Centre
DME	Distance Measuring Equipment
EIA	Environmental Impact Assessment
EMF	Electric and Magnetic Field
FIR	Flight Information Region
HAR	Helicopter Access Report
HMRI	Helicopter Main Route Indicator
IAIP	Integrated Aeronautical Information Package
ICAO	International Civil Aviation Organisation
IFP	Instrument Flight Procedures
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IoM	Isle of Man
IR	Infra-Red
JTF	Joint Task Force
LAT	Lowest Astronomical Tide
LoS	Line of Sight
MAG	Manchester Airports Group
MCA	Maritime and Coastguard Agency

MONA OFFSHORE WIND PROJECT

Acronym	Description
MDS	Maximum Design Scenario
MGN	Marine Guidance Note
MiIAIP	Military Aeronautical Information Publication
MLAT	MultiLATERation
MOD	Ministry of Defence
MSA	Minimum Safe Altitude
NERL	NATS En-Route Limited
NHV	Noordzee Helikopters Vlaanderen
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
NSTA	North Sea Transition Authority
NSWWS	National Severe Weather Warning Service
OGA	Oil and Gas Authority
OLS	Obstacle Limitation Surface
OREI	Offshore Renewable Energy Installations
OSP	Offshore Sub-station Platform
PEIR	Preliminary Environmental Information Report
PEXA	Practice and Exercise Areas
PMO	Prime Minister's Office
PSR	Primary Surveillance Radar
RAF	Royal Air Force
RCS	Radar Cross Section
RDDS	Radar Data Display Screen
RDP	Radar Data Processor
SAR	Search and Rescue
SoCG	Statement of Common Ground
SSR	Secondary Surveillance Radar
TMZ	Transponder Mandatory Zone
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
UKHO	United Kingdom Hydrographic Office

MONA OFFSHORE WIND PROJECT

Units

Unit	Description
cd	Candela
ft	Feet
km	Kilometre
m	Metre
MW	Megawatt
nm	Nautical mile

1 Aviation and radar

1.1 Introduction

1.1.1 Overview

1.1.1.1 This chapter of the Environmental Statement presents the assessment of the potential impact of the Mona Offshore Wind Project on aviation and radar. Specifically, this chapter considers the potential impact of the Mona Offshore Wind Project within the aviation and radar study area during the construction, operations and maintenance, and decommissioning phases.

1.1.1.2 This chapter has been written by Osprey Consulting Services Ltd (Osprey), with the assessment undertaken with specific reference to the relevant legislation and guidance and draws upon information contained within Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement, which contains:

- Appendix A, Helicopter Access Report (HAR) (Anatec, 2023), which details access to current Irish Sea (Liverpool Bay) oil and gas installations (platforms) near the Mona Offshore Wind Project
- Appendix B, Instrument Flight Procedures (IFP) assessment (Osprey, 2023) detailing published IFP of Irish Sea littoral airfields.

1.2 Legislative and policy context

1.2.1 Legislation

1.2.1.1 The Civil Aviation Authority (CAA) Civil Aviation Publication (CAP) 393: The Air Navigation Order (ANO) (CAA, 2022) sets out the provisions of the ANO as amended together with the legislation made under the Order. It is prepared for those concerned with day-to-day matters relating to air navigation that require an up-to-date version of the air navigation regulations and is edited by the legal advisers' department of the CAA. CAP 393 also includes application of aviation obstruction lighting to wind turbines in UK territorial waters. Additional relevant guidance is provided in section 1.4.1.

1.2.2 Planning policy context

1.2.2.1 The Mona Offshore Wind Project will be located wholly within Welsh offshore waters (beyond 12 nautical miles (nm) from the Welsh coast) and inshore waters, with the onshore infrastructure located wholly within Wales. As set out in Volume 1, Chapter 1: Introduction of the Environmental Statement, the Mona Offshore Wind Project is an offshore generating station with a capacity of greater than 350 MW located in Welsh waters and therefore is a Nationally Significant Infrastructure Project (NSIP) as defined by Section 15(3) of the Planning Act 2008 (as amended) (the 2008 Act). As such, there is a requirement to submit an application for a Development Consent Order (DCO) to the Planning Inspectorate to be decided by the Secretary of State for the Department for Energy Security and Net Zero (DESNZ).

MONA OFFSHORE WIND PROJECT

1.2.3 National Policy Statements

- 1.2.3.1 There are currently six energy National Policy Statements (NPSs), three of which contain policy relevant to offshore wind development and the Mona Offshore Wind Project, specifically:
- Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (DESNZ, 2024a)
 - NPS for Renewable Energy Infrastructure (NPS EN-3) (DESNZ, 2024b)
 - NPS for Electricity Networks Infrastructure (NPS EN-5) (DESNZ, 2024c).
- 1.2.3.2 NPS EN-1 and NPS EN-3 include guidance on what matters are to be considered in the assessment. These are summarised in Table 1.1. NPS EN-1 and NPS EN-3 also highlight a number of factors relating to the determination of an application and in relation to mitigation. These are summarised in Table 1.2.
- 1.2.3.3 NPS EN-5 includes guidance on what matters are to be considered in the onshore assessment of electrical networks. NPS EN-5 also highlights a number of factors relating to the determination of an application and in relation to mitigation. These are summarised in Table 1.3.

Table 1.1: Summary of the NPS EN-1 and NPS EN-3 provisions relevant to aviation and radar.

Summary of NPS EN-3 and EN-1 provision	How and where considered in the Environmental Statement
NPS EN-1	
<p>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.</p> <p>Paragraph 5.5.11</p>	<p>The potential impacts of the Mona Offshore Wind Project on aerodromes and airport safeguarded surfaces are considered in section 1.9 and in Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement (Appendix B, IFP assessment).</p>
<p>New energy infrastructure may create an obstruction to military low flying activities. A balance must be struck between defence and energy needs in these areas.</p> <p>Paragraph 5.5.19</p>	<p>The potential impacts of the Mona Offshore Wind Project on military low flying activities are considered in section 1.9.</p>
<p>The Joint Task Force (JTF) comprising industry and government bodies was established to enable the coexistence of UK air defence and offshore wind. The Strategy and Implementation Plan sets the direction of that collaboration. The recommendations generated by the JTF should be referred to by both defence and energy stakeholders.</p> <p>Paragraph 5.5.36</p>	<p>The potential impacts of the Mona Offshore Wind Project on aviation radar are considered in section 1.9.</p>
<p>If the proposed development could have an effect on civil and military aviation Communication, Navigation and Surveillance (CNS), meteorological radar and/ or other defence assets, an assessment of potential effects should be set out in the Environmental Statement.</p>	<p>The potential impacts of the Mona Offshore Wind Project on civil and military aviation CNS, meteorological radar and/or other defence assets are considered in section 0 and assessed, where relevant, in section 1.9.</p>

MONA OFFSHORE WIND PROJECT

Summary of NPS EN-3 and EN-1 provision	How and where considered in the Environmental Statement
<p>Paragraph 5.5.37</p> <p>Consultation with the Ministry of Defence (MOD), the CAA and NATS and any aerodrome, licensed or otherwise, likely to be affected by the proposed development should be completed in preparing the assessment of the proposal on aviation and, meteorological or other defence interests.</p> <p>Paragraph 5.5.39</p>	<p>Table 1.5 provides the results of consultation activity. A full record of consultation is also provided in the Consultation report (Document reference E3).</p>
<p>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.</p> <p>Paragraph 5.5.40</p>	<p>The potential impacts of the Mona Offshore Wind Project during the construction, operations and maintenance, and decommissioning phases are considered in section 0 and assessed, where relevant, in section 1.9.</p> <p>The assessment of aviation flight patterns is provided in Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement (Appendix B, IFP assessment).</p> <p>Cumulative impacts are assessed within section 1.10.</p>
<p>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 consultees are informed as soon as reasonably possible.</p> <p>Paragraph 5.5.42</p>	<p>All changes made during the pre-application period have been communicated to the relevant consultees as captured in Table 1.5.</p> <p>On 19 September 2023, an announcement was made regarding refinements to the offshore elements of the Mona Offshore Wind Project, including a reduction in the Mona Array Area from the boundary presented in the Preliminary Environmental Information Report (PEIR), an increase in the minimum spacing between the wind turbines, and maximum blade tip height.</p> <p>An electronic newsletter was distributed to the Mona Offshore Wind Project prescribed consultees (section 42) via email, signposting to the websites for further information. The information was sent to specially selected key stakeholders a day in advance of the public announcement.</p>
<p>The applicant should include appropriate mitigation measures as an integral part of the proposed development.</p> <p>Paragraph 5.5.43</p>	<p>Measures adopted as part of the Mona Offshore Wind Project are included in section 1.9.3.9.</p>
<p>Lighting must also be designed in such a way as to ensure that there is no glare or dazzle to pilots and/or Air Traffic Control (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. Lighting may also need to be compatible with night vision devices for military low flying purposes.</p> <p>Paragraph 5.5.55</p>	<p>The consideration of the fitment of aeronautical lighting is provided in Table 1.16.</p>
<p>NPS EN-3</p>	
<p>The applicant will need to assess impacts on civil and military radar and other aviation and defence interests.</p> <p>Paragraph 2.8.40</p>	<p>The potential impacts of the Mona Offshore Wind Project during the construction, operations and maintenance, and decommissioning phases on civil and military radar and</p>

MONA OFFSHORE WIND PROJECT

Summary of NPS EN-3 and EN-1 provision	How and where considered in the Environmental Statement
	<p>other aviation and defence interests are considered in section 0 and assessed, where relevant, in section 1.9.</p> <p>The assessment of civil and military aviation radar is provided in Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.</p>
<p>With regard to the fitment of aviation lighting, review of up-to-date research with regard to birds should be undertaken and all potential mitigation options presented. 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.</p> <p>Paragraph 2.8.240</p>	<p>Aviation lighting is discussed in Table 1.16.</p>
<p>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 to the decision maker. As such, appropriate mitigation should be included in any application to the decision maker, and ideally agreed between relevant parties.</p> <p>Paragraph 2.8.261</p>	<p>Consultation on mitigation principles is provided in Table 1.5. Where relevant, further mitigation is discussed within the assessment presented in section 1.9.</p>

Table 1.2: Summary of NPS EN-1 and NPS EN-3 policy on decision making relevant to aviation and radar.

Summary of NPS EN-1 policy	How and where considered in the Environmental Statement
NPS EN-1	
<p>The Secretary of State should be satisfied that the effects on meteorological radars, civil and military aerodromes, aviation technical sites and other defence assets or operations have been addressed by the applicant and that any necessary assessment of the proposal on aviation, National Severe Weather Warning Service (NSWWS) or defence interests has been carried out.</p> <p>Paragraph 5.5.49</p>	<p>The potential impacts of the Mona Offshore Wind Project during the construction, operations and maintenance, and decommissioning phases on aviation and radar receptors are considered in section 0 and assessed, where relevant, in section 1.9.</p> <p>The assessment of civil and military aviation radar is provided in Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.</p>
<p>The Secretary of State should be satisfied that the proposal has been designed, where possible, to minimise adverse impacts on the operation and safety of aerodromes and that realistically achievable mitigation is carried out on existing surveillance systems such as radar/tracking technologies.</p> <p>Paragraph 5.5.50</p>	<p>The potential impacts of the Mona Offshore Wind Project during the construction, operations and maintenance, and decommissioning phases are considered in section 0 and assessed, where relevant, in section 1.9.</p> <p>The assessment of aviation flight patterns is provided in Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement (Appendix B, IFP assessment).</p>
<p>When assessing the necessity, acceptability, and reasonableness of operational changes to aerodromes, the Secretary of State should be satisfied that they have the necessary information regarding the operational procedures along with any demonstrable risks or harm of such changes, taking into account the cases put forward by all parties. When making such a judgement in the case</p>	<p>The potential impacts of the Mona Offshore Wind Project during the construction, operations and maintenance, and decommissioning phases on aerodromes are considered in section 0 and assessed, where relevant, in section 1.9.</p> <p>The assessment of aviation flight patterns is provided in Volume 8, Annex 1.1: Aviation and radar technical report</p>

MONA OFFSHORE WIND PROJECT

Summary of NPS EN-1 policy	How and where considered in the Environmental Statement
<p>of military aerodromes, the Secretary of State should have regard to interests of defence and national security. Paragraph 5.5.51</p>	<p>of the Environmental Statement (Appendix B, IFP assessment).</p>
<p>In the case of meteorological radars, the Secretary of State should consider the extent to which the provision of weather and flood warnings is compromised. Paragraph 5.5.52</p>	<p>Meteorological radar is considered within Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement. Impacts to meteorological radar are scoped out as discussed in Table 1.7.</p>
<p>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</p>	<p>The consultation process with the military authority is provided in Table 1.5.</p>
<p>There are statutory requirements concerning lighting to tall structures. Where lighting is requested on structures that goes beyond statutory requirements by any of the relevant aviation and defence consultees, the Secretary of State should be satisfied of the necessity of such lighting taking into account the case put forward by the consultees. The effect of such lighting on the landscape and ecology may be a relevant consideration. Paragraph 5.5.54</p>	<p>The consideration of the fitment of aeronautical lighting is provided in Table 1.16.</p>
<p>Where new technologies to mitigate the adverse effects of wind farms on surveillance systems, such as radar, are concerned, the Secretary of State should have regard to any CAA guidelines and/or government guidance which emerges from existing and future including the joint government/Industry Aviation Management Board and the Joint Air Defence and Offshore Wind Task Force. Paragraph 5.5.56</p>	<p>Consultation on mitigation principles is provided in Table 1.5.</p>
<p>Where suitable technological solutions have not yet been developed or proven, the Secretary of State will need to consider the likelihood of a solution becoming available within the time limit for implementation of the DCO. Paragraph 5.5.57</p>	<p>Noted.</p>
<p>Where a proposed energy infrastructure development would significantly impede or compromise the safe and effective use of civil or military aviation, meteorological radars, defence assets and/or significantly limit military training, the Secretary of State may consider the use of ‘Grampian conditions’, or other forms of requirement which relate to the use of current or future technological solutions, to mitigate impacts on legacy CNS equipment. Paragraph 5.5.58</p>	<p>Noted.</p>

MONA OFFSHORE WIND PROJECT

Table 1.3: Summary of NPS EN-5 policy on decision making relevant to aviation and radar.

Summary of NPS EN-5 provision	How and where considered in the Environmental Statement
<p>In order to avoid unacceptable adverse impacts of Electric and Magnetic Fields (EMFs) from electricity network infrastructure on aviation, the Secretary of State will take account of statutory technical safeguarding zones defined in accordance with Planning Circular 01/0322, or any successor, when considering recommendations for DCO applications.</p> <p>Paragraph 2.11.14</p>	<p>The potential impacts of the Mona Offshore Wind Project during the construction, operations and maintenance, and decommissioning phases are considered in section 0 and assessed, where relevant, in section 1.9.</p> <p>The assessment of civil and military aviation radar is provided in Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.</p>

1.2.4 Welsh National Marine Plan

1.2.4.1 The aviation and radar impact assessment has been made with consideration to the specific policies set out in the Welsh National Marine Plan (Welsh Government, 2019). Key provisions are set out in Table 1.4 along with details as to how these have been addressed within the assessment.

Table 1.4: Welsh National Marine Plan policies of relevant to aviation and radar.

Policy	Key provisions	How and where considered in the Environmental Statement
Defence_01	<p>The armed forces make extensive use of the Wales’s coasts and seas for a range of defence purposes. Developers and decision makers should apply the safeguarding requirements for all sectors. The policy applies to all proposals from all sectors with the potential to impact upon MOD activities.</p>	<p>The potential impacts of the Mona Offshore Wind Project during the construction, operations and maintenance, and decommissioning phases are considered in section 0 and assessed, where relevant, in section 1.9.</p> <p>The assessment of civil and military aviation radar is provided in Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.</p>

1.3 Consultation

1.3.1.1 A summary of the key issues raised during consultation activities undertaken to date specific to aviation and radar is presented in Table 1.5 below, together with how these issues have been considered in the production of this chapter. Further detail is presented within Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.

Table 1.5: Summary of key consultation issues raised during consultation activities undertaken for the Mona Offshore Wind Project relevant to aviation and radar.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or were considered in this chapter
1 January 2022	NATS	NATS informed that there will be a predicted impact to NATS St Anne’s, the Great	The impact to NATS infrastructure is considered in section 1.9.3.10.

MONA OFFSHORE WIND PROJECT

Date	Consultee and type of response	Issues raised	Response to issue raised and/or were considered in this chapter
	Technical and Operational Assessment	Dun Fell and Lowther Hill Primary Surveillance Radar (PSR) systems created by the radar detection of the operational wind turbines and the creation of unwanted radar returns.	
25 April 2022	Manchester Airports Group (MAG) Email	MAG requested the completion of an IFP assessment in order to establish the IFP safeguarded areas will not be impacted by the Mona Offshore Wind Project.	The Applicant has commissioned an IFP assessment by a CAA Approved Procedure Design Organisation (APDO), the results of which are available in Appendix B of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.
4 May 2022	Noordzee Helikopters Vlaanderen (NHV)	NHV provide helicopter support to both Spirit Energy (including Harbour Energy) and Eni who stated to NHV, that impacts of varying degrees may be experienced by helicopter operations completed in poor weather conditions to their offshore hydrocarbon platforms due to the creation of obstacles.	A HAR has been completed which has considered the potential impact. The HAR is provided in Appendix B of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.
6 May 2022	Liverpool Airport Email	Liverpool Airport requested the completion of an IFP assessment in order to establish the IFP safeguarded areas will not be impacted by the Mona Offshore Wind Project. Furthermore, a radar trial may be required to establish degree of impact.	The Applicant has commissioned an IFP assessment by a CAA APDO, the results of which are presented in Appendix B of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.
31 May 2022	Isle of Man (IoM) Ronaldsway Airport Scoping response	Ronaldsway Airport ATC state that due to the range of the Mona Array Area from the Ronaldsway Airport PSR radar returns from the wind turbines should be capable of being radar suppressed by the radar signal processing systems; radar processing manipulation may be required by Selex. Any primary returns from the wind turbines would be similar in strength to returns	The impact to the IoM Airport PSR is considered in section 1.9.3.15.

MONA OFFSHORE WIND PROJECT

Date	Consultee and type of response	Issues raised	Response to issue raised and/or were considered in this chapter
		currently received from operational windfarms located to the east of the IoM at approximately the same range which are minimal.	
15 June 2022	The Planning Inspectorate Scoping Opinion	<p>Agreed that scoping out a number of potential impacts from the aviation and radar assessment was acceptable, including:</p> <ul style="list-style-type: none"> • Impacts to meteorological radar • Impacts to Helicopter Main Route Indicators (HMRIs) • Impacts to Secondary Surveillance Radar (SSR). 	Potential impacts scoped out of the assessment are presented in Table 1.7.
12 July 2022	Liverpool Airport Online meeting	Liverpool Airport informed their requirements of a flight trial which would assist establishment of a radar performance baseline in the airspace above the project before the project is built; the flight trial then being repeated after the project is built. It was established that the ATC PSR in operation at the airport may provide a level of mitigation through radar processing optimisation. Ahead of any requirement to conduct a flight trial, Liverpool Airport agreed to engage with their radar manufacturer in order to establish a clear indication of a route to a radar mitigation scheme	The impact to the Liverpool Airport PSR is considered in section 1.9.3.18.
24 November 2022	Harbour Energy response to pre-consultation questionnaire	Information on assets in the east Irish Sea and future activity, including intent to decommission the Calder platform.	Potential impact on helicopter access to offshore platforms is considered in section 1.9.2.
20 January 2023	IoM Ronaldsway Airport Online Meeting	<p>Ronaldsway ATC asked for clarification of their stakeholder status to better understand their degree of involvement in the engagement process.</p> <p>The Applicant presented the approach to assessing</p>	Stakeholder status as a non-prescribed consultation body was provisionally addressed in the meeting and followed up with a guidance note. The airport will be continued to be engaged in order to provide

MONA OFFSHORE WIND PROJECT

Date	Consultee and type of response	Issues raised	Response to issue raised and/or were considered in this chapter
		<p>affects and preliminary impact assessment results highlighting the need to engage further on potential mitigation options once the airport has reviewed the PEIR.</p> <p>Ronaldsway Airport agreed to further engagement post-PEIR and initiation of the Statement of Common Ground (SoCG) process.</p> <p>In was noted that the airport will hopefully soon be finalising a five year IFP update, review of procedures and Instrument Landing System (ILS) is also approaching completion and Distance Measuring Equipment (DME) infrastructure will be changing, so this as a good opportunity to work together.</p>	<p>an agreed route map to agreement of a SoCG.</p>
7 February 2023	Blackpool Airport Email	Introduction to the airport of the development of the Mona Offshore Wind Project and request for online meeting.	The impact to Blackpool Airport is considered at section 1.9.2 and supported by Appendix B of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.
29 March 2023	Walney Aerodrome and Warton Airfield Online Meeting	Results of assessment analysis concerning the Walney Aerodrome and Warton airfields was provided. Based on project parameters at the time, an impact was predicted to the Minimum Safe Altitudes (MSA) at both airfields; a radar impact was predicted to the Warton PSR.	The MOD in response to PEIR stated that they do not envisage an impact to Warton Airfield PSR (see response 23 June 2023) therefore impact to Warton is not considered further. Due to revision of project parameters, no impact is predicted to the Walney Aerodrome and Warton Airfield IFP or OLS. Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement (Appendix B, IFP assessment) provides the assessment conclusions.
31 March 2023	Liverpool Airport Online Meeting	Radar Line of Sight (LoS) analysis indicates that theoretically the Liverpool Airport PSR will detect operational wind turbines in	Liverpool Airport agreed to contact their radar manufacturer to discuss mitigation possibilities.

MONA OFFSHORE WIND PROJECT

Date	Consultee and type of response	Issues raised	Response to issue raised and/or were considered in this chapter
		<p>the east and southeast part of the Mona Array Area. However, the radar may have been replaced/ updated by the time the Mona Offshore Wind Project is constructed. The airport indicated that a radar flight trial may be required roughly 18 months before construction of the wind turbines.</p>	<p>The airport has confirmed that it wishes to continue engagement with the applicant on the potential of suitable mitigation solutions with the aim of identifying and agreeing appropriate mitigation which would be agreed and documented through the SoCG.</p>
June 2023	Liverpool Airport S42 Response	<p>Liverpool Airport agreed that the airport OLS and IFP will not be impacted by the Mona Offshore Wind Project but there would be a detrimental impact on its radar system, such that mitigation is required to be provided by the developer prior to the erection of any of the turbines.</p>	<p>The potential impact to Liverpool Airport is considered in section 1.9.3.18.</p>
June 2023	Blackpool Airport S42 Response	<p>The development of the Mona Offshore Wind Project will have an impact on the MSA currently used by Blackpool Airport. It is also likely that the development will have an impact on current and planned IFP to Blackpool Airport. The airport seeks reassurance that the development of the offshore project will not impact the MSAs and/or current or planned IFPs.</p>	<p>Consultation with the airport is continuing to reach a suitable and mutually agreeable mitigation solution to nullify the predicted impact to Blackpool Airport.</p>
02 June 2023	Ørsted S42 Response	<p>Potential impact of helicopter usage during the construction and operation of the Mona Offshore Wind Project. It is noted that the PEIR highlights that there may be two helicopter supports completing 365 return trips during installation works. No heliport site(s) or transit route(s) have been identified within the PEIR documentation.</p> <p>Requested further information to enable Ørsted to understand and respond to the potential</p>	<p>Helicopter operations will be conducted in Class G (uncontrolled airspace) in Visual Meteorological Conditions (VMC) under normal Rules of the Air and the 'See and Avoid' principle. Daily construction, operation & maintenance helicopter movements, conducted below 5,000 ft Above Mean Sea Level (AMSL), are likely insignificant compared to current Irish Sea Class G aviation activity. Heliport site(s) yet to be confirmed; further information can be</p>

MONA OFFSHORE WIND PROJECT

Date	Consultee and type of response	Issues raised	Response to issue raised and/or were considered in this chapter
		impacts and mitigations being proposed.	provided in regard to helicopter support operations when the mode of operation has been decided.
05 June 2023	IoM Airport Response to PEIR	The airport registered interest in the Mona Offshore Wind Project and wished to be kept engaged with in the 'interests of flight safety'.	The potential impact to the IoM Airport PSR is considered in section 1.9.3.15 and supported by Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.
23 June 2023	MOD S42 Response	The MOD in response confirmed their safeguarding position in which they stated that they do not envisage an impact to Royal Air Force (RAF) Valley or Warton Airfield PSRs. No further effect to MOD safeguarded elements was provided. Based on project parameters an impact is predicted to the RAF Valley MSA.	The potential impact to MOD low flying operations is considered in section 1.9.2 and supported by Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement. The impact to RAF Valley is considered and supported by Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement (Appendix B, IFP assessment). No further effect to MOD safeguarded elements was provided by the MOD, therefore impact to RAF Valley Airfield is not considered further.
1 August 2023	IoM Ronaldsway Airport Online Meeting	The Applicant acknowledges the potential effect on Ronaldsway Airport radar and flight procedures. The Applicant is continuing to engage with the airport to agree appropriate mitigation as required.	The potential impact to the IoM Airport PSR is considered in section 1.9.3.15.
10 August 2023	NATS Online Meeting	The Applicant acknowledges the potential effect on NATS radar systems and the desire for an appropriate regional mitigation. The Applicant is continuing to engage with NATS to agree appropriate mitigation as required.	The potential impact to NATS is considered in section 4.9.3.8.
25 August 2023	Blackpool Airport Online Meeting	Blackpool Airport predict an effect to the airport MSA and future IFP designs. The	The potential impact to Blackpool Airport is considered within section

MONA OFFSHORE WIND PROJECT

Date	Consultee and type of response	Issues raised	Response to issue raised and/or were considered in this chapter
		Applicant is continuing to engage with the airport to provide an agreed route to mitigation of the potential impact.	1.9.2 and supported by Appendix B of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.
5 September 2023	IoM Ronaldsway Airport Online Meeting	Discussion on PSR mitigation principles. The Applicant is continuing to engage with airport to provide an agreed route to mitigation of effect.	The potential impact to the IoM Airport PSR is considered in section 1.9.3.15.
8 November 2023	Liverpool Airport Online Meeting	Updated project parameters provided to the airport who will then provide to their radar manufacturer in order to establish a route to mitigation.	The impact to Liverpool Airport is considered in section 1.9.3.18.
24 November 2023	Met Office Response to PEIR	Confirmed that the nearest weather radar is approximately 108 km from the Mona Offshore Wind Project, and therefore impact will be limited. Confirmed no objections. Requested to be kept informed of the progress of the Mona Offshore Wind Project.	Potential impacts scoped out of the assessment are presented in Table 1.7.
16 January 2024	NATS Online Meeting	The Applicant acknowledges the potential effect on NATS radar systems and the desire for an appropriate regional mitigation. The Applicant is continuing to engage with NATS to agree appropriate mitigation as required.	The potential impact to NATS is considered in section 4.9.3.8.

1.4 Baseline methodology

1.4.1 Relevant guidance

1.4.1.1 A variety of aviation publications contain information and guidance relating to the potential impacts of an offshore wind development on aviation stakeholders. The following documents informed the desk-based study of potential impacts from the Mona Offshore Wind Project:

- International Civil Aviation Authority (ICAO), Document 8168 Ops/611 Procedures for Air Navigation Services Aircraft Operations (ICAO, 2018) describes operational procedures recommended for the guidance of flight operations personnel. It illustrates the need for operational personnel including

MONA OFFSHORE WIND PROJECT

flight crew to adhere strictly to published procedures to achieve and maintain an acceptable level of safety in operations

- CAA CAP 032 UK Aeronautical Information Publication (AIP) (CAA, 2023): Is 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
- CAA CAP 168 Licensing of Aerodromes (CAA, 2022): Sets out the standards required at UK national licensed aerodromes relating to management systems, operational procedures, physical characteristics, assessment and treatment of obstacles and visual aids
- CAA CAP 437 Standards for Offshore Helicopter Landing Areas (CAA, 2023): Provides the criteria applied by the CAA in assessing the standards of offshore helicopter landing areas for worldwide use by helicopters registered in the UK. It includes design of winching area arrangements located on wind turbine platforms to represent current best practice
- CAA CAP 670 Air Traffic Services Safety Requirements (CAA, 2019): Provides an overview of the regulatory framework as well as requirements and guidance for Air Traffic Services, Communication, Navigation, Surveillance, Meteorological and Information and Alerting Systems, as well ATC unit staffing and duty hours
- CAA CAP 764 Policy and Guidelines on Wind Turbines (CAA, 2016): Provides assistance to aviation stakeholders to help understand and address wind energy related issues thereby ensuring greater consistency in the consideration of the potential impact of proposed wind farm developments
- The Military Aeronautical Information Publication (MilAIP), (MOD, 2023) is the main resource for information and flight procedures at all military aerodromes as well as airspace, en-route procedures, charts and other air navigation information
- Maritime and Coastguard Agency (MCA) Marine Guidance Note (MGN) 654 Safety of Navigation: Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021): Contains information for operators and developers in formulating their emergency response plans and site safety management.

1.4.2 Scope of the assessment

1.4.2.1 The scope of this Environmental Statement has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 1.5. The scope of the assessment includes all aviation stakeholders whose operations are considered to be impacted by the Mona Offshore Wind Project.

1.4.2.2 Taking into account the scoping and consultation process, Table 1.6 summarises the issues considered as part of this assessment.

Table 1.6: Issues considered within this assessment.

Activity	Potential impacts scoped into the assessment
Construction phase	
Presence of construction infrastructure and installation of wind turbines and Offshore Sub-station Platforms (OSPs)	Creation of a physical obstacle - potential physical obstruction to aviation low flying operations and identified airport IFP/MSA due to height and number of above sea level infrastructure within the Mona Array Area.

MONA OFFSHORE WIND PROJECT

Activity Potential impacts scoped into the assessment	
Operations and maintenance phase	
Presence and operation of wind turbines and OSP	Creation of a physical obstacle - potential physical obstruction to aviation low flying operations and identified airport IFP/MSA due to size and number of above sea level infrastructure within the Mona Array Area.
	Operational wind turbines causing interference on civil radar systems - ATC may be unable to provide an effective surveillance service due to interference on radar displays.
Decommissioning phase	
Presence of decommissioning infrastructure and decommissioning of wind turbines and OSP	Creation of a physical obstacle - potential physical obstruction to aviation low flying operations and identified airport IFP/MSA due to height and number of above sea level infrastructure within the Mona Array Area.

1.4.2.3 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out, together with justification for scoping them out and whether the approach has been agreed with key stakeholders through either scoping or consultation, is presented in Table 1.7.

Table 1.7: Impacts scoped out of the assessment for aviation and radar.

Potential impact	Justification
During construction there will be no effect on civil and military radar systems as wind turbines will not be rotating	During scoping The Planning Inspectorate on behalf of the Secretary of State agreed that this matter can be scoped out of the Environmental Impact Assessment (EIA).
Transboundary impacts	During scoping The Planning Inspectorate agreed that given the distance of the Mona Offshore Wind Project from international boundaries, transboundary effects are unlikely to be significant and this matter can be scoped out of the EIA.
Impact to aviation activity in Practice and Exercise Areas (PEXAs)	The MOD section 42 response has not highlighted impact to aviation related PEXA as a concern. It is the professional opinion of the author that impacts to airborne activity in PEXAs are scoped out as there are no PEXAs in the vicinity of the Mona Offshore Wind Project which may be impacted by the development of the Mona Offshore Wind Project.
Impact to Meteorological Radar	During scoping The Planning Inspectorate agreed that given the distance of the Mona Offshore Wind Project from meteorological radar stations, this matter can be scoped out.
Impact to HMRI's	During scoping The Planning Inspectorate agreed that given the distance of the Mona Offshore Wind Project from HMRI's this impact can be scoped out. In relation to Mona Offshore Wind Project helicopter usage, given the distance of the Mona Offshore Wind Project from HMRI's it is considered that the measures being adopted (see Table 1.16) are sufficient to scope out potential impacts arising from Mona Offshore Wind Project helicopter usage during the construction and operations and maintenance phases of the Mona Offshore Wind Project.

MONA OFFSHORE WIND PROJECT

Potential impact	Justification
Impact to SSR	During scoping The Planning Inspectorate agreed that as there are no SSR systems located within the CAA suggested radius where impact is expected (10 km), potential impact to aviation SSR systems can be scoped out.
Impact to NATS Cleve Hill, Manchester Airport, RAF Valley British Aerospace Systems (BAES) Warton and West Freugh PSR systems	Radar LoS analysis concludes that these radar systems will not theoretically detect the operational wind turbines. The MOD have confirmed in their section 42 response that impacts to BAES Warton and RAF Valley PSRs are not expected.
Impact created by the offshore cable route	As the offshore cable is subsea, no impact to aviation related activity will occur.
Impact to onshore aviation related infrastructure located adjacent to the onshore cable route	A desktop review of the Mona Offshore Wind Project aviation and radar study area has been completed. Conclusions indicate that there are no aviation related activities, aerodromes or aviation related communication, navigational and surveillance assets that may be impacted by the creation of the onshore cable route.

1.4.3 Methodology to inform baseline

1.4.4 Study area

1.4.4.1 The aviation and radar study area (Figure 1.1) covers the aviation radar systems that provide radar coverage over the Mona Array Area, and which may theoretically detect the highest wind turbine blade tip height of 364 m above Lowest Astronomical Tide (LAT). It has been defined on the basis of established guidance; the CAA CAP 764 Policy and Guidelines on Wind Turbines (CAA, 2016), consultation zones and criteria. Whilst not definitive, CAP 764 provides criteria for assessing whether any wind turbine development might have an impact on aviation related operations. Consideration of the potential for the Mona Offshore Wind Project wind turbines to impact on aviation receptors has been undertaken in accordance with the standard consultation distances stated in CAP 764. The aviation and radar study area is therefore defined in line with the CAP 764 consultation zones or criteria which considers the following:

- Within 30 km of an aerodrome with surveillance radar - although it is acknowledged that the distance quoted in CAP 764 (CAA, 2016) can be greater than 30 km dependent on a number of factors at individual aerodromes, including type and coverage of radar utilised; this has been considered in the assessment of radar effect:
 - Aerodrome radar to 75 km
 - NATS en-route radar to 200 km
- Offshore hydrocarbon platforms with helidecks that are located within a 9 nm CAA recommended 'consultation buffer' that surrounds the Mona Array Area as considered in Appendix A of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement
- Airspace coincident with published IFPs to take into account an aerodrome's requirement to protect its IFPs as considered in Appendix B of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement

MONA OFFSHORE WIND PROJECT

- Within 17 km of a non-radar equipped licensed aerodrome with a runway of 1,100 m or more. There are no such aerodromes within 17 km of the Mona Array Area.

1.4.4.2 The aviation and radar study area is presented in Figure 1.1. The cumulative aviation and radar study area is the same, except for the assessment of radar cumulative effects which includes other offshore wind farms within a 100 km radius of the Mona Array Area that could have potential cumulative effects on identified radar receptors through the radar detection of operational wind turbines.

MONA OFFSHORE WIND PROJECT

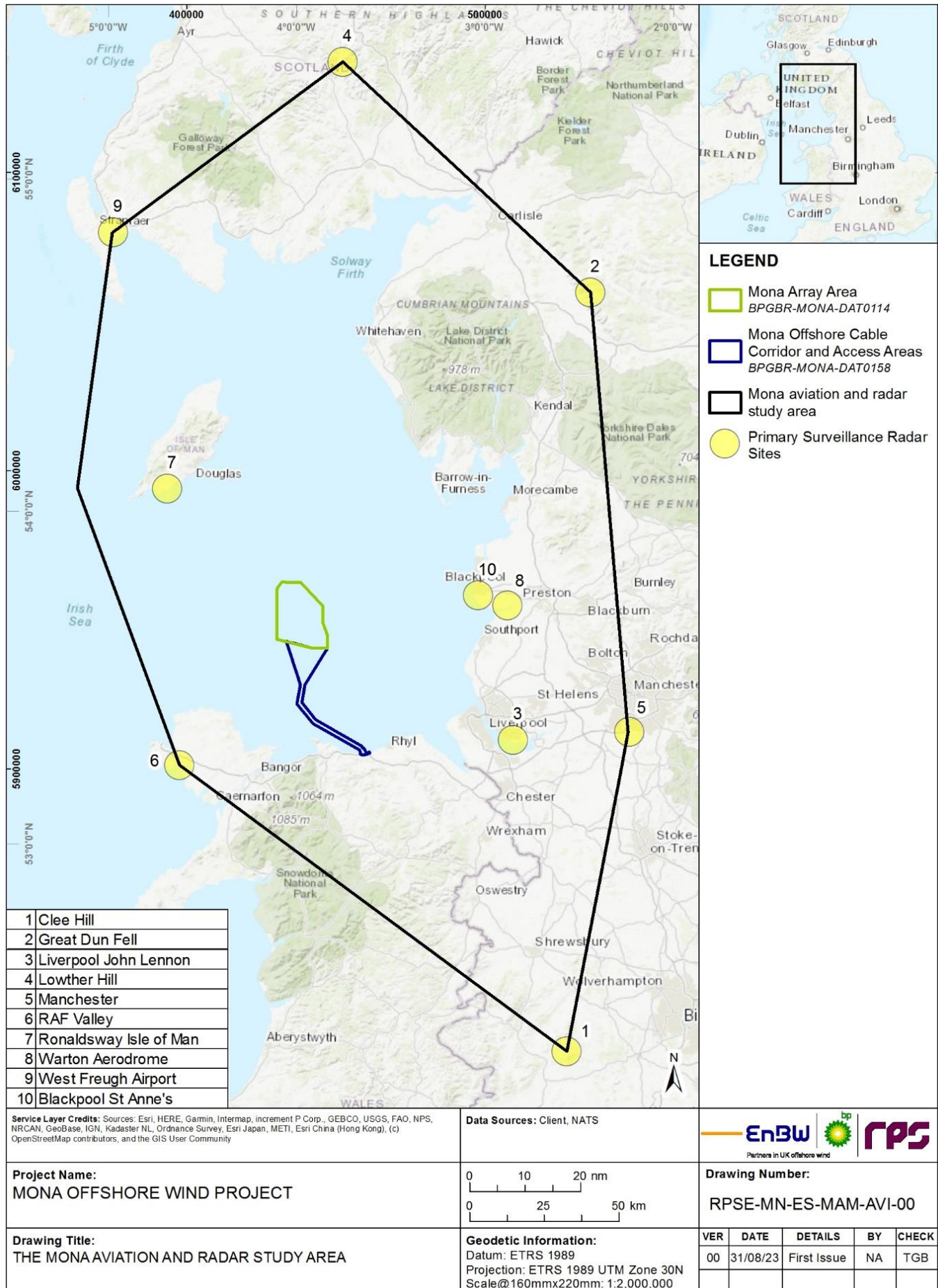


Figure 1.1: Aviation and radar study area.

MONA OFFSHORE WIND PROJECT

1.4.5 Desktop study

1.4.5.1 Information on aviation and radar within the aviation and radar study area was collected through a detailed desktop review of existing studies and datasets. Table 1.8 provides additional reports and sources utilised in the desktop study.

Table 1.8: Summary of key data sources and desktop reports.

Title	Source	Year	Author
CAA Visual Flight Rules (VFR) Charts	NATS	2023	CAA/Ordnance Survey/NATS
Radar LoS Analysis which is included in Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement	Osprey	2023	Osprey
Helicopter Access Report which is included as Appendix A to Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.	Anatec	2023	Anatec
Instrument Flight Procedure Assessment which is included as Appendix B to Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.	Osprey	2023	Osprey

1.4.5.2 NATS VFR Charts (CAA, 2023) are sectional aeronautical charts which are designed for visual navigation of slow to medium speed aircraft. The topographic information featured consists of a judicious selection of visual checkpoints used for flight under VFR.

1.4.5.3 The methodologies for the radar LoS, HAR and IFP desktop studies are discussed below.

Radar Line of Sight (LoS)

1.4.5.4 Radar detectable wind turbines can be a significant cause of radar false plots, or unwanted returns (clutter), as the rotating blades can trigger the Doppler threshold (e.g. minimum shift in signal frequency) of the Radar Data Processor (RDP) and therefore might be interpreted as aircraft targets. Additionally, the rotation of the wind turbine blades provides an indication to the radar system that the target acquired is moving and thus defeating Doppler processing techniques. This issue can be further compounded by a large number of wind turbines located together (such as a wind farm) which leads to a cumulative effect over a greater volume of airspace with higher densities of radar clutter produced.

1.4.5.5 Generally, the larger the wind turbine rotor diameter is, the larger its Radar Cross Section (RCS) will be to the radar, thus resulting in more energy being reflected and an increased chance of it creating clutter. This clutter will be processed by the radar and presented to an air traffic controller on the Radar Data Display Screens (RDDS). False plots, clutter and reduced radar sensitivity may reduce the effectiveness of radar to an unacceptable level and compromise the provision of a safe radar service to participating aircraft and detection of aircraft targets. In general this may lead to:

- Twinkling appearance/blade flash effect can distract the air traffic controller from their primary task
- Masking of real aircraft targets caused by increased clutter being displayed on the RDDS
- Increase in unwanted targets or false aircraft tracks
- Receiver saturation

MONA OFFSHORE WIND PROJECT

- Target desensitisation causing loss of valid aircraft targets that are of a small RCS
- Shadowing behind the wind turbines caused by physical obstruction (blocking of radar transmitted signal)
- Degradation of target processing capability and processing overload
- Degradation of tracking capabilities including track seduction (Real aircraft returns are relocated from their true return location as the radar attempts to update an aircraft track using the false return).

1.4.5.6 Without specific wind turbine mitigation processing capabilities, radar cannot distinguish between returns from wind turbines (false returns, or clutter) and those from aircraft. Air traffic controllers are required to assume that actual aircraft targets could be lost over the location of a wind farm; furthermore, identification of aircraft under control could be lost or interrupted. It is mainly for the above reasons that aviation radar system operators object to wind farm developments that are within radar LoS to radar systems.

1.4.5.7 Osprey utilised the Advanced Topographic Development and Imaging (ATDI) ICS LT (Version 22.4.7 x64) tool to model the terrain elevation profile between the identified PSR systems and the Mona Array Area. Otherwise known as a point-to-point radar LoS analysis, the result is a graphical representation of the intervening terrain and the direct signal LoS (taking into account earth curvature and radar signal properties). This is a limited and theoretical desk-based radar modelling study which is frequently used in order to establish the potential for individual wind farm developments to create an effect to aviation radar. However, there are unpredictable levels of atmospheric signal diffraction and attenuation within a given radar environment that can influence the probability of a wind turbine being detected. The analysis is designed to give an indication of the theoretical likelihood of a wind turbine being detected by the assessed radar system. The qualitative definitions utilised in the radar LoS assessment are defined in Table 1.9.

Table 1.9: Qualitative definition of radar LoS.

Result	Definition
Yes	The wind turbine is highly likely to be detected by the radar: direct LoS exists between the radar and the wind turbine.
Likely	The wind turbine is likely to be detected by the radar at least intermittently.
Unlikely	The wind turbine is unlikely to be detected by the radar but cannot rule out occasional detection.
No	The wind turbine is unlikely to be detected by the radar as significant intervening terrain exists.

1.4.5.8 Radar detectability of wind turbines does not automatically provide justification for an objection from radar stakeholders. Other factors will determine the nature and severity of the operational impact on the receptor, including:

- The consideration of airspace structure and classification in the wind turbine vicinity
- The operational significance of the airspace to the operator
- The range of the development from the radar source

MONA OFFSHORE WIND PROJECT

- Aircraft traffic patterns and procedures
- The type of radar service provided to air traffic using the airspace.

Helicopter access to offshore hydrocarbon platforms

- 1.4.5.9 In order to help achieve a safe operating environment, a CAA recommended consultation zone of 9 nm radius exists around offshore helicopter decks which are located on hydrocarbon platforms. This consultation zone is not considered a prohibition on wind farm development within a 9 nm radius of offshore helicopter operations but a trigger for consultation between the platform operators, the offshore helicopter operators, the operators of existing installations and wind developers to determine a solution that will maintain safe offshore helicopter operations in the presence of the wind farm. The basic requirement of the 9 nm consultation zone is to provide airspace for the safe operation of helicopter instrument approaches in poor weather conditions where a low visibility approach profile is needed.
- 1.4.5.10 Potential impact on helicopter access is described in Appendix A of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.

Instrument Flight Procedures

- 1.4.5.11 An Instrument Flight Procedure is a published procedure used by aircraft flying in accordance with the IFR which is designed to achieve and maintain an acceptable level of safety in operations and includes an instrument approach procedure, a standard instrument departure, a planned departure route and a standard instrument arrival.
- 1.4.5.12 The CAA state within CAP 764 that *'the CAA is responsible for being satisfied that a certificated or licensed aerodrome complies with the relevant requirements and is safe for use by civil aircraft, having regard in particular to the physical characteristics of the aerodrome and its surroundings. Aerodrome operators are required to have procedures for safeguarding, to monitor the changes in the obstacle environment, marking and lighting, and in human activities or land use on the aerodrome and in the areas around the aerodrome. In addition, a requirement is placed on the licensee to take all reasonable steps to ensure that the aerodrome and its surrounding airspace are safe at all times for use by aircraft'*.
- 1.4.5.13 Large wind turbine developments, dependent on location and proximity to published airport IFP safeguarded areas may impact the safe operation of these published procedures. Potential impact on IFP is described in Appendix B of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.

1.4.6 Site specific surveys

- 1.4.6.1 No site-specific surveys have been undertaken to inform the EIA for aviation and radar. This is because sufficient data exists in the public domain.

1.5 Baseline environment

1.5.1 Airspace and air traffic services

- 1.5.1.1 In aviation and airspace terms, the world is divided into Flight Information Regions (FIRs) for the allocation of responsibility for the provision of Air Traffic Service (ATS) to aircraft. The Mona Array Area is located within the UK FIR. The UK CAA is the airspace regulator for the UK FIR.

MONA OFFSHORE WIND PROJECT

1.5.1.2 Within Controlled Airspace (CAS), NATS En-route Limited (NERL) (which is a subsidiary of NATS) are the main ATS provider utilising several long-range PSR and SSR systems positioned to provide maximum coverage of UK airspace. Additionally, NATS has a licence obligation to provide radar data to other remote aviation stakeholders (such as the MOD) to a high quality and performance standard for the benefit of UK aviation as a whole. Any potential impact that the Mona Offshore Wind Project might have on NERL radar systems must be considered both in terms of effect on the civilian en-route services and in the context of its remote users such as the MOD and airports.

1.5.1.3 There are 10 PSR sites located within the Mona aviation and radar study area which are shown in Table 1.10. There are no SSR systems located within 10 km of the Mona Array Area (the CAA suggested radius where impact is expected); therefore, SSR is scoped out from further analysis.

Table 1.10: PSR systems within the Mona aviation and radar study area.

PSR site	Distance from Mona Array Area (nm)	Distance from Mona Array Area (km)
Ronaldsway IoM	26.7	49.5
Blackpool St Anne's	28.2	52.2
RAF Valley	28.8	53.4
Warton Aerodrome	33.1	61.2
Liverpool John Lennon	37.6	69.6
Manchester	56.8	105.1
West Freugh Airport	70.2	130.1
Great Dun Fell	74.3	137.6
Clee Hill	84.8	157.1
Lowther Hill	94.5	175.1

1.5.1.4 The Mona Array Area is located within a multi-layered area of Class G uncontrolled airspace (avoiding the airspace underneath the Holyhead Control Area (CTA)), where the application of an ATS is not mandated, and Class C CAS established above that. Within Class C CAS an ATS is mandatory for pilots. The avoidance of the Holyhead CTA would minimise adverse impacts on the operation and safety of Ronaldsway (IoM) Airport in particular. A number of published procedures are established within the airspace surrounding the Mona Array Area for the sequencing of arriving and departing aircraft. The division of airspace and rules applicable to uncontrolled airspace and CAS is provided within Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement. Above and surrounding the Mona Array Area, the Class G airspace is used by both military and civil registered aircraft.

1.5.1.5 Aircraft operating in the vicinity of the Mona Array Area observe the airspace rules dependent on the classification of airspace they are operating in and the type of ATS they are receiving as follows:

- Civil air traffic controllers located at the Swanwick Area Control Centre (ACC) utilise NATS radar for the provision of ATS to aircraft flying within the CAS above and surrounding the Mona Array Area. Outside of CAS and for the crossing of

MONA OFFSHORE WIND PROJECT

CAS, military controllers located at the ACC, may provide on request, an ATS within Class G airspace and for the crossing of CAS subject to suitable radar and radio coverage being available

- Ronaldsway IoM Airport is the main airport located on the IoM. Air traffic services are provided by the airport by controllers utilising the IoM PSR for provision of radar based ATC services to aircraft inbound and outbound from the airport and to aircraft operating within IoM CAS. The airport also publishes a number of IFP procedures which are required to be safeguarded by the airport authority to maintain safe flight operations. Analysis conclusions contained in the IFP assessment indicate that the Ronaldsway IoM Airport IFP will not be impacted by the Mona Offshore Wind Project (Appendix B of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement)
- Liverpool Airport is an international gateway with scheduled domestic, European and inclusive tour destinations feeding the holiday market. ATC at the airport utilise the airport PSR for provision of radar based ATC services to aircraft inbound and outbound from the airport and to aircraft operating within proximity of the airport CAS
- The non-aviation radar equipped airfields at Blackpool and Walney Aerodrome offer a non-radar ATS to participating aircraft. ATC at these airfields are unlikely to be offering an ATS to aircraft flying within the immediate vicinity of the Mona Array Area. The Blackpool Airport published airfield MSA, which is the altitude below which it is unsafe to fly in Instrument Meteorological Conditions (IMC) owing to presence of terrain or obstacles within a specified area, will be penetrated by the maximum blade tip height of wind turbines placed within the Mona Array Area
- Military low flying aircraft operate low level in the Class G airspace surrounding the Mona Array Area, at or below an altitude of 2,000 ft AMSL. The creation of above sea level infrastructure could impede military low flying training
- Helicopters operating in support of the offshore hydrocarbon industry conduct specific sorties to helicopter platform equipped offshore facilities. The installations within 9 nm of the Mona Array Area are shown in Table 1.11.

Table 1.11: Hydrocarbon infrastructure considered for helicopter access within 9 nm of the Mona Array Area.

Installation name	Type	Operator	Status	Distance from Mona Array Area (nm)
Conwy Platform	NUI Day and Night	Eni	Active	4.6
Calder	NUI Day Only	Spirit Energy (Harbour Energy owned)	Active	7.1

1.5.2 Future baseline scenario

- 1.5.2.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 require that "an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge" is included within the Environmental Statement. In the event that

MONA OFFSHORE WIND PROJECT

Mona Offshore Wind Project does not come forward, an assessment of the future baseline conditions has been carried out and is described within this section.

- 1.5.2.2 It is difficult to define what the likely evolution of the aviation interests in the Irish Sea will be either with, or in the absence of, the Mona Offshore Wind Project. The North Sea Transition Authority (NSTA) (the new name of the Oil and Gas Authority¹ (OGA)) regulate the licensing of exploration and development of the UK's offshore and onshore oil and gas resources, gas storage and unloading activities in accordance with the OGA Strategy and the UK Government's target of net zero greenhouse gas emissions by 2050. The OGA Annual Report and Accounts 2022-2023 (NSTA, 2023) reported a predicted decline in gas production and usage. Operators continue to find it difficult to predict production accurately as older fields mature and their reliability reduces. The Prime Minister's Office (PMO) and DESNZ reported during July 2023 that the Prime Minister has committed to future oil and gas licensing rounds with two areas in the North Sea chosen as locations for carbon capture usage and storage clusters. The independent Climate Change Committee predicting around a quarter of the UK's energy demand will still be met by oil and gas when the UK reaches net zero in 2050, the Government states that it is taking steps to slow the rapid decline in domestic production of oil and gas, which will secure UK domestic energy supply and reduce reliance on hostile states.
- 1.5.2.3 As fields are decommissioned, it is the opinion of the author that helicopter use to those hydrocarbon platforms will eventually decline; however, the NSTA is completing the latest oil and gas licensing round which may increase the use of helicopter support to the offshore hydrocarbon industry. As future offshore wind projects are approved an overall increase is expected in offshore aviation activity as new offshore areas are developed to support net zero targets.
- 1.5.2.4 No change to the present airspace construction or usage above the Mona Array Area is expected. Blackpool Airport, in support of its ten year growth plan, has a desire to acquire an airport PSR, however, no further details are currently available.

1.5.3 Data limitations

- 1.5.3.1 The data used in this chapter is the most up to date publicly available information which can be obtained from the data sources as cited. Data has also been provided through consultation as detailed in Table 1.5.
- 1.5.3.2 The results of the LoS analysis are considered to be conservative in the establishment of results and are provided in order to establish the worst-case possibility of impact to aviation stakeholders. Radar LoS results are theoretical in nature however, analysis is based on an industry standard for establishing the impact to aviation radar systems from operational wind turbines and it is considered will not have an implication for the conclusions of the assessment.

1.6 Impact assessment methodology

1.6.1 Overview

- 1.6.1.1 The aviation and radar impact assessment has followed the methodology set out in Volume 1, Chapter 5: EIA methodology of the Environmental Statement. Specific to

¹ On 21 March 2022, the OGA became known by a new business name: North Sea Transition Authority (NSTA) to reflect its evolving role in the energy transition. The OGA remains the legal name of the company. References to the NSTA should be interpreted as the OGA.

MONA OFFSHORE WIND PROJECT

the aviation and radar impact assessment, the guidance documents listed at section 1.4.1 have also been considered.

1.6.1.2 In addition, the aviation and radar impact assessment has considered the legislative framework as provided in CAP 393.

1.6.2 Impact assessment criteria

1.6.2.1 The criteria for determining the significance of effects is a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Volume 1, Chapter 5: EIA methodology of the Environmental Statement.

1.6.2.2 The criteria for defining magnitude in this chapter are outlined in Table 1.12.

Table 1.12: Definition of terms relating to the magnitude of an impact.

Magnitude of impact	Definition
High	Total loss of ability to carry on activities and/or impact is of extended spatial extent and/or long-term duration (i.e. total life of project and/or frequency of repetition is continuous and/or effect is not reversible for project).
Medium	Loss or alteration to significant portions of key components of current activity and/or spatial extent of impact is moderate and/or medium-term duration (i.e. operational period) and /or frequency of repetition is medium to continuous and/or effect is not reversible for project phase.
Low	Minor shift away from baseline, leading to a reduction in level of activity that may be undertaken and/or spatial extent of impact is low and/or short to medium term duration (i.e. construction period) and/or frequency of repetition is low to continuous and/or effect is not reversible for project phase.
Negligible	Very slight change from baseline condition and/or spatial extent of impact is negligible and/or short- term duration (i.e. less than two years) and/or frequency of repetition is negligible to continuous and/or effect is reversible.

1.6.2.3 The criteria for defining sensitivity in this chapter are outlined in Table 1.13.

Table 1.13: Definition of terms relating to the sensitivity of the receptor.

Sensitivity	Definition
Very High	Receptor or the activities of the receptor, is of critical importance to the local, regional or national economy and/or the receptor or the activities of the receptor, is highly vulnerable to impacts that may arise from the project and/or recoverability is long term or not possible.
High	Receptor or the activities of the receptor, is of high value to the local, regional or national economy and/or the receptor or the activities of the receptor, is generally vulnerable to impacts that may arise from the project and/or recoverability is slow and/or costly.
Medium	Receptor or the activities of the receptor, is of moderate value to the local, regional or national economy and/or the receptor or the activities of the receptor, is somewhat vulnerable to impacts that may arise from the project and/or has moderate to high levels of recoverability.
Low	Receptor or the activities of the receptor, is of low value to the local, regional or national economy and/or the receptor or the activities of the receptor, is not generally vulnerable to impacts that may arise from the project and/or has high recoverability.

MONA OFFSHORE WIND PROJECT

Sensitivity	Definition
Negligible	Receptor provides a service which is of negligible value to the local, regional or national economy, and/ or the receptor is not vulnerable to impacts that may arise from the project, and/ or has high recoverability.

1.6.2.4 The significance of the effect upon aviation and radar is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 1.14. Where a range of significance of effect is presented in Table 1.14 the final assessment for each effect is based upon expert judgement.

1.6.2.5 For the purposes of this assessment, any effects with a significance level of minor or less have been concluded to be not significant in terms of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Table 1.14: Matrix used for the assessment of the significance of the effect.

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Minor	Minor or Moderate	Moderate or Major	Major
Very High	Minor	Moderate or Major	Major	Major

1.7 Key parameters for assessment

1.7.1 Maximum Design Scenario

1.7.1.1 The Maximum Design Scenarios (MDSs) identified in Table 1.15 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the Project Design Envelope provided in Volume 1, Chapter 3: Project description of the Environmental Statement. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different infrastructure layout), to that assessed here be taken forward in the final design scheme.

1.7.1.2 The assessment of potential impacts on aviation and radar is based on the MDS as identified from a design envelope and is specific to the potential impacts identified in this chapter. The key parameters for the MDS include consideration of the maximum number of wind turbines across the largest area and the maximum blade tip height of 364 m above LAT.

1.7.1.3 The MDS for impacts on aviation radar services assumes that the entirety of the Mona Array Area will be populated with wind turbines (68) at the maximum blade tip height of 364 m above LAT and one Offshore Substation Platform with a maximum height of 95 m above LAT. This is because the largest area of the highest wind turbines will create the largest impact from a physical obstruction and radar interference perspective, leading to a greater effect on aviation services. Any aspects of the

MONA OFFSHORE WIND PROJECT

infrastructure that are lower in height than the wind turbines (i.e. the OSP) and less than the extent of the Mona Array Area will not create an incremental effect on aviation interests.

1.7.1.4 Table 1.15 provides the MDS for impacts to aviation and radar.

Table 1.15: MDS considered for the assessment of potential impacts on aviation and radar.

^a C=construction, O=operations and maintenance, D=decommissioning

Potential impact	Phase ^a			Maximum Design Scenario	Justification
	C	O	D		
Creation of a physical obstacle	✓	✓	✓	<p>Construction phase</p> <ul style="list-style-type: none"> Up to four years construction duration Wind turbines: construction of 68 wind turbines with a maximum blade tip height of 364 m above LAT OSPs: presence of one OSP with a maximum height, inclusive of antenna structure, of 95 m above LAT During the construction phase the potential creation of physical obstacles to aircraft operations will be gradual as the presence of infrastructure increases. The MDS in terms of the presence of infrastructure would be on the completion of construction. <p>Operations and maintenance phase</p> <ul style="list-style-type: none"> Operational lifetime of up to 35 years Wind turbines: presence of 68 wind turbines with a maximum blade tip height of 364 m above LAT OSPs: presence of one OSP with a maximum height, inclusive of antenna structure, of 95 m above LAT. <p>Decommissioning phase</p> <ul style="list-style-type: none"> During the decommissioning phase creation of physical obstacles to aircraft operations would gradually decrease from the operational MDS as structures are removed. 	<p>Maximum physical obstruction from the largest wind turbine to aviation operations due to size and number of infrastructures above LAT within the Mona Array Area.</p> <p>The maximum blade tip height has potential to breach safeguarded areas at Blackpool Airport.</p>
Wind turbines causing interference to civil PSR systems.	×	✓	×	<p>Operations and maintenance phase</p> <ul style="list-style-type: none"> 68 wind turbines with a maximum blade tip height of 364 m above LAT Impact duration present during operations and maintenance phase. Maximum number and height of wind turbines is the MDS as it provides the maximum potential interference to radar propagation in the area. 	<p>Maximum number of the highest wind turbines is the MDS as it provides the maximum potential interference to radar propagation in the area. ATC may be unable to provide an effective surveillance service due to interference on radar displays.</p>

1.8 Measures adopted as part of the Mona Offshore Wind Project

1.8.1.1 For the purposes of the EIA process, the term 'measures adopted as part of the project' is used to include the following measures (adapted from IEMA, 2016):

- Measures included as part of the project design. These include modifications to the location or design of the Mona Offshore Wind Project which are integrated into the application for consent. These measures are secured through the consent itself through the description of the development and the parameters

MONA OFFSHORE WIND PROJECT

secured in the DCO and/or marine licence (referred to as primary mitigation in IEMA, 2016)

- Measures required to meet legislative requirements, or actions that are generally standard practice used to manage commonly occurring environmental effects and are secured through the DCO requirements and/or the conditions of the marine licence (referred to as tertiary mitigation in IEMA, 2016).

1.8.1.2 A number of measures (primary and tertiary) have been adopted as part of the Mona Offshore Wind Project to reduce the potential for impacts on aviation and radar. These are outlined in Table 1.16 below. As there is a commitment to implementing these measures, they are considered inherently part of the design of the Mona Offshore Wind Project and have therefore been considered in the assessment presented in section 1.9 below (i.e. the determination of magnitude and therefore significance assumes implementation of these measures).

Table 1.16: Measures adopted as part of the Mona Offshore Wind Project.

Measures adopted as part of the Mona Offshore Wind Project	Justification	How the measure will be secured
Primary measures: Measures included as part of the project design		
Development of, and adherence to a Design Plan (DP) that incorporates two lines of orientation agreed with Natural Resources Wales (NRW) in consultation with the Maritime Coastguard Agency (MCA) and Trinity House	Development of a DP that maintains two lines of orientation for Search And Rescue (SAR) purposes. The Mona Offshore Wind Project will consider MCA MGN 654 Safety of Navigation OREI - Guidance on UK Navigational Practice, Safety and Emergency Response, in addition to CAP 393 ANO 2022, CAP 764 CAA Policy and Guidelines on Wind Turbines and CAP 437 Standards for Offshore Helicopter Landing Areas, where applicable.	DP incorporating two lines of orientation is secured within the deemed marine licence within schedule 14 of the Draft DCO and expected to be secured within the standalone NRW marine licence.
Tertiary measures: Measures required to meet legislative requirements, or adopted standard industry practice		
Development of and adherence to an aids to navigation management plan (AtoNMP) and implementation of aviation lighting as required by the ANO 2016 and determined necessary for aviation safety in consultation with the Defence Infrastructure Organisation Safeguarding and as directed by the CAA.	The Mona Offshore Wind Project will be designed and constructed in accordance with relevant guidance from: <ul style="list-style-type: none"> • Trinity House Provision and Maintenance of Local Aids to Navigation Marking OREIs • MCA OREIs: Requirements, Guidance and Operational Considerations for SAR and Emergency Response. Appropriate marking, lighting and aids to navigation will be employed during the construction, operations and maintenance and decommissioning phases as appropriate to ensure the safety of all parties. Appropriate lighting, in line with MCA guidance will ensure the offshore structures are visible for SAR and emergency response procedures. In addition, Mona Offshore Wind Project lighting will conform to the following: <ul style="list-style-type: none"> • Red medium intensity aviation warning lights (of variable brightness between a maximum of 2,000 candela (cd)) to a minimum of 10% of the maximum which would be 200 cd) will be located on either side of the nacelle of significant peripheral wind turbines. These lights will flash simultaneously with a Morse W flash pattern and will also include an infra-red (IR) component 	Aviation lighting requirements secured within schedule 2 of the Draft DCO. AtoNMP secured within the deemed marine licence in schedule 14 of the Draft DCO and expected to be secured within the standalone NRW marine licence.

MONA OFFSHORE WIND PROJECT

Measures adopted as part of the Mona Offshore Wind Project	Justification	How the measure will be secured
	<ul style="list-style-type: none"> • All aviation warning lights will flash synchronously throughout the Mona Array Area and be able to be switched on and off by means of twilight switches (which activate when ambient light falls below a pre-set level) • Aviation warning lights will allow for reduction in lighting intensity at and below the horizon when visibility from every wind turbine is more than 5 km (to a minimum of 10% of the maximum (i.e. 200 cd)) • SAR lighting of each of the non-periphery wind turbines will be combi IR /200 cd steady red aviation hazard lights, individually switchable from the control centre at the request of the MCA (i.e. when conducting SAR operations in or around the Mona Array Area) • All wind turbines will be fitted with a low intensity light for the purpose of helicopter winching (green hoist lamp). All wind turbines will also be fitted with suitable illumination (minimum one 5 cd light) for identification signs • The location of all infrastructure (including wind turbines, OSPs, and cables) will be communicated to the UK Hydrographic Office (UKHO) so that they can be incorporated into Admiralty Charts and the Notice to Mariners procedures. 	
<p>Defence Geographic Centre (DGC) Notification - information regarding construction should be passed to the DGC (at dvof@mod.gov.uk) at least 10 weeks in advance of the obstacle type(s) erection detailing position, height (tip of arc) and type of aviation lighting. Once reported, all will be included in the DGC Obstruction database and all that meet aviation chart inclusion criteria will be published for broader awareness.</p>	<p>In line with RenewableUK guidance.</p>	<p>In line with standard industry practice.</p>
<p>NATS Aeronautical Information Service (AIS) Notification - Appropriate information about the site construction and any associated lighting (where applicable), for example the height and temporary location of construction cranes, should be provided to the NATS AIS (for promulgation in applicable aviation publications including the UK Integrated Aeronautical Information Package (IAIP)).</p>	<p>In line with standard industry practice.</p>	<p>In line with standard industry practice.</p>

MONA OFFSHORE WIND PROJECT

- 1.8.1.3 Where significant effects have been identified, further mitigation measures (referred to as secondary mitigation in IEMA, 2016) have been identified to reduce the significance of effect to acceptable levels following the initial assessment. These are measures that could further prevent, reduce and, where possible, offset any adverse effects on the environment. These measures are set out, where relevant, in section 1.9 below.

1.9 Assessment of significant effects

1.9.1 Overview

- 1.9.1.1 The impacts of the construction, operations and maintenance, and decommissioning phases of the Mona Offshore Wind Project have been assessed on aviation and radar. The potential impacts arising from the construction, operations and maintenance and decommissioning phases of the Mona Offshore Wind Project are listed in Table 1.15, along with the MDS against which each impact has been assessed.
- 1.9.1.2 A description of the potential effect on aviation and radar receptors caused by each identified impact is given below.

1.9.2 Creation of a physical obstacle to aircraft operations

- 1.9.2.1 The construction, operations and maintenance, and decommissioning of the Mona wind turbines and OSP may lead to the creation of a physical obstacle to aircraft operations. The MDS is represented by 68 wind turbines and one OSP due to size, number and height above LAT within the Mona Array Area and is summarised in Table 1.15.

Construction phase

Magnitude of impact

Military and other low flying operations

- 1.9.2.2 Wind turbine and OSP construction infrastructure above LAT could pose a physical obstruction to flight operations in the vicinity, and specifically to military and other low flying operations, including survey work. Construction infrastructure, OSPs and erected wind turbines can be difficult to see from the air, particularly in poor meteorological conditions, leading to potential increased obstacle collision risk. Furthermore, during the construction phase, the presence and movement of associated infrastructure may present a potential obstacle collision risk to aircraft flight operations.
- 1.9.2.3 A range of adopted measures, in the form of appropriate notification to aviation stakeholders, development of, and adherence to a Design Plan, and lighting and marking to minimise effects to aviation flight operations would apply to the development of the Mona Offshore Wind Project. These will comply with current guidelines where appropriate and be agreed with the appropriate stakeholders and are outlined in Table 1.16.
- 1.9.2.4 The impact is predicted to be of regional spatial extent, short term duration, intermittent and low reversibility for the construction phase. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

MONA OFFSHORE WIND PROJECT

Helicopter operations

- 1.9.2.5 Wind turbine and OSP construction infrastructure above LAT could restrict access for helicopters operating in support of the offshore hydrocarbon industry. Hydrocarbon platform and helicopter operators have been consulted with regard to the potential for the Mona Offshore Wind Project to create an obstruction to aviation activities conducted in the vicinity of the wind turbines and OSPs.
- 1.9.2.6 Appendix A of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement considers those offshore platforms which are located within 9 nm of the Mona Array Area and assesses helicopter access to current Irish Sea (Liverpool and Morecambe Bay) oil and gas installations (platforms) near the Mona Array Area. HAR analysis considered two installations within a 9 nm range (the Conwy and Calder installations, operated by Eni and Spirit Energy and located 4.6 nm and 7.1 nm from the Mona Array Area respectively). Due to the locations of each platform in relation to the Mona Offshore Wind Project, it was concluded that an Airborne Radar Approach (ARA) can be flown, and sufficient distance is available for a go-around or IMC take-off towards the Mona Offshore Wind Project. This conclusion indicates that there would be no significant restriction for helicopter access to either installation.
- 1.9.2.7 A range of adopted measures, in the form of appropriate notification to aviation stakeholders, development of, and adherence to a Design Plan, and lighting and marking to minimise effects to aviation flight operations would apply to the development of the Mona Offshore Wind Project. These will comply with current guidelines where appropriate and be agreed with the appropriate stakeholders and are outlined in Table 1.16.
- 1.9.2.8 The impact is predicted to be of local spatial extent, short term duration, intermittent and low reversibility for the construction phase. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Instrument flight procedures

- 1.9.2.9 Wind turbine and OSP construction infrastructure above LAT could pose a physical obstruction to flight operations in the vicinity, specifically to flight procedures. Appendix B of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement assesses those Irish Sea littoral aerodromes' flight procedures which are within 50 nm of the Mona Array Area. The IFP assessment which was completed at a maximum blade tip height of 364 m LAT has concluded that the Mona Array Area will breach the Blackpool Airport MSA. This area guarantees a minimum of 1,000 ft obstacle clearance required for IFR flights.
- 1.9.2.10 The impact is predicted to be of regional spatial extent, short term duration, intermittent and low reversibility for the construction phase. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **medium**.

Sensitivity of the receptor

Military and other low flying operations

- 1.9.2.11 Pilots are obliged to plan their flying activities in advance and to be familiar with any en-route obstacles they may encounter; however, during flight, weather conditions or operational requirements may necessitate route adjustments. In VMC, pilots are ultimately responsible for seeing and avoiding obstructions such as wind turbines and will be aware through notification procedures of the Mona Offshore Wind Project. Furthermore, when flying in IMC pilots may be under the control of ATC with an

MONA OFFSHORE WIND PROJECT

appropriate level of radar service and flying at an altitude which provides the required separation from obstacles below them.

1.9.2.12 The MOD, ATC service providers and helicopter operators have been consulted with regard to the potential for the Mona Offshore Wind Project to create an obstruction to military and other low flying operations conducted in the vicinity of construction infrastructure. No concerns were raised on this issue.

1.9.2.13 The stakeholders' ability to continue to conduct military and other low flying operations in the Irish Sea airspace is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be **medium**.

Helicopter operations

1.9.2.14 NHV provide helicopter support to both Spirit Energy (including Harbour Energy) and Eni. Consultation with NHV during the Scoping phase indicated that impacts of varying degrees may be experienced by helicopter operations completed in poor weather conditions to their offshore hydrocarbon platforms due to the creation of obstacles (Table 1.5). Harbour Energy and Eni were contacted during Section 42 consultation and neither party expressed concern for potential impacts to their helicopter operations arising from the Mona Offshore Wind Project.

1.9.2.15 The receptor is deemed to be of low vulnerability, high recoverability and medium value. The sensitivity of the receptor is therefore considered to be **negligible**.

Instrument flight procedures

1.9.2.16 Blackpool Airport has been consulted throughout the pre-application phase, as presented in Table 1.5. The Applicant is continuing to engage with Blackpool Airport to provide an agreed route to mitigation.

1.9.2.17 The receptor is deemed to be of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore considered to be **high**.

Significance of the effect

Military and other low flying operations

1.9.2.18 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Helicopter operations

1.9.2.19 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Instrument flight procedures

1.9.2.20 Overall, the magnitude of the impact is deemed to be medium and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms.

Further mitigation and residual effect

Instrument flight procedures

- 1.9.2.21 Consultation with regard to the potential breach of the Blackpool Airport MSA is continuing to reach agreement on mitigation to maintain a safe altitude for aircraft flying IFR procedures in the sectors of the MSA impacted by the Mona Array Area.
- 1.9.2.22 Agreement with Blackpool Airport is being sought to raise the impacted MSA altitudes to a level that will provide the required minimum of 1,000 ft separation between the highest obstacle (wind turbine) and IFR flight rules aircraft operating within the affected area. The residual impact to the Blackpool Airport MSA would be **minor adverse** with mitigation in place, which is not significant in EIA terms.

Operations and maintenance phase

Magnitude of impact

Military and other low flying operations

- 1.9.2.23 During the operations and maintenance phase of the Mona Offshore Wind Project, the presence and operation of wind turbines and the OSP could pose a physical obstruction to flight operations in the vicinity of the Mona Array Area, specifically to military and other low flying operations. As discussed in paragraph 1.9.2.2, wind turbines and OSPs can be difficult to see from the air, leading to potential increased obstacle collision risk.
- 1.9.2.24 A range of adopted measures, in the form of appropriate notification to aviation stakeholders, development of, and adherence to a Design Plan, and lighting and marking to minimise effects to aviation flight operations would apply to the development of the Mona Offshore Wind Project. These will comply with current guidelines where appropriate and be agreed with the appropriate stakeholders and are outlined in Table 1.16.
- 1.9.2.25 The impact is predicted to be of regional spatial extent, long term duration, continuous and low reversibility for the operations and maintenance phase. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Helicopter operations

- 1.9.2.26 The presence and operation of wind turbine and OSP infrastructure above LAT could restrict access for helicopters operating in support of the offshore hydrocarbon industry, as discussed in paragraph 1.9.2.5.
- 1.9.2.27 Appendix A of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement assesses helicopter access to the Conwy and Calder installations, operated by Eni and Spirit Energy and located 4.6 nm and 7.1 nm from the Mona Array Area respectively. Due to the locations of each platform in relation to the Mona Offshore Wind Project, it was concluded that an ARA can be flown, and sufficient distance is available for a go-around or IMC take-off towards the Mona Offshore Wind Project. This conclusion indicates that there would be no significant restriction for helicopter access to either installation.
- 1.9.2.28 A range of adopted measures, in the form of appropriate notification to aviation stakeholders, development of, and adherence to a Design Plan, and lighting and

MONA OFFSHORE WIND PROJECT

marking to minimise effects to aviation flight operations would apply to the development of the Mona Offshore Wind Project. These will comply with current guidelines where appropriate and be agreed with the appropriate stakeholders and are outlined in Table 1.16.

- 1.9.2.29 The impact is predicted to be of local spatial extent, long term duration (depending on the temporal overlap between the operation of the installations and the Mona Offshore Wind Project operations and maintenance phase), continuous and low reversibility for the operations and maintenance phase. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Instrument flight procedures

- 1.9.2.30 The presence and operation of wind turbine and OSP infrastructure above LAT could pose a physical obstruction to flight operations in the vicinity, specifically to flight procedures. Appendix B of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement assesses those Irish Sea littoral aerodromes' flight procedures which are within 50 nm of the Mona Array Area. The IFP assessment which was completed at a maximum blade tip height of 364 m LAT has concluded that the Mona Array Area will breach the Blackpool Airport MSA.

- 1.9.2.31 The impact is predicted to be of regional spatial extent, long term duration, continuous and low reversibility for the operations and maintenance phase. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **medium**.

Sensitivity of receptor

Military and other low flying operations

- 1.9.2.32 Pilots are obliged to plan their flying activities in advance and to be familiar with any en-route obstacles they may encounter; however, during flight, weather conditions or operational requirements may necessitate route adjustments. In VMC, pilots are ultimately responsible for seeing and avoiding obstructions such as wind turbines and will be aware through notification procedures of the Mona Offshore Wind Project. Furthermore, when flying in IMC pilots may be under the control of ATC with an appropriate level of radar service and flying at an altitude which provides the required separation from obstacles below them.

- 1.9.2.33 The MOD, ATC service providers and helicopter operators have been consulted with regard to the potential for the Mona Offshore Wind Project to create an obstruction to military and other low flying operations conducted in the vicinity of the Mona Array Area. No concerns were raised on this issue.

- 1.9.2.34 The stakeholders' ability to continue to conduct military and other low flying operations in the Irish Sea airspace is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be **medium**.

Helicopter operations

- 1.9.2.35 As described in paragraph 1.9.2.14, consultation with NHV during the Scoping phase indicated the potential for impact on helicopter operations to offshore hydrocarbon platforms. Harbour Energy and Eni were contacted during Section 42 consultation and neither party expressed concern for potential impacts to their helicopter operations arising from the Mona Offshore Wind Project.

MONA OFFSHORE WIND PROJECT

1.9.2.36 The receptor is deemed to be of low vulnerability, high recoverability and medium value. The sensitivity of the receptor is therefore considered to be **negligible**.

Instrument flight procedures

1.9.2.37 Blackpool Airport have been consulted throughout the pre-application phase, as presented in Table 1.5. The Applicant is continuing to engage with Blackpool Airport to provide an agreed route to mitigation.

1.9.2.38 The receptor is deemed to be of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore considered to be **high**.

Significance of effect

Military and other low flying operations

1.9.2.39 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Helicopter operations

1.9.2.40 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Instrument flight procedures

1.9.2.41 Overall, the magnitude of the impact is deemed to be medium and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms.

Further mitigation and residual effects

Instrument flight procedures

1.9.2.42 Consultation with regard to the potential breach of the Blackpool Airport MSA is continuing to reach agreement on mitigation to maintain a safe altitude for aircraft flying IFR procedures in the sectors of the MSA impacted by the Mona Array Area.

1.9.2.43 Agreement with the impacted airport is being sought to raise the impacted MSA altitudes to a level that will provide the required minimum of 1,000 ft separation between the highest obstacle (wind turbine) and IFR flight rules aircraft operating within the affected area. The residual impact to the Blackpool Airport MSA would be **minor adverse** with mitigation in place, which is not significant in EIA terms.

Decommissioning phase

Magnitude of impact

Military and other low flying operations

1.9.2.44 During the decommissioning phase, the presence and movement of decommissioning infrastructure could pose a physical obstruction to flight operations in the vicinity, and specifically to military and other low flying operations. As discussed in paragraph 1.9.2.2, decommissioning infrastructure, wind turbines and OSPs can be difficult to see from the air, leading to potential increased obstacle collision risk.

MONA OFFSHORE WIND PROJECT

1.9.2.45 A range of adopted measures would apply to the decommissioning phase of the Mona Offshore Wind Project, as discussed in paragraph 1.9.2.3 and outlined in Table 1.16. It is expected that any measures implemented will remain in place until the last wind turbine has been removed.

1.9.2.46 The impact is predicted to be of regional spatial extent, short term duration, continuous and high reversibility as infrastructure is removed during the decommissioning phase. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **low**.

Helicopter operations

1.9.2.47 During the decommissioning phase, the presence and movement of decommissioning infrastructure could restrict access for helicopters operating in support of the offshore hydrocarbon industry.

1.9.2.48 As discussed in paragraph 1.9.2.6, HAR analysis indicated that there would be no significant restriction for helicopter access to the Conwy and Calder installations (Appendix A of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement).

1.9.2.49 A range of adopted measures, in the form of appropriate notification to aviation stakeholders, development of, and adherence to a Design Plan, and lighting and marking to minimise effects to aviation flight operations would apply to the development of the Mona Offshore Wind Project. These will comply with current guidelines where appropriate and be agreed with the appropriate stakeholders and are outlined in Table 1.16.

1.9.2.50 The impact is predicted to be of local spatial extent, short term duration, continuous and high reversibility as infrastructure is removed during the decommissioning phase. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **negligible**.

Instrument flight procedures

1.9.2.51 During the decommissioning phase, the presence and movement of decommissioning infrastructure could pose a physical obstruction to flight operations in the vicinity, and specifically to flight procedures. As discussed in paragraph 1.9.2.9, the IFP assessment has concluded that the Mona Array Area will breach the Blackpool Airport MSA (Appendix B of Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement).

The impact is predicted to be of regional spatial extent, short term duration, continuous and high reversibility as infrastructure is removed during the decommissioning phase. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **medium**.

Sensitivity of receptor

Military and other low flying operations

1.9.2.52 As discussed in paragraph 1.9.2.11, pilots are obliged to plan their flying activities in advance and to be familiar with any en-route obstacles they may encounter. Pilots will be aware of Mona Offshore Wind Project decommissioning activities through notification procedures. When flying in IMC pilots may be utilising on board radar which detects obstructions and may be under the control of ATC and flying at an altitude which provides the required separation from obstacles below them.

MONA OFFSHORE WIND PROJECT

1.9.2.53 The MOD, ATC service providers and helicopter operators have been consulted with regard to the potential for the Mona Offshore Wind Project to create an obstruction to military and other low flying operations conducted in the vicinity of the Mona Array Area. No concerns were raised on this issue.

1.9.2.54 The stakeholders' ability to continue to conduct military and other low flying operations in the Irish Sea airspace is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be **medium**.

Helicopter operations

1.9.2.55 As discussed in paragraph 1.9.2.14, Harbour Energy and Eni were contacted during Section 42 consultation and neither party expressed concern for potential impacts to their helicopter operations arising from the Mona Offshore Wind Project.

1.9.2.56 The receptor is deemed to be of low vulnerability, high recoverability and medium value. The sensitivity of the receptor is therefore considered to be **negligible**.

Instrument flight procedures

1.9.2.57 Blackpool Airport has been consulted throughout the pre-application phase, as presented in Table 1.5. The Applicant is continuing to engage with Blackpool Airport to provide an agreed route to mitigation.

1.9.2.58 The receptor is deemed to be of high vulnerability, low recoverability and high value. The sensitivity of the receptor is therefore considered to be **high**.

Significance of effect

Military and other low flying operations

1.9.2.59 Overall, the magnitude of the impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Helicopter operations

1.9.2.60 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Instrument flight procedures

1.9.2.61 Overall, the magnitude of the impact is deemed to be medium and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms.

Further mitigation and residual effects

Instrument flight procedures

1.9.2.62 Consultation with regard to the potential breach of the Blackpool Airport MSA is continuing to reach agreement on mitigation to maintain a safe altitude for aircraft flying IFR procedures in the sectors of the MSA impacted by the Mona Array Area.

1.9.2.63 Agreement with the impacted airport is being sought to raise the impacted MSA altitudes to a level that will provide the required minimum of 1,000 ft separation between the highest obstacle (wind turbine) and IFR flight rules aircraft operating

MONA OFFSHORE WIND PROJECT

within the affected area. The residual impact to the Blackpool Airport MSA would be **minor adverse** with mitigation in place, which is not significant in EIA terms.

1.9.3 Wind turbines causing interference on civil PSR systems

Operations and maintenance phase

Magnitude of impact

- 1.9.3.1 A radar LoS analysis across the Mona Array Area has been completed in order to establish theoretical radar detectability of the wind turbines, placed within the Mona Array Area to selected PSR systems located in the UK based on a maximum upper blade tip height of 364 m above LAT. The full details are presented in Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement.
- 1.9.3.2 Radar LoS modelling results indicate that, due to the location of the Mona Array Area, the possible effects are theoretically likely to affect the operations associated with the following PSRs due to detectability of the wind turbines:
- Lowther Hill: over 175 km from the Mona Array Area, but due to the vertical extent of the wind turbines, the northern elements are theoretically highly likely to be in radar LoS to this NATS PSR
 - St Anne's: at approximately 54 km from the Mona Array Area, the wind turbines are theoretically likely to be in radar LoS to this NATS PSR
 - Great Dun Fell: approximately 137 km from the Mona Array Area, intermittent (likely) detection cannot be completely ruled out of the southwestern corner of the Mona Array Area
 - Ronaldsway IoM Airport: less than 50 km from the Mona Array Area, the wind turbines are theoretically likely to be in radar LoS to this aerodrome PSR.
 - Liverpool: over 70 km from the Mona Array Area, the eastern and central wind turbines are theoretically highly likely to be in radar LoS to this aerodrome PSR (Table 1.10).
- 1.9.3.3 All radar receptors aim to ensure 'clutter free' radar to continue to deliver a safe and effective ATS and to monitor UK airspace. Without mitigation, the impact created by the detection of operational wind turbines is predicted to be of regional spatial extent, long term duration, continuous and low reversibility for the operations and maintenance phase. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **medium**.

Sensitivity of receptor

- 1.9.3.4 The ability of NATS and airport authorities to accurately use their respective radar systems for the provision of an ATS could be impacted in the presence of wind turbine interference created by radar detectability and the consequential production of radar clutter onto radar displays.
- 1.9.3.5 Wind turbines detectable by a PSR system might degrade the system by creating false targets, reduce system sensitivity, create radar shadowing behind the wind turbines and saturate the radar receiver leading to clutter potentially concealing real aircraft targets.
- 1.9.3.6 As summarised in Table 1.5, consultation with NATS, IoM Ronaldsway Airport and Liverpool Airport all identified that there was potential for impact to aviation PSR

MONA OFFSHORE WIND PROJECT

systems. All of these parties are actively engaged with the Applicant to provide an agreed route to mitigation of effect.

- 1.9.3.7 All radar receptors aim to ensure 'clutter free' radar to continue to deliver a safe and effective ATS and to monitor UK airspace. The radar stakeholders are considered to be of high vulnerability, low recoverability and high value. The sensitivity of these receptor is therefore, considered to be **high**.

Significance of effect

- 1.9.3.8 Overall, the magnitude of the impact is deemed to be medium and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **moderate adverse** significance which is significant in EIA terms.

Further mitigation and residual effects

- 1.9.3.9 An ATS provider such as NATS and the airport authorities affected may accept that although an impact may be present, that it can be managed and accepted by implementing operational mitigation in airspace that is not regularly used for the separation of aircraft. However, in the complex airspace in which the Mona Array Area is located, operational acceptance of the effect created is unlikely to be acceptable to all ATC providers without mitigation, as portions of airspace may be more important to some ATC establishments than others, due to the role and responsibility of ATC provision allocated to them.

NATS PSR

- 1.9.3.10 In the case of NATS radar systems impacted (Lowther Hill, St Anne's and Great Dun Fell PSRs) previous acceptable mitigation of wind turbine impact to these systems has been achieved through agreement by NATS of radar blanking and radar infill or an application for an airspace change to implement a Transponder Mandatory Zone (TMZ).
- 1.9.3.11 The mitigation solution decided upon will be subject to commercial agreement between the Applicant and NATS and will be implemented by radar blanking of the affected areas of the Lowther Hill, St Anne's and Great Dun Fell PSRs which will remove all wind turbine radar returns; however, all other radar returns in the blanked area will also be removed. To resolve this, radar data from another NATS radar asset such as the NATS Clee Hill PSR (which does not detect the wind turbines) may 'infill' the 'blanked' areas ensuring 'clutter free' radar coverage above the Mona Array Area.
- 1.9.3.12 Alternatively, to resolve the removal of radar returns through radar blanking, an application to the CAA for an airspace change and the provision of a TMZ will remove impact created by the Mona Offshore Wind Project to the effected NATS PSR. A TMZ is a defined piece of airspace in which the carriage and operation of a pressure-altitude transponder is mandatory within an aircraft. The creation of a TMZ allows the airspace above the development to retain its original classification, yet also allows for enhanced situational awareness for all users and for air traffic controllers. Provision can be made for non-compliant aircraft to gain access to the TMZ; the creation of the TMZ will require regulatory approval by the CAA through an airspace change proposal.
- 1.9.3.13 Consultation with NATS continues with the expectation that, if required, a technical mitigation solution will be agreed which will reduce the magnitude of the impact. Agreement will be required on the mitigation solution to be utilised. With mitigation implemented and associated operational process and procedures in place (in line with the airport's flight safety management) the residual effect to the impacted NATS PSR systems will be of **minor adverse** significance, which is not significant in EIA terms.

MONA OFFSHORE WIND PROJECT

1.9.3.14 At the time of application submission, NATS have not yet provided the Applicant with a preferred mitigation solution, though they have confirmed that it is in production. The Applicant and NATS are maintaining regular contact to monitor progress and engagement on any mitigation requirements. This engagement will continue beyond submission. The Applicant also anticipates that once any required mitigation is agreed with NATS, it may need to be secured through a requirement within the Draft DCO.

Ronaldsway IoM Airport PSR

1.9.3.15 Ronaldsway Airport ATC have indicated that the airport's PSR should be capable of removing wind turbine clutter created by the Mona Offshore Wind Project through radar suppression system techniques which may be required to be completed by the radar manufacturer (Selex). Any primary returns from the Mona Offshore Wind Project wind turbines would be similar in strength to returns currently received from operational wind farms located to the east of the IoM at approximately the same range which are minimal. However, during further engagement with the airport, radar suppression of the wind turbine created clutter would not be the preferred option to provide suitable mitigation.

1.9.3.16 Consultation with the airport continues with the expectation that, if required, a technical mitigation solution will be agreed, which may take the form of mitigation through installation of additional MultiLATERation (MLAT) sensors within the Mona Array Area to aid solid secondary radar coverage within the airspace above and/or radar blanking and airspace change application for a TMZ. This agreement will be required on the mitigation solution to be utilised. With mitigation implemented and associated operational process and procedures in place (in line with the airport's flight safety management) the residual effect to the impacted airport's PSR system will be of **minor adverse** significance, which is not significant in EIA terms.

1.9.3.17 At the time of application submission, agreement over mitigation requirements with Ronaldsway Airport have not been progressed further due to the Applicant needing to understand mitigation expectations from NATS and any inter-linkages between any mitigation requirements for the two stakeholders, for examples, with regard to the need for a TMZ. The Applicant will continue engagement on mitigation solutions with Ronaldsway Airport beyond submission of the application. The Applicant also anticipates that once any required mitigation is agreed with Ronaldsway Airport, it may need to be secured through a requirement within the Draft DCO.

Liverpool Airport PSR

1.9.3.18 Volume 8, Annex 1.1: Aviation and radar technical report of the Environmental Statement provides the results of the Radar LoS analysis. The analysis indicates that the southeast area of the Mona Array Area will be theoretically detectable by the Liverpool Airport PSR. Liverpool Airport operate a Raytheon ASR10 Mk II PSR that would provide a 'basic level' of mitigation without any specific optimisation required; however, there is a risk that optimisation of the inherent radar processing capability would not be sufficient to mitigate the predicted impact satisfactorily.

1.9.3.19 Consultation with the Liverpool Airport Air Traffic Engineering (ATE) team continues with the expectation that, if required, a mutually acceptable mitigation scheme which will remove all wind turbine induced radar clutter will be agreed. Liverpool Airport agreed to engage with their radar manufacturer in order to establish a clear indication of a route to a radar mitigation scheme.

1.9.3.20 Consultation with the airport continues with the expectation that, if required, a technical mitigation solution will be agreed. This agreement will be required on the mitigation solution to be utilised. With mitigation implemented and associated operational

MONA OFFSHORE WIND PROJECT

process and procedures in place (in line with the airport's flight safety management) the residual effect to the impacted Liverpool Airport PSR system will be **minor adverse**, which is not significant in EIA terms.

1.9.4 Future monitoring

1.9.4.1 No aviation and radar monitoring to test the predictions made within the impact assessment is considered necessary.

1.10 Cumulative effect assessment methodology

1.10.1 Methodology

1.10.1.1 The Cumulative Effects Assessment (CEA) takes into account the impact associated with the Mona Offshore Wind Project together with other projects and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see Volume 5, Annex 5.1: Cumulative effects screening matrix of the Environmental Statement). Each project has been considered on a case by case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

1.10.1.2 For the purposes of the Environmental Statement in the assessment of the cumulative obstruction effect, the additive impact has been assessed within 40 km from the Mona Array Area, which is considered to be the maximum range where the creation of an aviation obstacle to fixed wing and rotary aircraft operating offshore may occur although some impacts are likely to be localised to the Mona Array Area.

1.10.1.3 For the purposes of this chapter, this additive impact to aviation radar has been assessed within 100 km from the Mona Array Area, which is considered to be the maximum range where radar cumulative effects may occur although some impacts are likely to be localised to the Mona Array Area due to the unmitigated effect created by the detection of operational wind turbines.

1.10.1.4 The aviation and radar CEA methodology has followed the methodology set out in Volume 1, Chapter 5: EIA methodology of the Environmental Statement. As part of the assessment, all projects and plans considered alongside the Mona Offshore Wind Project have been allocated into 'tiers' reflecting their current stage within the planning and development process, as follows:

- Tier 1
 - Under construction
 - Permitted application
 - Submitted application
 - Those currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact
- Tier 2
 - Scoping report has been submitted and is in the public domain
- Tier 3
 - Scoping report has not been submitted and is not in the public domain
 - Identified in the relevant Development Plan

MONA OFFSHORE WIND PROJECT

- Identified in other plans and programmes.

- 1.10.1.5 This tiered approach is adopted to provide a clear assessment of the Mona Offshore Wind Project alongside other projects, plans and activities.
- 1.10.1.6 The specific projects, plans and activities scoped into the CEA, are outlined in Table 1.17 and shown in Figure 1.2.
- 1.10.1.7 Certain impacts assessed for the project alone are not considered in the cumulative assessment due to:
- The highly localised nature of the impacts (i.e. they occur entirely within the Mona Array Area)
 - Management measures in place for the Mona Offshore Wind Project will also be in place on other projects reducing their risk of occurring
 - A lack of data or confidence in data preventing meaningful assessment (Tier 3).
- 1.10.1.8 The impacts excluded from the CEA for the above reasons are as follows:
- Wind turbines creating an impact to offshore helicopter operations to hydrocarbon platforms
 - Impact to IFP/MSA.
- 1.10.1.9 Therefore, the impacts that are considered in the CEA are as follows:
- Creation of physical obstacle to aircraft operations
 - Wind turbines causing interference on civil PSR systems.

MONA OFFSHORE WIND PROJECT

Table 1.17: List of other projects, plans and activities considered within the CEA for aviation and radar.

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore cable corridor (km)	Description of project/plan	Dates of construction and operation (if applicable) and overlap with the Mona Offshore Wind Project
Tier 1					
Awel y Môr Offshore Wind Farm	Consent approved	13.5	3.6	Offshore energy	Project construction phase overlaps with the Mona Offshore Wind Project proposed construction phase.
Barrow Offshore Wind Farm	Operational	43.3	53.9	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
Burbo Bank Offshore Wind Farm	Operational	40.3	32.8	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
Burbo Bank Offshore Wind Farm Extension	Operational	30.6	26.1	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
Gwynt y Môr Offshore Wind Farm	Operational	17.8	9.9	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
North Hoyle Offshore Wind Farm	Operational	29.6	13.6	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
Ormonde Offshore Wind Farm	Operational	44.0	58.0	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.

MONA OFFSHORE WIND PROJECT

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore cable corridor (km)	Description of project/plan	Dates of construction and operation (if applicable) and overlap with the Mona Offshore Wind Project
Rhyl Flats Offshore Wind Farm	Operational	25.6	3.8	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
Robin Rigg West	Operational	98.6	126.0	Offshore Energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
Walney 1 Offshore Wind Farm	Operational	35.4	49.6	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
Walney 2 Offshore Wind Farm	Operational	34.1	51.5	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
Walney Extension 3 Offshore Wind Farm	Operational	31.6	53.6	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
Walney Extension 4 Offshore Wind Farm	Operational	30.7	47.8	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
West of Duddon Sands Offshore Wind Farm	Operational	31.9	43.9	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.

MONA OFFSHORE WIND PROJECT

Project/Plan	Status	Distance from the Mona Array Area (km)	Distance from the Mona Offshore/Onshore cable corridor (km)	Description of project/plan	Dates of construction and operation (if applicable) and overlap with the Mona Offshore Wind Project
Tier 2					
Morecambe Offshore Windfarm: Generation Assets (hereafter referred to as the Morecambe Generation Assets)	PEIR submitted	8.9	21.5	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
Morgan Offshore Wind Project: Generation Assets (hereafter referred to as the Morgan Generation Assets)	PEIR submitted	5.5	32.9	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed construction and operations and maintenance phases.
Moor Vannin Offshore Wind Farm (IoM)	Pre-application (Scoping)	34.5	59.9	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed operations and maintenance phases.
Tier 3					
Draig y Môr Offshore Wind Farm	Pre-application	68.4	61.4	Offshore energy	Project operational phase overlaps with the Mona Offshore Wind Project proposed operations and maintenance phases.

MONA OFFSHORE WIND PROJECT

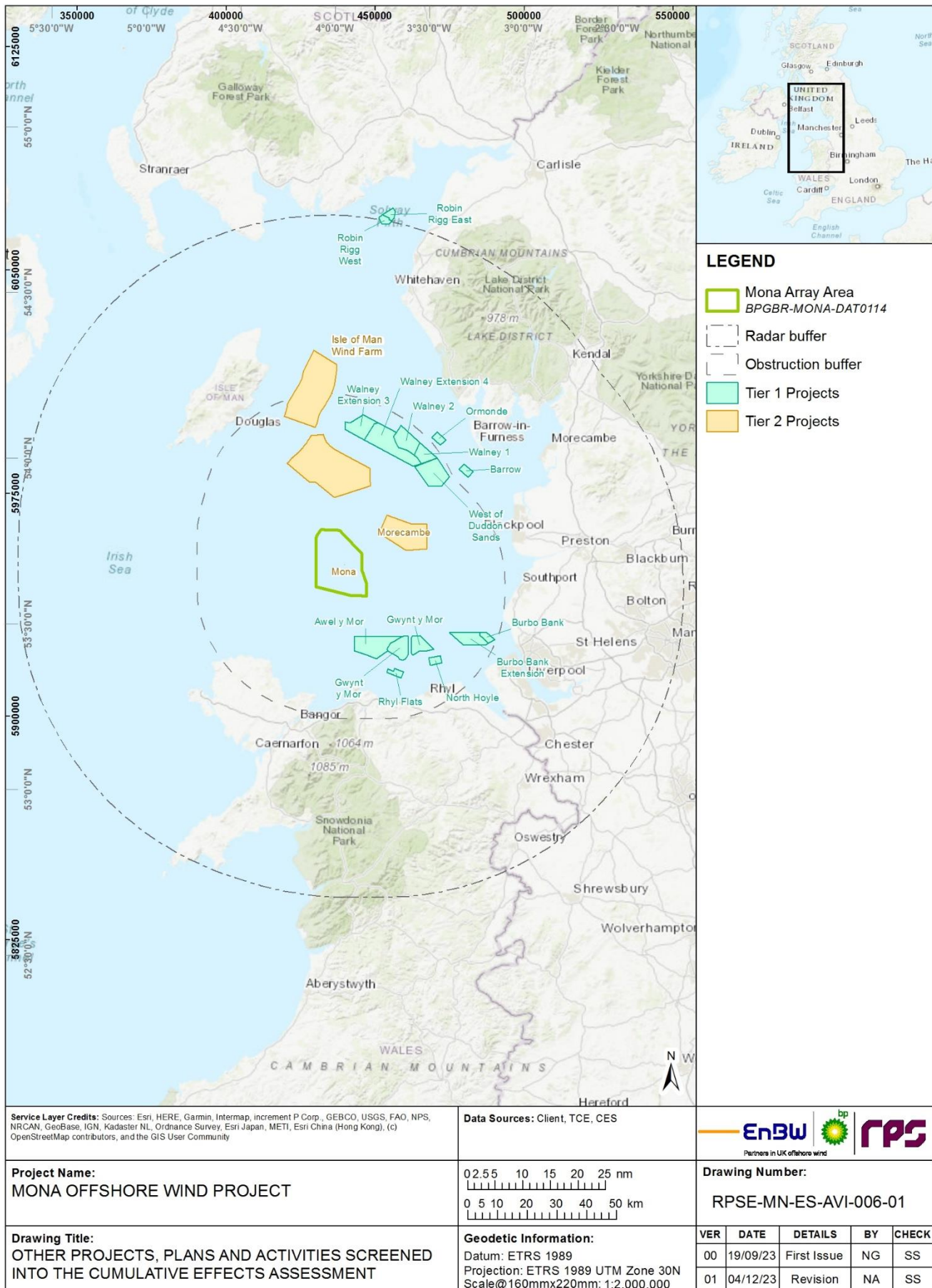


Figure 1.2: Other projects, plans and activities screened into the cumulative effects assessment.

MONA OFFSHORE WIND PROJECT

1.10.2 Maximum Design Scenario

1.10.2.1 The MDSs identified in Table 1.18 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section have been selected from the Project Design Envelope provided in Volume 1, Chapter 3: Project description of the Environmental Statement as well as the information available on other projects and plans, to inform an MDS. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the Project Design Envelope (e.g. different wind turbine layout), to that assessed here, be taken forward in the final design scheme.

Table 1.18: MDS considered for the assessment of potential cumulative effects on aviation and radar.

^a C=construction, O=operations and maintenance, D=decommissioning

Potential cumulative effect	Phase ^a			Maximum Design Scenario	Justification
	C	O	D		
Creation of a physical obstacle	✓	✓	✓	<p>MDS as described for the Mona Offshore Wind Project (Table 1.15) assessed cumulatively with the following other projects/plans within 40 km of the Mona Array Area:</p> <p>Tier 1</p> <ul style="list-style-type: none"> • Awel y Môr Offshore Wind Farm • Burbo Bank Offshore Wind Farm Extension • Gwynt y Môr Offshore Wind Farm • North Hoyle Offshore Wind Farm • Rhyl Flats Offshore Wind Farm • Walney 1 Offshore Wind Farm • Walney 2 Offshore Wind Farm • Walney Extension 3 Offshore Wind Farm • Walney Extension 4 Offshore Wind Farm • West of Duddon Sands Offshore Wind Farm <p>Tier 2</p> <ul style="list-style-type: none"> • Morecambe Generation Assets • Morgan Generation Assets • Mooir Vannin Offshore Wind Farm 	This includes the presence of other offshore wind farm developments which will have the potential to create a cumulative aviation obstacle and affect the available airspace for other users in the same region within a representative 40 km buffer of the Mona Array Area.
Wind turbines causing interference on civil PSR systems	x	✓	x	<p>MDS as described for the Mona Offshore Wind Project (Table 1.15) assessed cumulatively with the following other projects/plans within 100 km of the Mona Array Area:</p> <p>Tier 1</p> <ul style="list-style-type: none"> • Awel y Môr Offshore Wind Farm • Barrow Offshore Wind Farm • Burbo Bank Offshore Wind Farm • Burbo Bank Offshore Wind Farm Extension • Gwynt y Môr Offshore Wind Farm 	Maximum aviation and radar cumulative effect is calculated within a representative 100 km buffer of the Mona Array Area.

MONA OFFSHORE WIND PROJECT

Potential cumulative effect	Phase ^a			Maximum Design Scenario	Justification
	C	O	D		
				<ul style="list-style-type: none"> North Hoyle Offshore Wind Farm Ormonde Offshore Wind Farm Robin Rigg Offshore Wind Farm Rhyl Flats Offshore Wind Farm Walney 1 Offshore Wind Farm Walney 2 Offshore Wind Farm Walney Extension 3 Offshore Wind Farm Walney Extension 4 Offshore Wind Farm West of Duddon Sands Offshore Wind Farm <p>Tier 2</p> <ul style="list-style-type: none"> Morecambe Generation Assets Morgan Generation Assets Moor Vannin Offshore Wind Farm <p>Tier 3</p> <ul style="list-style-type: none"> Draig y Môr Offshore Wind Farm 	

1.11 Cumulative effects assessment

1.11.1 Overview

1.11.1.1 A description of the significance of cumulative effects upon aviation and radar receptors arising from each identified impact is given below.

1.11.2 Creation of a physical obstacle to aircraft operations

Tier 1/Tier 2

Construction phase

Magnitude of impact

Military and other low flying operations

1.11.2.1 There is potential for cumulative effect as a result of construction activities associated with the Mona Offshore Wind Project and Tier 1/Tier 2 projects (Table 1.17). For the purposes of the Environmental Statement, this additive impact has been assessed within 40 km from the Mona Array Area, which is considered to be the maximum range where the creation of an aviation obstacle to fixed wing and rotary aircraft operating offshore may occur although some impacts are likely to be localised to the Mona Array Area. The Tier 1 and 2 projects are listed in Table 1.18.

1.11.2.2 Aviation operations in the UK are highly regulated. The Mona Array Area is located in airspace where the provision of an ATS is routine. The same rules of the air which maintain a safe operating environment in the current baseline will apply in the Irish Sea during all phases of the Mona Offshore Wind Project and other projects considered in the cumulative assessment; the provision of an ATS will not be affected.

MONA OFFSHORE WIND PROJECT

- 1.11.2.3 The cumulative effect is predicted to be of regional spatial extent, short term duration, intermittent and low reversibility once construction has commenced. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

Military and other low flying operations

- 1.11.2.4 The MOD, ATC service providers and helicopter operators have been consulted with regard to the potential for the Mona Offshore Wind Project to create an obstruction to aviation activities conducted in the vicinity of construction infrastructure.
- 1.11.2.5 Pilots are obliged to plan their flying activities in advance and to be familiar with any en-route obstacles they may encounter on their route of flight. The Mona Offshore Wind Project and other offshore developments considered within the CEA will be included within applicable military and CAPs and charts; pilots will be aware of the presence of the developments through notification procedures. Notification of construction, operation and decommissioning of the wind farm and the lighting and promulgation on aviation charts of all wind farms considered to provide a cumulative obstruction to aviation will reduce any physical obstruction effect to aviation activities in the region of the Mona Array Area. Due to measures adopted, it is considered that low flying operations in the uncontrolled airspace available below CAS between the operational and planned offshore wind farms, though constricted would not be affected by the operation of the Mona Offshore Wind Project and other projects. It is predicted that the impact will affect the aviation receptors operating in the airspace directly but without a change to present operating parameters.
- 1.11.2.6 The low flying aircraft operator is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be **medium**.

Significance of effect

- 1.11.2.7 Overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Operations and maintenance phase

Tier 1/Tier 2

Magnitude of impact

Military and other low flying operations

- 1.11.2.8 There is potential for cumulative effect as a result of operational activities associated with the Mona Offshore Wind Project and other projects (Table 1.17). For the purposes of the Environmental Statement, this additive impact has been assessed within 40 km from the Mona Array Area, which is considered to be the maximum range where the creation of an aviation obstacle to fixed wing and rotary aircraft operating offshore may occur although some impacts are likely to be localised to the Mona Array Area. The Tier 1 and 2 projects are listed in Table 1.18.
- 1.11.2.9 Aviation operations in the UK are highly regulated. The Mona Array Area is located in airspace where the provision of an ATS is routine. The same rules of the air which maintain a safe operating environment in the current baseline will apply in the Irish Sea

MONA OFFSHORE WIND PROJECT

during all phases of the Mona Offshore Wind Project and other projects considered in the cumulative assessment; the provision of an ATS will not be affected.

- 1.11.2.10 The impact is predicted to be of regional spatial extent, long term duration, continuous and low reversibility during the operations and maintenance phase. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

Military and other low flying operations

- 1.11.2.11 Helicopter operators, the MOD and ATC service providers have been consulted with regard to the potential for the Mona Offshore Wind Project to create an obstruction to aviation activities conducted in the vicinity of the operational wind turbines.
- 1.11.2.12 Pilots are obliged to plan their flying activities in advance and to be familiar with any en-route obstacles they may encounter on their route of flight. The Mona Offshore Wind Project and other offshore developments considered within the CEA will be included within applicable military and CAPs and charts; pilots will be aware of the presence of the developments through notification procedures. Notification of construction, operation and decommissioning of the wind farm and the lighting and promulgation on aviation charts of all wind farms considered to provide a cumulative obstruction to aviation will reduce any physical obstruction effect to aviation activities in the region of the Mona Array Area. Due to measures adopted, it is considered that low flying operations in the uncontrolled airspace available below CAS between the operational and planned offshore wind farms, though constricted would not be affected by the operation of the Mona Offshore Wind Project and other projects. It is predicted that the impact will affect the aviation receptors operating in the airspace directly but without a change to present operating parameters.
- 1.11.2.13 The low flying aircraft operator and the ability to continue using the Irish Sea airspace is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be **medium**.

Significance of effect

Military and other low flying operations

- 1.11.2.14 Overall, the magnitude of the impact is deemed to be low, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Decommissioning phase

Tier 1/Tier 2

Magnitude of impact

Military and other low flying operations

- 1.11.2.15 There is potential for cumulative effect as a result of decommissioning activities associated with the Mona Offshore Wind Project and other projects (Table 1.17). For the purposes of this chapter, this additive impact has been assessed within 40 km from the Mona Array Area, which is considered to be the maximum range where the creation of a cumulative aviation obstacle to fixed wing and rotary aircraft operating offshore

MONA OFFSHORE WIND PROJECT

may occur although some impacts are likely to be localised to the Mona Array Area. The Tier 1 and 2 projects are listed in Table 1.18.

1.11.2.16 Aviation operations in the UK are highly regulated. The Mona Array Area is located in airspace where the provision of an ATS is routine. The same rules of the air which maintain a safe operating environment in the current baseline will apply in the Irish Sea during all phases of the Mona Offshore Wind Project and other projects, the provision of an ATS will not be affected.

1.11.2.17 The impact is predicted to be of regional spatial extent, short term duration, continuous and high reversibility as decommissioning progresses. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **low**.

Sensitivity of the receptor

Military and other low flying operations

1.11.2.18 The MOD, ATC service providers and helicopter operators have been consulted with regard to the potential for the Mona Offshore Wind Project to create an obstruction to aviation activities conducted in the vicinity of decommissioning infrastructure.

1.11.2.19 The low flying aircraft operator is deemed to be of low vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore considered to be **medium**.

Significance of effect

Military and other low flying operations

1.11.2.20 Overall, the magnitude of the cumulative impact is deemed to be low, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

1.11.3 Wind turbines causing interference to civil PSR systems

Tier 1/Tier 2

Operations and maintenance phase

Magnitude of impact

1.11.3.1 There is potential for cumulative radar effect as a result of the Mona Offshore Wind Project and other projects (Table 1.17). For the purposes of this chapter, this additive impact to aviation radar has been assessed within 100 km from the Mona Array Area, which is considered to be the maximum range where radar cumulative effects may occur although some impacts are likely to be localised to the Mona Array Area due to the unmitigated effect created by the detection of operational wind turbines. The Tier 1 and Tier 2 projects are listed in Table 1.18.

1.11.3.2 Theoretical radar LoS analysis for the NATS Lowther Hill, St Anne's and Great Dun Fell PSRs together with detection of the operational wind turbines by the airport PSR at Ronaldsway IoM and Liverpool Airports indicate that the operational Mona Offshore Wind Project wind turbines with a tip height of 364 m above LAT would be considered to be detectable (by varying degrees) to the PSR systems. It is likely that those consented and operational wind farms included in the CEA are already mitigated against the effect to aviation radar; for example, Awel-y-Mor radar mitigation is secured in the associated DCO, as would highly likely be the case for the Mona Offshore Wind Farm Project and the projects listed as Tier 2 in Table 1.17. Radar detectability of wind

MONA OFFSHORE WIND PROJECT

turbines does not automatically provide justification for an objection from radar stakeholders. Other factors will determine the nature and severity of the operational impact on the receptor, these factors are provided in section 1.4.5.8. Unmitigated, the potential cumulative effect created by the detection of operational Mona Array Area wind turbines will be to potentially add to radar screen clutter that presently may be operationally managed by the aviation stakeholder, potentially leading to an increase in the individual signal processing demands of the predicted effected PSRs.

- 1.11.3.3 The impact is predicted to be of regional spatial extent, long term duration, continuous and low reversibility for the operations and maintenance phase, with loss of significant system components. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be **medium**.

Sensitivity of the receptor

- 1.11.3.4 NATS and airport authorities aim to ensure 'clutter free' radar to continue to deliver a safe and effective ATS. The radar stakeholders are considered to be of high vulnerability, low recoverability and high value. The sensitivity of these receptors is therefore, considered to be **high**.

Significance of effect

- 1.11.3.5 Overall, the magnitude of the impact is deemed to be medium, and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **moderate adverse** significance which is significant in EIA terms.

Further mitigation and residual effects

- 1.11.3.6 Mitigation as described in Section 1.9.3 will be agreed (reducing the magnitude of the impact and receptor sensitivity through modified process and procedures in the provision of the ATS). With mitigation in place the effect is expected therefore, to be of **minor adverse** significance, which is not significant in EIA terms.

1.11.4 Future monitoring

- 1.11.4.1 As mitigation will have been required for those radar systems which are affected by operational and planned projects, no radar cumulative effect will be apparent and therefore with mitigation in place, the residual effect will be **minor** which is not significant in EIA terms for all scenarios. No monitoring is therefore considered necessary.

1.12 Transboundary effects

- 1.12.1.1 A screening of transboundary impacts has been carried out and has identified that there was no potential for significant transboundary effects with regard to aviation and radar from the Mona Offshore Wind Project upon the interests of other states.

1.13 Inter-related effects

- 1.13.1.1 Inter-relationships are considered to be the impacts and associated effects of different aspects of the proposal on the same receptor. These are considered to be:
- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the Mona Offshore Wind Project (construction, operations and maintenance, and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in

MONA OFFSHORE WIND PROJECT

these three phases (e.g. subsea noise effects from piling, operational turbines, vessels and decommissioning)

- Receptor-led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on aviation and radar (creation of a physical obstacle and wind turbines causing interference on PSR systems) may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects may be short term, temporary or transient effects, or incorporate longer term effects.

1.13.1.2 The individual project alone impacts were assigned residual significance of impact of no greater than minor adverse once mitigation is applied. ATS provision and the rules of air, including the 'see and be seen principle', will mean reduced potential for inter and intra-related effects for helicopter operators and low flying aircraft including those performed by the MOD alike, operating at low level in the airspace surrounding the Mona Array Area. It is therefore anticipated the significance of these combined effects on airspace users will not be of any greater significance than the effects when assessed in isolation (i.e. minor adverse significance once mitigation is applied).

1.13.1.3 There are no inter-related effects that are of greater significance than those assessed in isolation.

1.14 Summary of impacts, mitigation measures and monitoring

1.14.1.1 Information on aviation and radar within the aviation and radar study area was collected through desktop review and consultation.

1.14.1.2 Table 1.19 presents a summary of the potential impacts, measures adopted as part of the project and residual effects in respect to aviation and radar. The impacts assessed include:

- Creation of a physical obstacle to aircraft operations
- Wind turbines causing interference to civil PSR systems.

1.14.1.3 Overall it is concluded that there will be the following significant effects arising from the Mona Offshore Wind Project during the operations and maintenance phase, prior to further mitigation:

- Creation of a physical obstacle to aircraft operations – Instrument flight procedures
- Wind turbines causing interference to civil PSR systems.

1.14.1.4 With further mitigation in place, the effects are expected to be of **minor adverse** significance, which is not significant in EIA terms.

1.14.1.5 Table 1.20 presents a summary of the potential cumulative impacts, mitigation measures and residual effects. The cumulative impacts assessed include:

- Creation of physical obstacle to aircraft operations
- Wind turbines causing interference to civil PSR systems.

1.14.1.6 Overall it is concluded that there will be the following significant cumulative effects from the Mona Offshore Wind Project alongside other projects/plans.

- Wind turbines causing interference to civil PSR systems.

MONA OFFSHORE WIND PROJECT

1.14.1.7 With further mitigation in place, the effect is expected to be of **minor adverse** significance, which is not significant in EIA terms.

MONA OFFSHORE WIND PROJECT

Table 1.19: Summary of potential environmental effects, mitigation and monitoring.

^a C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase ^a			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Creation of a physical obstacle to aircraft operations – Military and low flying operations	✓	✓	✓	Design Plan Lighting and marking Notification	C: Low O: Low D: Low	C: Medium O: Medium D: Medium	C: Minor adverse O: Minor adverse D: Minor adverse	None	C: N/A O: N/A D: N/A	None
Creation of a physical obstacle to aircraft operations – Helicopter operations	✓	✓	✓	None	C: Negligible O: Negligible D: Negligible	C: Negligible O: Negligible D: Negligible	C: Negligible O: Negligible D: Negligible	None	C: N/A O: N/A D: N/A	None
Creation of a physical obstacle to aircraft operations – Instrument flight procedures	✓	✓	✓	None	C: Medium O: Medium D: Medium	C: High O: High D: High	C: Moderate adverse O: Moderate adverse D: Moderate adverse	Raise the impacted MSA altitudes to a level that will provide the required minimum of 1,000 ft separation between the highest obstacle (wind turbine) and IFR flight rules aircraft operating within the affected area.	C: Minor adverse O: Minor adverse D: Minor adverse	None
Wind turbines causing interference to civil PSR systems	✗	✓	✗	None	C: N/A O: Medium D: N/A	C: N/A O: High D: N/A	C: N/A O: Moderate adverse D: N/A	NATS – Radar blanking followed by radar infill or airspace change application. Radar blanking and airspace change application and/or	C: N/A O: Minor adverse D: N/A	None

MONA OFFSHORE WIND PROJECT

Description of impact	Phase ^a			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
								improvement to the airport MLAT system. Liverpool Airport: optimisation of radar suppression techniques.		

MONA OFFSHORE WIND PROJECT

Table 1.20: Summary of potential cumulative environmental effects, mitigation and monitoring.

^a C=construction, O=operations and maintenance, D=decommissioning

Description of impact	Phase ^a			Measures adopted as part of the project	Magnitude of impact	Sensitivity of the receptor	Significance of effect	Further mitigation	Residual effect	Proposed monitoring
	C	O	D							
Creation of a physical obstacle to aircraft operations – Military and low flying operations	✓	✓	✓	Design Plan Lighting and marking Notification	C: Low O: Low D: Low	C: Medium O: Medium D: Medium	C: Minor adverse O: Minor adverse D: Minor adverse	Not required	N/A	None
Wind turbines causing interference to civil PSR systems	x	✓	x	None	C: N/A O: Medium D: N/A	C: N/A O: High D: N/A	C: N/A O: Moderate adverse D: N/A	NATS – Radar blanking followed by radar infill or airspace change application. Ronaldsway IoM Airport – Radar blanking and airspace change application and/or improvement of the airport MLAT system. Liverpool Airport – Optimisation of radar suppression techniques.	C: N/A O: Minor adverse D: N/A	None

1.15 References

- Anatec Limited (Anatec) (2023) Mona and Morgan Offshore Wind Farm Helicopter Access Report (HAR).
- Civil Aviation Authority (CAA) (2016) Civil Aviation Publication (CAP) 764 Policy and Guidelines on Wind Turbines. Available:
<http://publicapps.caa.co.uk/modalapplication.aspx?catid=33&pagetype=65&appid=11&mode=detail&id=5609>. Accessed August 2023.
- CAA (CAA) (2022) The Air Navigation Order. Accessed 2023
- CAA CAP 168 Licensing of Aerodromes (CAA) (2022). Available:
<https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=6114>. Accessed August 2023.
- CAA CAP 437 Standards for Offshore Helicopter Landing Areas (CAA) (2023). Available:
<https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=523>. Accessed August 2023.
- CAA CAP 670 Air Traffic Services Safety Requirements (CAA) (2019). Available:
<https://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=9124>. Accessed August 2023.
- CAA CAP 393 The Air Navigation Order (CAA) (2022). Accessed November 2023.
- CAA CAP 032 UK Aeronautical Information Publication (CAA) (2023a). Available:
<https://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=223>. Accessed November 2023.
- Department for Energy Security & Net Zero (2024a) Overarching National Policy Statement for Energy (NPS EN-1). Available:
<https://assets.publishing.service.gov.uk/media/65a7864e96a5ec0013731a93/overarching-nps-for-energy-en1.pdf>. Accessed February 2024.
- Department for Energy Security & Net Zero (2024b) National Policy Statement for Renewable Energy Infrastructure (NPS EN-3). Available:
<https://assets.publishing.service.gov.uk/media/65a7889996a5ec000d731aba/nps-renewable-energy-infrastructure-en3.pdf>. Accessed February 2024.
- Department for Energy Security & Net Zero (2024c) National Policy Statements for Electricity Networks Infrastructure (NPS EN-5). Available:
<https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf>. Accessed February 2024.
- IEMA (2016) Environmental Impact Assessment. Guide to Delivering Quality Development. Available: [REDACTED]. Accessed August 2023.
- International Civil Aviation Organisation (ICAO) (2018) Procedures for Air Navigation Services Aircraft Operations Ops/611. Accessed: August 2023.
- Maritime and Coastguard Agency (MCA) Safety of Navigation Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response. (MCA) (2021). Available:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1157005/MGN_654.pdf. Accessed August 2023.
- Ministry of Defence (MOD) (2023) Military Aeronautical Information Publication (MilAIP).
- North Sea Transition Authority (NTSA) (2023) Oil and Gas Authority Annual Report and Accounts 2022–23. Available:

MONA OFFSHORE WIND PROJECT

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1170945/oil-and-gas-authority-annual-report-and-accounts-2022-23-accessible.pdf. Accessed August 2023.

Osprey Consulting Services (Osprey) (2023) Morgan and Mona Windfarms - Instrument Flight Procedure (IFP) Impact Assessment.

The Institute of Environmental Management and Assessment (IEMA) (2016) Environmental Impact Assessment Guide to Delivering Quality Development.

UK Government (Gov) (2017) The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. Available: <https://www.legislation.gov.uk/ukxi/2017/572/contents/made>. Accessed August 2023.

Welsh National Marine Plan (Welsh Government) (2019) Available: <https://www.gov.wales/welsh-national-marine-plan>. Accessed August 2023.