Environmental Impact Assessment Report (EIAR)

Ballydermot Wind Farm Co. Offaly and Co. Kildare

Chapter 16 Aviation

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GLOSSARY OF TERMS

Terms	Definition
Airmanship	Airmanship is the consistent use of good judgment and well-developed skills to accomplish flight objectives. This consistency is founded on a cornerstone of uncompromising flight discipline and is developed through systematic skill acquisition and proficiency. A high state of situational awareness completes the airmanship picture and is obtained through knowledge of one's self, aircraft, environment, team and risk[1]
Military Operational Area	A restricted area, termed a military operational area, within a designated area, individually identified by a number and the boundary of which is defined by co-ordinates and data specified in Part I of the Schedule to the Order and as depicted, by way of illustration only, on the map in Part III of the Schedule OR A restricted area for use by aircraft of the Defence Forces within which the flight of civil aircraft may be restricted in accordance with such standing criteria as are specified by the Authority in relation thereto and published in the Aeronautical Information publication
Controlled Airspace	Airspace of defined dimensions within which air traffic control services are provided. The level of control varies with different classes of airspace.
Uncontrolled Airspace	Airspace in which an air traffic control service is not deemed necessary or cannot be provided for practical reasons. It is the opposite of controlled airspace.
Class A Airspace	Airspace for use by Instrument Flight Rules (IFR) flights only; Used mainly by the Airlines, Cargo flights or Business jets
Class C Airspace	Airspace that may be used by both IFR and Visual Flight Rules (VFR). However, VFR flight is subject to adherence to Air Traffic Control (ATC) instructions; Some pilots prefer to fly in airspace not controlled by ATC
Class G Airspace	Airspace for use by both IFR and VFR flights. The airspace is not controlled by ATC; however, they are generally available to advise flights, monitor aircraft should emergencies arise, and provide general flight assistance, subject to controller workload
EI-R16	Airspace that is restricted for use by State aircraft
EI-RI6C	Restricted area which extends vertically from a lower limit of 1,500 ft AMSL up to an upper limit of Flight Level 240 (FL240)

[1] *Ref: Redefining Airmanship. Dr Tony Kern. 1996.*

EI-R16H	Restricted area which extends vertically from a lower limit of 2,500 ft AMSL up to an upper limit of Flight Level 240 (FL240)
Low Flying Training Areas	Not formally regulated airspaces but have been 'designated' as a result of an internal Air Corps process

GLOSSARY OF ACRONYMS

Acronym	Meaning
AD	Air Defence
AIP	Aeronautical Information Publication
AMSL	Above Mean Sea Level
ASR	Airport Surveillance Radar
ATC	Air Traffic Control
ATCC	Air Traffic Control Centre
CDP	County Development Plan
CTA	Controlled airspace
CTR	Control Zone
DME	Distance Measuring Equipment
DoD	Department of Defence
DVOR	Doppler Very High Frequency Omni Directional Range
EASA	European Aviation Safety Agency
EIAR	Environmental Impact Assessment Report
ENR	en-route
FAF	Final Approach Fix
FIR	Flight Information Region
FL	Flight Level
GASU	Garda Air Support Unit
IAA	Irish Aviation Authority
IAC	Irish Air Corps
IAP	Instrument Approach Procedures
ICAO	International Civil Aviation Organisation
IFP	Instrument Flight Procedure
IFR	Instrument Flight Rules
ILS	Instrument Landing Systems
IMC	Instrument Meteorological Conditions
KCDP	Kildare County Development Plan
km	Kilometres
KWES	Kildare Wind Energy Strategy
LFA	Low Flying Training Area
MOA	Military Operating Area
m	metre
MOCA	Minimum Obstacle Clearance Altitude

mOD	Metres over Datum
NDB	Non-Directional Beacons
nm	Nautical Miles
NOTAM	Notice To Airmen
OCDP	Offaly County Development Plan
OHS	Outer Horizontal Surface
OLS	Obstacle Limitation Surface
OWES	Offaly Wind Energy Strategy
PSR	Primary Surveillance Radar
R	Restricted
RLoS	Radar Line of Sight
SAR	Search and Rescue
SERA	Standardised European Rules of the Air
SFC	Surface
SSR	Secondary Surveillance Radar
SUA	Special Use Airspace
ToF	Top of Foundation
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VOR	Very High Frequency Omni-Range
WMO	World Meteorological Organisation

16. AVIATION

16.1 Introduction

Material Assets are defined in the '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports'* (EPA, 2022)[2] as '*built services and infrastructure*'. Material assets may be either of human or natural origin. This chapter of the EIAR addresses the likely significant effects of the proposed Ballydermot Wind Farm on aviation (military and civil) capabilities and safety and aviation assets.

Chapter 15 of this EIAR assess the potential for impacts on Traffic and Transport, Telecommunications, Utilities and Waste Management. The cultural assets of Cultural Heritage are addressed in Chapter 14 of this Environmental Impact Assessment Report (EIAR). Economic assets of natural heritage include non-renewable resources such as minerals or soils, and renewable resources such as wind and water. These assets are addressed in Chapter 8: Land, Soils and Geology, Chapter 9: Water, Chapter 10: Air Quality, and Chapter 11: Climate. Tourism and amenity resources, which are also considered material assets, are addressed in Chapter 5: Population and Human Health. The Population and Human Health chapter also addresses existing land-uses (economic assets).

This chapter of the EIAR has been prepared in accordance with the requirements of the EIA legislation and guidance detailed in Chapter 1: Introduction.

As detailed in Section 1.1.1 in Chapter 1 Introduction, for the purposes of this EIAR, the various project components are described and assessed using the following references: 'Proposed Project', 'Proposed Enhancement Areas', 'Proposed Construction Haul Routes', 'Proposed Turbine Delivery Route', 'Project Site', 'Proposed Wind Farm', 'Proposed Turbines', 'Proposed Grid Connection', 'Proposed Onsite Substation' and 'Proposed Offsite Substation'.

The Proposed Project is described in full in Chapter 4 of this Environmental Impact Assessment Report (EIAR).

16.2 Chapter Structure

The layout of this chapter comprises the following:

- **Guidelines and Legislation:** A review of the available aviation guidelines and legislation from a National and International perspective (Section 16.5).
- **Methodology:** Definition of the study area used for assessment and discussion on the methodology used to assess the impacts on military airspace designations (Section 16.6).
- **Baseline Environment:** Review of the current military airspace designations above the Proposed Wind Farm and the planning history within the vicinity relating to renewable energy and aviation. Explanation of aviation terminology and military airspace designations discussed in this chapter (Section 16.7)
- **Likely Future Receiving Environment:** Discussion on the likely future receiving environment and future environmental trends of the Project Site within the context of the ongoing EPA Licenced activities for the Proposed Wind Farm site (Section 16.8)
- **Aviation Assessment:** Detailed assessments on airspace analysis (Section 16.9.1), radar impact (Section 16.9.2), aerodrome safeguarding (Section 16.9.3), and instrument flight procedure (IFP) (Section 16.9.4).

[2] *EPA, 2022. Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. Available at: https://www.epa.ie/publications/monitoring–assessment/assessment/EIAR_Guidelines_2022_Web.pdf*

- **Impact Assessment**: Assessment of the potential effects on current military airspace designations above the Proposed Wind Farm during the construction, operation and decommissioning phases (Section 16.10) as well as the cumulative impact assessment (Section 16.9.5) of the potential effects on current military airspace designations above the Proposed Wind Farm and other operational, permitted and proposed wind farms during the construction, operation and decommissioning phases.

This chapter should be read in conjunction with the following specialist reports and assessments,

- Appendix 16-1 Airspace Analysis Ballydermot Wind Farm – Cyrrus Limited
- Appendix 16-2 – Impact of Proposed Wind Fram Planning Decisions & Irish Air Corps Review – Cyrrus Ltd (Confidential)
- Appendix 16-3 Radar Impact Assessment – AI Bridges Ltd (Confidential)
- Appendix 16-4 Instruments Flight Procedure Assessment – Sagentia (Confidential)

16.3 Statement of Authority

This chapter of the EIAR, which includes a summary of the various assessments carried out by Sagentia, AI Bridges and Cyruss Ltd has been prepared by Catherine Johnson, and reviewed by Ellen Costello, Sean Creedon and Michael Watson, all of MKO.

Ai Bridges

Kevin Hayes is a senior radio planner / engineer with Ai Bridges and holds a B.Eng, M.Eng. in Communications & Electronic Engineering with over 30 years of experience in telecommunications network design, software modelling services and project implementation and roll-out of turnkey solutions for clients. Kevin Hayes takes overall responsibility for the approval of all Telecommunications, Aviation and Television Impact Statements provided by Ai Bridges.

Cyrrus

Peter Foulsham (Cyrrus Ltd) has worked in the aviation industry for nearly four decades. He has been both a military and civilian Air Traffic Controller, been seconded to a National regulator as an Air Traffic Control inspector and has held both Tower and Approach Control licence ratings. He has also spent the past 23 years as a Pilot flying for the Airlines, as well as flying corporate aircraft for multi-national companies. He holds both UK CAA and United States FAA Airline Transport Pilots Licences. Peter has also served on an Air Accidents Review Board for a National regulator.

Sagentia Aviation

Osprey Consulting Services Ltd (t/a Sagentia Aviation) is an Approved Procedure Design Organisation (APDO) consisting of 5 qualified Instrument Flight Procedure (IFP) Designers operating in both the Civil and Military domain. The IFP Safeguarding Assessment was completed by Sam Shuttlewood and Liam Clarke.

Sam Shuttlewood is an IFP Designer with over 10 years of experience in the design, review and safeguarding of published IFPs worldwide.

Liam Clarke is Head of IFP Design at Osprey Consulting Services Ltd (t/a Sagentia Aviation) with over 10 years of experience in the design, review and safeguarding of published IFPs worldwide.

MKO

Catherine is a Project Environmental Scientist at MKO with over 4 years of consultancy experience in climate, renewable energy, and sustainability. Catherine possesses skills in mapping and design, which complement her experience in preparing comprehensive reports for EIAs. Catherine holds a BSc in Earth and Ocean Science and a LLM in Global Environment and Climate Change Law. Catherine has been involved in a myriad of environmental service offerings at MKO including EIA Screenings and Reports, climate and sustainability related work and renewable energy infrastructure projects, including both onshore and offshore wind energy developments.

Ellen Costello is a Senior Environmental Scientist with MKO with over 6 years' experience in private consultancy. Ellen holds a BSc (Hons) in Earth Science, and a MSc (Hons) in Climate Change: Integrated Environmental and Social Science Aspects where she focused her studies on renewable energy development in Europe and its implications on environment and society. Ellen's key strengths and expertise are Environmental Protection and Management, Environmental Impact Statements, Project Management, and GIS Mapping and Modelling. Since joining MKO, Ellen has been involved in a range of renewable energy infrastructure projects. In her role as a senior project manager, Ellen works with and co-ordinates large multidisciplinary teams including members from MKO's Environmental, Planning, Ecological and Ornithological departments.

This report has been reviewed by Sean Creedon (B.Sc., M.Sc.) and Michael Watson (BA, MA CEnv). Sean has 23 years' experience in planning and environmental impact elements within all stages of wind farm project delivery. Michael has over 20 years experience in planning and environmental impact assessment including all stages of wind farm project delivery.

16.4 Scoping and Consultation

16.4.1 Scoping

An EIAR scoping document, providing details of the Proposed Project, was prepared by MKO and circulated to statutory consultees in relating to telecommunications in 2020 and to all general stakeholders in 2021 in order to determine the content, depth and extent of the topics to be addressed in the environmental information submitted to the competent authority. An updated scoping document was issued to consultees in December 2025, reflecting the time elapsed since the previous scoping exercise, updates in local and national policy, legislation and relevant EIAR guidance, changes in the environmental baseline, and refinement of the Proposed Project layout and design. A full description of the scoping and consultation exercise, including the complete list of consultees and the responses received, is provided in Section 2.8 of Chapter 2 of this EIAR. The scoping responses of relevance to aviation are summarised in Table 16-1 below.

Table 16-1: Aviation Scoping Responses

Consultee	Date of Response -Scoping Round 1 -2021	Date of Response – Scoping Round 2 -2025
AirNav	Consulted as part of Irish Aviation Authority in 2021 – response received from IAA on 13/03/2021	No response received
Department of Defence	Response received on 01/03/2021	Response received on 30/12/2025 Meeting held on 19/05/2026. Refer to Section 16.4.2 below and Section 2.9.4.4 of Chapter 2 for further details.

Consultee	Date of Response -Scoping Round 1 -2021	Date of Response – Scoping Round 2 -2025
Irish Aviation Authority	Response received 10/03/2021	Response received 04/12/2025 and 05/12/2025 asking for further detail – no response to further correspondence received
Irish Parachute Club	Not included in 2021 Scoping	No Response Received

Department of Defence

A scoping request was issued to the Department of Defence (DoD) on the 2nd of February 2021 and 4th December 2025. A response was received on 1st March 2021 and 30th December 2025 detailing the aviation airspace restricted areas as listed in the Position Paper.

Specific issues raised by the DoD in 2021 response included:

- The distance of the Proposed Turbines from Casement Aerodrome.
- General impact to the Air Corps ability to conduct flight training / recovery of IFR air traffic to the Casement Aerodrome.
- Impact to the Edenderry/Allenwood/Rathangan Low Flying Training Area.
- Impact to routes used by the Air Corps to access other training areas and issues. surrounding the separation of aircraft from one another.

A follow up was issued to the DoD on the 28th May 2021 requesting a meeting to discuss the observations made in the scoping response. A response was received on the 3rd June 2021 acknowledging that any consent is solely a matter for the planning authorities/An Bord Pleanála (now An Coimisiún Pleanála) as appropriate and added that it did not see the merit in a meeting as observations made prior would remain.

Specific issues raised by the DoD in 2025 response included:

- A portion of the proposed Ballydermot Wind Farm lies within 20NM of Casement Aerodrome Doppler Very High Frequency Omni Directional Range (DVOR)/ Distance Measuring Equipment (DME).
- The proposed development also lies within the Edenderry/Allenwood/Rathangan (Lullymore) Air Corps Low Flying Training Area. The cumulative effect of wind turbines and meteorological masts will make the area unusable for Irish Air Corps low flying training.
- Development of wind turbines or other tall structures above 45m above ground level within the Edenderry/Allenwood/Rathangan (Lullymore) Air Corps Low Flying Training Area and within 20NM of Casement Aerodrome has the potential to significantly impact on Air Corps flight operations.
- The cumulative effect of renewable energy developments has the potential to impede the Irish Air Corps operability.

A follow up was issued to the DoD on 14th April 2026 requesting a meeting to discuss the observations made in the scoping response and aviation constraints associated with the Proposed Wind Farm. A meeting was held on 19th May 2026 with the Applicant, MKO, Cyrrus and Ai Bridges. Refer to Section 16.4.2 below and Section 2.9.4.4 in Chapter 2 for further detail on this meeting.

A final consideration of the DoD was the acknowledgement of other contested and operational wind farms within these zones but commented that the cumulative impact would negatively affect navigability of military aircraft. Refer to Appendix 16-2 for a response to each item by the DoD.

Irish Aviation Authority

A scoping request was issued to the Irish Aviation Authority (IAA) on the 2nd of February 2021 and 4th December 2025. A further response was received on 15th February 2021 recommending engagement with Clonbullogue Aerodrome (Parachute club) located 4km to the west and recommended an aeronautical obstacle warning light scheme be confirmed at the commencement of the construction phase and location/dimension details to be provided as a condition of consent.

The Applicant is committed to including the most appropriate lighting scheme as is required by the IAA at the time of construction. Further engagement will be held with the IAA at the time of construction to inform appropriate lighting requirements.

A further email response was received on the 10th March 2021 which reiterated the lighting and location detail conditions.

In 2025 an email response was received on 4th December 2025 recommending engagement with the Irish Parachute Club operating out of Clonbullogue Airfield. Refer to the section below for detail on this engagement. A further response was received by the IAA on 5th December 2025 requesting further detail from MKO in relation to turbine locations and coordinates. This detail was provided on 3rd February 2026, with a follow up on 14th April 2026; no further responses were received from the IAA.

Irish Parachute Club

A letter was issued to the Irish Parachute Club on November 23rd 2020. An updated scoping request was issued to the Irish Parachute Club on 4th December 2025 at the request of the IAA. No response has been received to date.

Local Airfields

Clonbullogue Licenced Aerodrome is the nearest licenced aerodrome and lies approximately 5.5 kilometres (km) west-southwest of the Proposed Turbines. This is a small, licensed airfield that is predominantly used for parachuting activities and was consulted via the Irish Parachute Club detailed above. It's 770 metre (m) grass runway is orientated in an east-west direction. The airfield is also located approximately 2.5km south of the existing Cloncreen Wind Farm. Due to the distance of the airfield from the Proposed Wind Farm, it has been determined that there is no potential for effects on this airstrip and therefore it has not been considered further in the below assessment.

Additionally, a desktop study of private airstrips was carried out to identify any private airstrips in proximity of the Aviation Study Area. There is 1 no. airstrip located 0.7km south of the nearest Proposed Turbine (i.e., T14). A discussion on private airstrips is identified in Section 16.7.5 below.

16.4.2 Consultation

As outlined in Section 16.4.1 above, the most recent meeting with the DoD was held on the 19th May 2026. Discussion points were centred around the restricted airspaces established above the Proposed Wind Farm as well as Low Flying Areas and the manner in which they are utilised by the Irish Air Corps. A Radar Line of Sight study has been completed for this EIAR, outlined in Section 16.9.3.3 and Section 16.9.3.4 below, which was included in the presentation to the DoD. Additional points flagged by the DoD and Irish Air Corps were Aerodrome Safeguarding and Cumulative effects. The requirement to assess the potential impact on Instrument Flight Procedures (IFP) at Casement Aerodrome was outlined and the DoD recommended that a dedicated IFP assessment be carried out for the Proposed Wind Farm and included in the EIAR / planning application documents. An IFP assessment was procured and t this scope of work has been completed by Sagentia. The IFP Assessment is detailed in Section 16.9.3.6 below and provided as Appendix 16-4.

The DoD stated that low flying was a core skill of military flying and had to be practised. The DoD also noted the use of Edenderry Low Flying Area as a helicopter practise area for off-airfield landing training below 500ft AGL.

The Department of Defence further raised concern regarding IFR military flight into Casement Aerodrome.

16.5 Guidelines and Legislation

This chapter of the EIAR is carried out in accordance with Directive 2011/92/EU as amended by Directive 2014/52/EU, the 'EIA Directive', and having regard, where relevant, to guidance listed below. A summary of some of the aviation specific documents can be found below.

- CAA CAP 764: Policy and Guidelines on Wind Turbines, 2025[3]
- Irish Aviation Authority Act, 1993 (as amended).[4]
- Irish Aviation Authority (Designated Areas) Order, 2007 (S.I. No. 806/2007)[5]
- Irish Aviation Authority Aeronautical Information Publication (2026) (AIP)[6]
- Irish Aviation Authority IAA (Obstacles to Aircraft in Flight) Order, 2005 (S.I. No. 215/2005)[7]
- Irish Aviation Authority (Standardised Rules of the Air) Order, 2019 (S.I. No. 266/2019)[8]
- European Aviation Safety Agency (EASA) Standardised European Rules of the Air (SERA)
  - Easy Access Rules for Standardised European Rules of the Air (August 2025)[9]
- International Civil Aviation Organisation (ICAO)
- World Meteorological Organisation (WMO) (2010) Commission for Instruments and Methods of Observation 15th session (Helsinki)[10]
- Kildare County Development Plan 2023-2029[11]
- Kildare County Development Plan Wind Energy Strategy 2023-2029[12]
- Offaly County Development Plan 2021-2027[13]
- Offaly County Development Plan Wind Energy Strategy 2021-2027[14]
- Department of Defence Air Corps Wind Farm/Tall Structures Position Paper 2014[15]
- Environmental Protection Agency (2022) '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports*'[16]

[3] https://www.caa.co.uk/data-and-publications/publications/documents/content/cap-764/
[4] https://www.irishstatutebook.ie/eli/1993/act/29/enacted/en/html
[5] https://www.irishstatutebook.ie/eli/2007/si/806/made/en/print
[6] *Irish Aviation Authority Aeronautical Information Publication (September 2026)* https://www.airnav.ie/air-traffic-management/aeronautical-information-management
[7] https://www.irishstatutebook.ie/eli/2005/si/215/made/en/print
[8] https://www.irishstatutebook.ie/eli/2019/si/266/made/en/print
[9] *EASA (August 2025) Easy Access Rules for Standardised European Rules of the Air* <https://www.easa.europa.eu/en/downloads/68174/en>
[10] https://library.wmo.int/records/item/32298-commission-for-instruments-and-methods-of-observation-fifteenth-session#.Xir7MTJKiUk
[11] https://kildarecoco.ie/AllServices/Planning/DevelopmentPlans/KildareCountyDevelopmentPlan2023-2029/KildareCountyDevelopmentPlan2023-2029/
[12] https://kildarecoco.ie/AllServices/Planning/DevelopmentPlans/KildareCountyDevelopmentPlan2023-2029/Appendices/2.%20Wind%20Energy%20Strategy.pdf
[13] https://www.offaly.ie/stage-4-final-plan/
[14] https://www.offaly.ie/app/uploads/Combined-Copy.pdf
[15] https://www.pleanala.ie/publicaccess/EIAR-NIS/311565/4.%20EIAR%20Volume%20II/Annex%2013.2%20-%20Air%20Corps%20Position%20Paper.pdf
[16] https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf

16.5.1 Irish Aviation Authority Act, 1993 (as amended)

The Irish Aviation Authority Act of 1993 established the Irish Aviation Authority in Ireland to regulate the safety of aircraft and air navigation services in Ireland. The IAA is responsible, on behalf of the State, for the oversight of safety and security of the Irish civil aviation sector and part of its remit is to conduct ongoing audits of all of its Regulated Entities (i.e. airlines, airports, ground handling agents, freight forwarders etc)

16.5.2 Irish Aviation Authority (Designated Areas) Order, 2007.

In 2007, the then Minister for Public Enterprise and the Minister for Defence, ordered the designation of the areas of Irish Airspace listed in Articles 4 and 5 hereunder for use by the Defence Forces:

'3. In this Order: "the Act" means the Irish Aviation Authority Act, 1993 (No. 29 of 1993) as amended;

> *"designated area" (as specified in section 68 of the Act) means an airspace of defined dimensions designated by the Irish Aviation Authority with the consent of the Minister for Transport and the Minister for Defence for use by the Defence Forces. An aircraft, other than an aircraft of the Defence Forces, may not enter such an airspace without the permission of the person operating air navigation services therein;*
>
> *"restricted area" means, for the purposes of this Order, airspace of defined dimensions in a designated area above the land areas or territorial waters of the state, within which the flight of civil aircraft is subject to specified restrictions;*
>
> *"TOP" Maximum vertical extent (expressed as an altitude or level) of an area of airspace;*
>
> *"BASE" Minimum vertical extent (expressed as the surface, an altitude or level) of an area of airspace;*
>
> *"AREA database" A name attributed to a collection of data defining the boundaries of the airspace areas referred to in this Order, listed in Part I of the Schedule to the Order and described in the database interpretative material contained in Part II of the Schedule to the Order;*
>
> *"EIR..." means, for purposes of this Order, a restricted area, within a designated area, individually identified by a number and the boundary of which is defined by co-ordinates and data in the AREA database as specified in Part 1 of the Schedule to the Order and as depicted, by way of illustration only, on the map in Part III of the Schedule;*
>
> *"MOA..." means, for purposes of this Order, a restricted area, termed a military operational area, within a designated area, individually identified by a number and the boundary of which is defined by co-ordinates and data specified in Part 1 of the Schedule to the Order and as depicted, by way of illustration only, on the map in Part III of the Schedule;*
>
> *"military operational area" means, for the purposes of this Order, a restricted area for use by aircraft of the Defence Forces within which the flight of civil aircraft may be restricted in accordance with such standing criteria as are specified by the Authority in relation thereto and published in the Aeronautical Information publication.*

4. The areas EIR 15, EIR 16, EIR 22, EIR 23 are hereby designated as restricted areas with vertical and lateral extent as defined for each area by the AREA database and database interpretative material in Parts I and II of the Schedule to the Order...

5. The following airspace areas MOA 3, MOA 4, MOA 5 are hereby designated as military operational areas with vertical and lateral extent as defined for each area by the AREA database and database interpretative material in Parts I and II of the Schedule to the Order...'[17]

16.5.3 International Civil Aviation Organisation (ICAO)

The International Civil Aviation Organisation (ICAO) is funded and directed by 193 national governments in support of diplomacy and cooperation in air transport. This is accomplished by the Countries being signatories to the Chicago Convention (1944). Several stakeholders, made up of industry and civil society groups as well as other concerned regional and international organisations, also participate in developing new standards at ICAO.

These stakeholders receive technical and other inputs from a series of subject matter experts in order to present the best possible new standards for presentation to governments. Once governments achieve diplomatic consensus around a new standard's scope and details, it is then adopted by those same 193 countries in order to bring worldwide alignment to their national regulations, helping to realize safe, secure and sustainable air operations on a global basis.

National and regional aviation regulatory bodies form national regulators which enforce regulation at a national level. Countries are able to, and do, file differences with ICAO where deviation from these ICAO standards exists.

The Republic of Ireland is a signatory to ICAO, but the Country does not have many differences filed with the Organisation. Ireland has the European Union Aviation Safety Agency (EASA) as its regulatory foundation and in general adopts these regulations.

16.5.4 European Aviation Safety Agency

EASA has many varied regulatory areas which range from technical standards of aircraft maintenance and standards required during flight, to the licensing of airfields and personnel. Many of the standards and criteria required to be met during flight are captured in their SERA documentation.

The EASA is the focal point of the European Union's master plan for aviation safety. At its heart is the plan to develop common safety and environmental rules at the European level and in so doing, promoting the highest common standards of safety and environmental protections in civil aviation. It monitors the implementation of these standards through inspections within the Member States and also provides, technical expertise, training and research. National authorities manage the 'everyday' operational tasks of its aviation industry such as aircraft certification, maintenance oversight and aircrew and Air Traffic Control (ATC) licensing.

Tasks of EASA include, amongst others:

- Rulemaking: the drafting of aviation safety legislation and provision of technical advice to Member States
- Inspections, training and standardisation programmes to ensure uniform and consistent implementation of legislation across Member States
- Data collection, analysis and research driving the continuous improvement of aviation safety

[17] https://www.iaa.ie/docs/default-source/publications/legislation/statutory-instruments-(orders)/irish-aviation-authority-(designated-areas)-order-2007.pdf?sfvrsn=84b70df3_4

16.5.5 Department of Defence Draft Air Corps Wind Farm/Tall Structures Position Paper

In August 2014 the Department of Defence issued the draft Air Corps Wind Farm/Tall Structures Position Paper (the Draft Position Paper), as outlined in the IAA scoping response in Appendix 2-1. The Draft Position Paper has as its focus the Air Corps endeavours to create and maintain a flight environment that is both safe and economic for the Corps to train in. Training is a fundamental part of military flying. The Air Corps statement of position within the Draft Position Paper is the '*opposition of the erection of wind farms or other obstacles which will affect its ability to train and operate in a safe and economic manner*.'

The objective of the Draft Position Paper is to ensure that:

a. *'Air Corps operations and training may be accomplished in a safe and economical manner;*
b. *Baldonnel remains a viable aerodrome for IFR and VFR traffic;*
c. *The ability to train military flying skills is protected;*
d. *Vital navigation routes to and from the regions to Baldonnel and the Dublin area are protected to safeguard the ability of the Air Corps to fulfil its role.'*

The Draft Position Paper provides a list of areas across the Country within which they are opposed to the construction of wind farms or other tall structures and a list of areas within which structures greater than 45m are proposed require referral to the Air Corps for assessment.

16.5.6 Local Policy

The Project Site falls across the administrative area of both Kildare and Offaly County Councils and therefore the provisions of both County Development Plans (CDPs) for these areas have been considered and are set out below.

16.5.6.1 Kildare County Development Plan 2023-2029

The Kildare County Development Plan 2023-2029 (KCDP) came into effect on the 28th January 2023. It recognises the importance of developing the renewable energy resources of the County in order to reduce dependence on fossil fuels.

The KCDP acknowledges the role of natural capital, green infrastructure and peatland habitats in climate change mitigation and adaptation. The KCDP supports the protection, restoration and enhancement of peatlands, wetlands and other carbon-rich ecosystems, recognising their contribution to carbon sequestration, biodiversity and flood attenuation. The KCDP also supports the transition to a low-carbon economy and facilitates renewable energy infrastructure that contributes to national and regional climate objectives. The continued rehabilitation of lands within the parts of Allen Bog Group and the generation of renewable electricity by the Proposed Project are therefore consistent with the climate action and environmental objectives of the KCDP. Refer to Section 2.6.4 of Chapter 2 for further detail on local policy.

16.5.6.1.1 *Kildare County Development Plan Wind Energy Strategy*

Appendix 2 of the KCDP is the Kildare Wind Energy Strategy (KWES) which details Kildare County Council's objectives in relation to wind energy development and sets out the methodology for the identification of suitable locations for wind energy development in the county, having regard to the relevant policy context.

As part of the KWES development methodology, a constraints analysis including aviation constraints was conducted for the County. The KWES acknowledges that the majority of the County falls under Military Operating Area (MOA) 4 (see Section 16.7.2.1 below for further details) and that An Coimisiún Pleanála has both granted and refused wind energy developments within this zone (see Section 16.7.6 below). The KWES states further, '*Any wind farm applications within the larger Military Operating Area will be considered on its own merits in accordance with Development Plan standards and consultation with the Department of Defence*'.

The KWES overlays 'Areas of Aviation Significance' with landscape sensitivities, wind speeds, grid infrastructure, protected areas and settlements to produce three strategic areas relating to the suitability of wind energy development:

- **Acceptable in Principle:** This is the preferred area for wind energy development characterised by a robust landscape, a low housing density, adequate windspeeds and proximity to the existing electricity transmission and distribution grid, while having no significant conflicts with natural heritage designations. Wind farm developments will be facilitated in this area subject to compliance with normal planning and environmental criteria outlined in Section 5 of this report and the development management standards in the County Development Plan.
- **Open For Consideration:** This area is characterised by medium landscape sensitivity which is a less robust category of landscape sensitivity. It has the potential to accommodate wind farm development subject to a detailed assessment on the visual impact of the proposal on the landscape in particular, and cumulative visual impacts with existing and permitted wind farms. Wind farm developments will be facilitated in this area subject to compliance with normal planning and environmental criteria outlined in Section 5 of this report and the development management standards in the County Development Plan. Wind farm proposals in this area will be required to demonstrate potential for cumulative visual impacts at application stage.
- **Not Normally Permissible:** This area is considered to be generally unsuitable for wind farm development as it is defined by highly sensitive landscapes, settlements, designated sites, areas of aviation significance and/or low windspeeds. Individual small-scale turbines and community led initiatives may be considered on a case-by-case basis. Any development in this area will be subject to compliance with planning and environmental criteria outlined in Section 5 of this report and the development management standards in the County Development Plan.

The Proposed Turbines are located entirely within an area designated as Open to Consideration for wind energy developments. The KWES calculates that with the combined areas of 'Acceptable in Principle' and 'Open to Consideration', the full potential resource of wind energy generation within the County is 280MW with the potential to delivery 107MW of wind energy within the lifetime of the current plan. The Proposed Project has the potential to generate a minimum of 322MW, 196MW of which is located within the administrative area of Co. Kildare, with an anticipated commission timeframe of 2032.

16.5.6.2 Offaly County Development Plan 2021-2027

The Offaly County Development Plan 2021-2027 (OCDP) is the principal instrument that is used to manage change in land use in the County. The OCDP sets out Offaly County Council's strategic land use objectives and policies for the overall development of the County up to the year 2027 and beyond. The plan recognises that Offaly has had a long history of energy production, predominantly related to the commercial exploitation of peatlands and recognises the potential economic benefit of a transition from fossil fuel based energy production through to investment in renewable energy.

Offaly County Council recognises the importance which cutaway bogs may have in relation to decarbonisation, biodiversity enhancement, and renewable energy generation and also acknowledges

the impact the closure of peat harvesting has had in parts of the County and states that these impacts must be mitigated. It states that the focus of this mitigation includes but is not limited to:

Appropriate re-use of some, (where identified within an overall strategic framework) former industrial peatlands and associated infrastructure / works sites with a focus on sustainable employment generation, renewable energy projects community resilience, tourism facilities and amenities.

16.5.6.2.1 Offaly County Development Plan Wind Energy Strategy

Offaly County Council have produced a Wind Energy Strategy (OWES) to accompany the OCDP. The OWES includes areas that are 'Open for Consideration for Wind Energy Developments' and 'Unsuitable for Wind Energy Development' and also sets out a renewable energy target to be achieved by the end of the plan period. The wind energy target for the county is 466.3MW. The Proposed Project has the potential to generate a minimum of 322MW, 126MW of which is located within the administrative area of Co. Offaly.

- **Open for Consideration for Wind Energy Developments are defined as**: have a viable wind speed and good access to the electricity grid; have fewer environmental and landscape constraints outlined in Section 5 above; are characterised by dispersed or sparse patterns of rural housing; are of a sufficient size to accommodate commercial wind farms and associated infrastructure rather than a smaller remote and dispersed area.
- **Unsuitable for Wind Energy Development** This area is considered to be generally unsuitable for wind farm development due to significant environmental, heritage and landscape constraints and housing density.

According to the Draft Position Paper, County Offaly falls within MOA 4, MOA 5, EI R16 and Edenderry/Allenwood/Rathangan Low Flying Area, (refer to Section 16.7 for further detail). The OWES / OCDP do not consider these aviation assets.

16.6 Methodology

The EPA document '*Guidelines on the information to be contained in Environmental Impact Assessment Reports*' (EPA, 2022) (hereafter the EPA Guidelines), criteria for the assessment of likely significant effects require that likely effects are described with respect to their quality (i.e. negative, positive or neutral), significance, extent, context, probability, duration, frequency and reversibility. The descriptors used in this environmental impact assessment are those set out in the EPA (2022) as shown in Section 1.8.3 of Chapter 1 of this EIAR.

Published Irish and UK aviation guidance does not prescribe an EIA sensitivity-and-magnitude matrix for aviation receptors or airspace designations. Published aviation guidance, as outlined in Section 16.5 above, establishes safeguarding requirements, technical assessment zones, obstacle-clearance criteria and consultation or safety-assurance processes. Accordingly, the assessment applies professional judgement informed by the specialist assessments in Appendices 16-1 to 16-4, the applicable aviation standards and guidance identified in Section 16.5, consultation responses, and the EPA Guidelines to inform the aviation assessment.

All aviation receptors assessed are assigned 'High' sensitivity as they perform safety-critical or operational functions. Other aviation receptors maybe relevant for other sites that would have an either a medium or low sensitivity. The assignment of High sensitivity does not, in itself, mean that an effect is significant. The significance of an effect also depends on the magnitude of change, its probability, duration, extent and context, and whether the change has a technical or operational consequence. Refer to Table 16-2 below which detailed the basis of sensitivity for aviation receptors assessed within this EIAR chapter and Table 16-3 detailing the justification relating to magnitude of change and associated EPA Guideline classification of significance.

Table 16-2: Aviation Receptor Sensitivity Classification and associated basis

Aviation receptor	Sensitivity	Basis
Restricted Airspace: MOA4 and EI-R16	High	Safety-critical airspace management and military/civil transit functions informing obstacle clearance, routing, navigability and/or operational flexibility.
Edenderry/Allenwood/Rathangan LFTA	High	Used for military low-level helicopter/off-airfield training.
Primary Surveillance Radar (PSR)	High	Provides surveillance information supporting civil or military air traffic services, informing target detection, controller workload and/or operational assurance.
Secondary Surveillance Radar (SSR)	High	Supports cooperative aircraft identification and surveillance
Meteorological Radar	High	Supports weather detection relevant to safe aviation operations
Aerodrome Safeguarding	High	Protects the obstacle environment and continued safe aerodrome operations.

Table 16-3: Aviation impact assessment magnitude of change criteria and correlation to EPA Guidelines Significance of Effects

Magnitude of Change	Aviation-specific definition	EPA Guidelines Significance of Effects
High	A change that would prevent or materially curtail the receptor's safe use or operation; create an unresolved infringement of a protected surface or procedure; cause an unacceptable safety/operational risk; or require relocation or fundamental operational change.	Profound Very Significant Significant
Medium	A material, measurable change to technical or operational performance, airspace availability, routing or workload that requires specific technical or operational mitigation but does not prevent the receptor from continuing to perform its function.	Moderate
Low	A limited or localised measurable change. The receptor remains available and its principal function is maintained through standard safeguarding, notification, marking, lighting or minor operational measures.	Slight
Negligible	No material operational degradation or loss of function. Any interaction is technically minor, remote, within established tolerances or overlapping coverage, and is capable of being managed through routine requirements.	Not Significant Imperceptible
No change	No credible pathway by which the Proposed Project could alter the receptor.	No Impact

Sensitivity and magnitude are not combined through a mechanical matrix. The EPA effect descriptions are applied using professional judgement and the evidence for each receptor. The basis for each conclusion is identified in Section 16.9

16.6.1 Study Area

The primary study area for aviation, i.e., the **Aviation Study Area**, is considered to be the Project Site which contains all structures at height (i.e., the Proposed Turbines, Proposed Onsite Substation, Proposed Offsite Substation, 2 no. met masts, relay mast, and 2 no. telecom towers) (Figure 16-1). It has been considered that structures at height with the potential to affect aviation are considered to be those in excess of 45m, i.e., those which require notification to the IAA prior to construction. Consideration has been given to the vertical limit required for obstacle clearance (i.e., 1,000 feet above mean sea level (AMSL)).

The Proposed Onsite Substation, Proposed Offsite Substation, 2 no. met masts, relay mast, and 2 no. telecom towers, along with the Proposed Construction Haul Routes, and all Proposed Wind Farm infrastructure (not including the Proposed Turbines) have been screened out of this assessment as the proposed heights will not result in any identifiable effects on aviation.

Characteristics of the Proposed Project

There are 19 no. Proposed Turbines with a tip height of 200m and 27 no. Proposed Turbines with a tip height of 220m. Table 16-4 identifies the tip height for each Proposed Turbine, along with the associated top of foundation (ToF) in meters over datum (mOD) and height AMSL. The turbines are shown on Figure 16-2, with the 19 no. Proposed Turbines with a tip height of 200m delineated by a green point and 27 no. Proposed Turbines with a tip height of 220m delineated by a blue point.

The final ToF Level of the turbine foundations will be determined by the actual ground conditions at each Proposed Turbine location and may differ slightly from those levels listed in Table 16-4.

Table 16-4: Proposed Turbine Locations and Elevations

Turbine	ITM X	ITM Y	Turbine Tip Height	ToF Levels (mOD)	Turbine Tip Height + ToF	AMSL (feet)
1	669577	723417	200	73.235	273.235	896.440
2	667966	722318	200	75.027	275.027	902.320
3	668652	722904	200	74.710	274.71	901.280
4	667122	722389	200	74.441	274.441	900.397
5	666811	722918	220	69.063	289.063	948.369
6	667272	723632	220	70.448	290.448	952.913
7	666843	724155	220	68.260	288.26	945.735
8	666062	723362	220	68.740	288.74	947.310
9	665993	724419	220	70.120	290.12	951.837
10	665722	725145	220	69.086	289.086	948.445
11	665245	723070	220	68.650	288.65	947.014
12	665675	722587	200	70.978	270.978	889.035
13	664725	722393	200	69.641	269.641	884.649
14	665129	721837	200	68.231	268.231	880.023
15	664797	723510	220	70.092	290.092	951.745
16	664366	723995	220	70.136	290.136	951.890
17	664368	724900	220	68.683	288.683	947.123

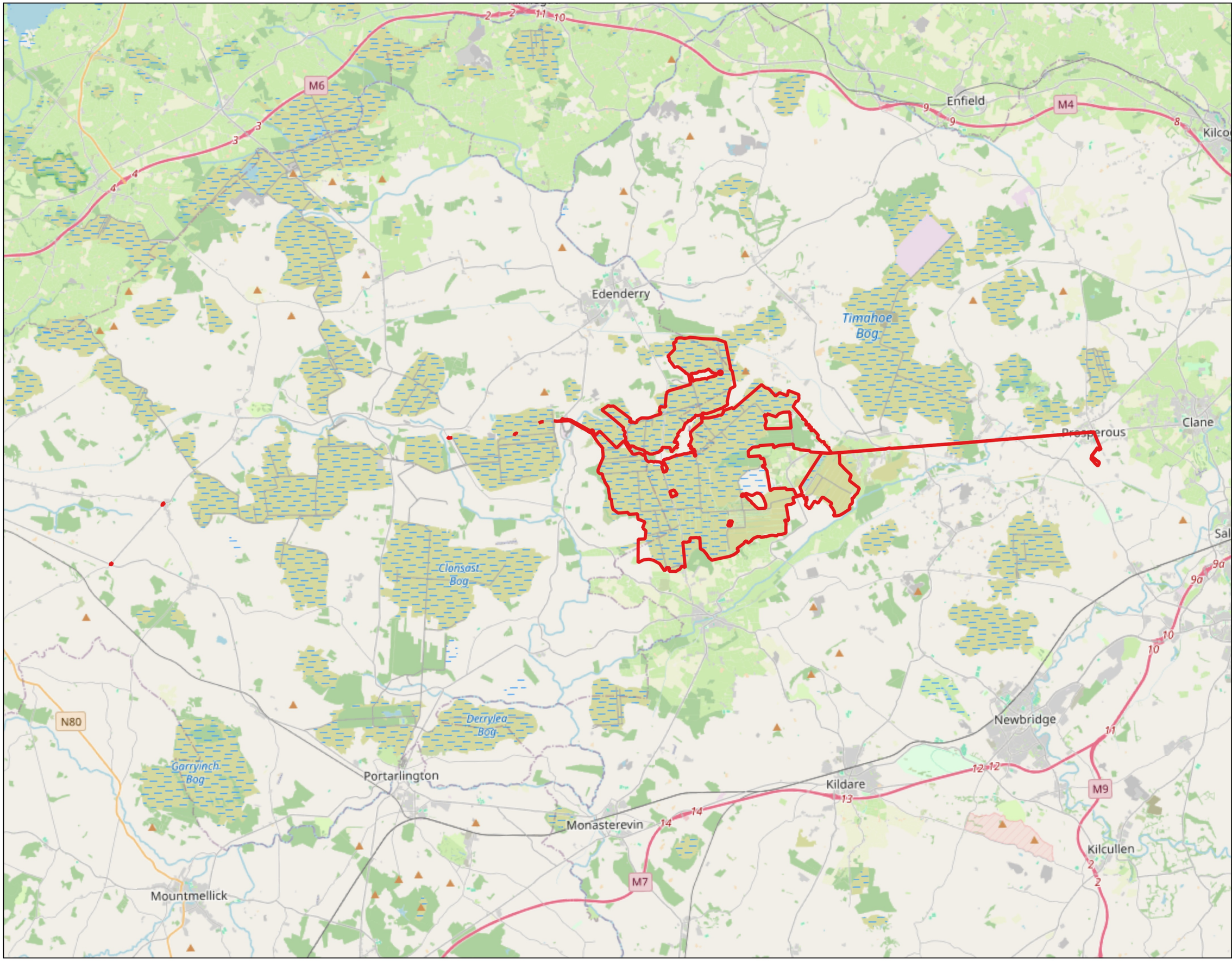
18	665151	724290	220	70.218	290.218	952.159
19	663527	724680	200	75.403	275.403	903.553
20	663228	725279	200	70.488	270.488	887.428
21	664020	725419	220	69.697	289.697	950.449
22	663076	726129	200	68.964	268.964	882.428
23	665568	728222	200	68.120	268.12	879.659
24	664901	727516	220	72.190	292.19	958.629
25	664557	726842	220	70.301	290.301	952.431
26	663924	727245	200	71.804	271.804	891.745
27	666654	728789	200	73.798	273.798	898.287
28	667453	728387	200	73.808	273.808	898.320
29	667535	729311	200	72.416	272.416	893.753
30	667317	730151	200	75.278	275.278	903.143
31	666424	729892	200	74.219	274.219	899.669
32	665913	730395	200	74.117	274.117	899.334
33	668791	723754	220	73.086	293.086	961.568
34	668234	724133	220	72.474	292.474	959.560
35	667696	724705	220	71.653	291.653	956.867
36	667700	725703	220	72.074	292.074	958.248
37	668428	725406	220	71.935	291.935	957.792
38	666932	725059	220	68.515	288.515	946.572
39	666484	725794	220	69.344	289.344	949.291
40	667297	726306	220	71.946	291.946	957.828
41	666699	726708	220	71.436	291.436	956.155
42	667233	727483	220	71.324	291.324	955.787
43	668319	727108	220	74.938	294.938	967.644
44	668927	727701	220	75.084	295.084	968.123
45	668094	727874	220	74.120	294.12	964.961
46	669561	728266	200	74.864	274.864	901.785

Modern wind turbines from turbine manufacturers have evolved to share a common appearance and other design characteristics, with minor cosmetic differences differentiating one from another. The wind turbines that will be installed on the Proposed Wind Farm will be conventional three-blade turbines, that will be geared so the rotors of all turbines always rotate in the same direction.

The Proposed Turbines will be multi-ply coated to protect against corrosion. It is proposed that the turbines would be of a white, off-white or light grey colour to blend into the sky background. This minimises visual impact as recommended by the following guidelines on wind energy development:

- Wind Farm Development – Guidelines for Planning Authorities, (DoEHLG, 2006) (WEDG 2006)
- Draft Revised Wind Energy Development Guidelines (DoEHLG, 2019) (Draft WEDG 2019)
- The Influence of Colour on the Aesthetics of Wind Turbine Generators (ETSU, 1999)

As outlined in Section 16.4.1 above, the IAA recommended that an aeronautical obstacle warning light scheme be confirmed at the commencement of the construction phase and location/dimension details to be provided as a condition of consent. The Applicant is committed to including the most appropriate lighting scheme as is required by the IAA at the time of construction. Further engagement will be held with the IAA at the time of construction to inform appropriate lighting requirements.



Map Legend

- Aviation Study Area

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Drawing Title: Aviation Study Area

Project Title: Ballydermot Wind Farm, Co. Offaly and Co. Kildare

Drawn By	Checked By
CJ	MW
Project No.	Drawing No.
250708	Figure 16-1
Scale	Date
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16.6.2 Airspace Analysis

The methodology employed for airspace analysis is that of desk-top analysis. National and Regional regulations are referred to, along with expert experience of the author in order to inform the content of this assessment and associated appendices.

- Scoping and Consultation (Section 16.4).
- Review of guidelines and legalisation listed in Section 16.5.
- Review of existing baseline environment for aviation, including nationally restricted airspace (Section 16.7.2.1), low flying training areas (16.7.2.2), radar (16.7.3), aerodrome safeguarding (Section 16.7.4), private airstrips (Section 16.7.5) and the planning history of the area relating to other wind farms and associated aviation designations (Section 16.7.6)

Refer to Appendix 16-1 for further detail on airspace analysis.

Restricted Airspace

The Aviation Study Area and turbine layout was plotted against the published lateral and vertical limits of MOA4 and EI-R16 (Sectors C and H) as set out in the AIP Ireland[18]. Where the Aviation Study Area is confirmed to lie within a Military Operating Area or restricted area, the assessment considered:

- The nature of military activity typically associated with the airspace (e.g. low-level flying training, weapons training, general handling) where available;
- Whether the Proposed Turbines would constitute a physical hazard to low-level military flight, having regard to typical operating heights; and
- Any mitigation or operational restriction proposed in response to Air Corps feedback.

Draft Position Paper

The Draft Position Paper was utilised to check the Proposed Turbine layout against the areas of objection identified in the Draft Position Paper, insofar as that document, or any superseding statement of DoD policy, remains available and current. Further detail on the Draft Position Paper is outlined in Section 16.5.5 above.

Where the Aviation Study Area is confirmed to lie within areas mapped by the Draft Position Paper, the assessment considered:

- The nature of aviation activity typically associated with the airspace where available;
- Whether the Proposed Turbines would constitute a physical hazard aviation activities; and
- Any mitigation or operational restriction proposed in response to DoD feedback.

Radar Impact Assessment

In 2025 Ai Bridges were commissioned on behalf of the Applicant to carry out a Radar Impact Assessment, which forms Appendix 16-3. Potential PSR impact by moving wind farm turbine blades is considered to be determined, in general, by whether or not the radar can 'see' the wind farm. This assessment is known as a Radar Line of Sight (RLoS) assessment and a study to determine the probability of the radar having an unobstructed view of a wind farm has been completed. Radar

[18] https://www.airnav.ie/air-traffic-management/aeronautical-information-management

antenna angles etc are considered along with the generality of the terrain profile to determine a RLoS picture.

A review of the existing radar landscape and aviation airspace has been undertaken within Appendix 16-3 to aid the radar analysis. All civil radar surveillance sensors have been assessed. The radar sensors at Forrest Little, Dublin3, Tooman Co. Dublin and Woodcock Hill, Co. Clare were selected for a more detailed assessment. In addition to the four civil radar sensors, the Irish Air Corps' radar installation at Casement has also been assessed.

Radar Coverage Plots have been generated to show the level of service coverage from each radar station at various altitudes. In Section 2 of Appendix 16-3, the radar service coverage maps show that the airspace above the Proposed Turbines has overlapping coverage from multiple radar stations. RLoS path profiles between the radar stations and the Proposed Turbines have also been generated and provided in Section 3 of Appendix 16-3. These RLoS profiles are used to assess if the Proposed Turbines would be detectable by the radar stations. Any potential impact due to the Proposed Turbines would be informed by the results of these analyses.

EUROCONTROL, the European Organization for the Safety of Air Navigation, have published guidelines to be used when assessing the impact of wind turbines on radar surveillance sensors (PSR and SSR radar systems). By using the information from the radar coverage service coverage plots and the RLoS profiles, the applicable Radar Assessment Zone has been determined for each of the Proposed Turbines.

Further detail on the Radar Impact Assessment is in Section 16.9.3.3 and Section 16.9.3.4, and within Appendix 16-3.

Aerodrome Safeguarding

The purpose of the aerodrome safeguarding assessment is to determine whether the Proposed Wind Farm would:

- Penetrate any obstacle limitation surface (OLS) associated with a nearby aerodrome, as defined in accordance with ICAO Annex 14[19];
- Conflict with published instrument flight procedures (IFPs), minimum safe altitudes, or low-flying training routes;
- Give rise to physical or electromagnetic (radar/navigation aid) obstruction within State or civil safeguarded airspace, including MOA4 and EI-R16; and
- Require registration as an obstacle to air navigation under the relevant Irish Aviation Authority Orders.

The position of the Proposed Turbines and associated tip height (i.e., 200m and 220m) has been plotted in three dimensions against the ICAO Annex 14 OLS (including, as relevant to the aerodrome type and runway classification, the Outer Horizontal Surface (OHS), Conical Surface, Approach Surface, Take-off Climb Surface and Transitional Surfaces)[20,21]. Where any part of a turbine (including blade tip in any rotational position) is found to penetrate a defined surface, this will be reported as a potential physical obstruction requiring resolution with the relevant aerodrome operator and/or the IAA.

[19] *International Civil Aviation Organisation (ICAO) Annex 14 to the Convention on International Civil Aviation, Volume I – Aerodrome Design and Operations.*
[20] *Ibid.*
[21] *IAA (En Route Obstacles to Air Navigation) Order 1999 (S.I. No. 423 of 1999). Available at: https://www.iaa.ie/publications/docs/default-source/publications/legislation/statutory-instruments-(orders)/irish-aviation-authority-(en-route-obstacles-to-air-navigation)-order-1999*

Instrument Flight Procedure

In 2026, following consultation with the Department of Defence and Irish Air Corp, Sagentia was appointed on behalf of the Applicant to carry out an IFP Safeguarding assessment, which forms Appendix 16-4. IFP Safeguarding, like the OLS, above, is a series of complex surfaces that define the Protection Areas associated with Instrument Approach Procedures (IAPs). IAPs are a defined series of 'paths' in the sky around an airport catering for IFR flight. Aircraft fly these 'paths' or procedures which culminate in a position close to the runway at which point pilots decide if they have the required visual references to land. These procedures give pilots the confidence of a fully-protected environment in which to make an approach in poor weather. The procedures are designed and assessed (if necessary) by highly trained people, using very specialised software.

Unless the obstacle lies within a defined 'safeguarded area', 'sterile area', or a 'Building Restricted Area' the technical navigational aids at an airport will be unaffected by an obstacle.

The OLS of an airport considered under Physical Safeguarding regularly has one or more of its protective surfaces penetrated over the years by obstacles such as new tall buildings etc. On occasion, wind farms are proposed near airports which would penetrate one or more protective surface, and this would require consultation with the airport, as well as some form of agreed mitigation put in place.

The OLS at a large airport would have as its 'final' surface extending away from the more complex surfaces that are close to the runway, a surface known as the 'Outer Horizontal Surface' (OHS). This would be 150m high and extend out to 15,000m (15km).

16.7 Baseline Environment

16.7.1 Airspace

The Proposed Wind Farm site (i.e., the part of the Project Site containing the Proposed Wind Farm and Proposed Onsite Substation) is located within the Shannon Flight Information Region (FIR)[22] which is regulated by the IAA and AirNav Ireland. An FIR is a specified region of airspace in which a flight information service, an alerting service, which provides coordination for distress, search and rescue, and an area control centre are provided. The Shannon FIR is the FIR which covers the airspace of the Republic of Ireland.

Airspace can be said to be either Controlled or Uncontrolled. Airspace is classed in general according to what flying activity is taking place in it and the extent of control that ATC need to exercise in order to safely enable that activity.

Airspace is divided from Class A to Class G with various Countries including or omitting classes as their needs dictate. The Republic of Ireland has Classes A, C and G noted in the Aeronautical Information Publication (AIP).

- Class A Airspace is for use by IFR flights only; Used mainly by the Airlines, Cargo flights or Business jets.
- Class C Airspace may be used by both IFR and VFR. However, VFR flight is subject to adherence to ATC instructions; Some pilots prefer to fly in airspace not controlled by ATC.
- Class G Airspace is for use by both IFR and VFR flights. The airspace is not controlled by ATC; however, they are generally available to advise flights, monitor aircraft should emergencies arise, and provide general flight assistance, subject to controller workload. Pilots are allowed to fly with no notification to ATC or be in any

[22] https://metar-taf.com/fir/EISN-Shannon

kind of radio contact. Whilst IFR flight is possible, the potential lack of ATC oversight when flying in cloud in Class G airspace is not ideal and therefore IFR flight in uncontrolled airspace is not considered the norm and is not undertaken lightly

In addition to the Classes of airspace, two different rules under which any aircraft flies must also be considered. A flight must be conducted under one of these rules:

- Visual Flight Rules (VFR); or
- Instrument Flight Rules (IFR).

VFR flight is conducted when the pilot is controlling the aircraft whilst looking through the windscreen and IFR flight is accomplished while operating the aircraft with reference to the instruments in the cockpit and ground based electronic navigation aids such as ATC i.e. IFR flight is conducted in accordance with rules that must assume the pilot cannot see anything outside. Pilots must be trained and licenced. However, additional training must be undertaken, along with licence endorsements, in order to fly in accordance with IFR.

VFR flight is undertaken in Visual Meteorological Conditions (VMC) only. This is when weather conditions are such that visual flight is possible i.e. the aircraft is able to be operated without having to enter flying cloud.

IFR flight is possible in Instrument Meteorological Conditions (IMC). This is when weather conditions are such that visual flight is not possible.

A VFR pilot may only fly in VMC but an IFR pilot may fly in both VMC and IMC.

VFR and IFR are the rules by which an aircraft is flown, whilst VMC and IMC are the conditions in which the aircraft is flown. Different minimum heights obstacle criteria apply to the two different flight rules, as presented in Table 16-5.

Table 16-5: Different minimum heights obstacle criteria

Flight Rule	Horizontal Distance from Obstacle (feet)	Vertical Distance from Obstacle (feet)
VFR	500	500
IFR	8	1000

Airspace has both lateral and vertical limits. The lower limit is generally a value given as AMSL such as 5,000 feet AMSL. The upper limit may also be such a figure. However, it is equally probable that the figure is given as a Flight Level (FL).

The Aviation Study Area is located under Class G (uncontrolled) airspace.

16.7.2 Designations

Aviation designations within the Aviation Study Area relating to the Proposed Turbines encompasses:

- Restricted airspace (i.e., MOA4, EI-R16 (C and H Sectors)) above the Aviation Study Area;
- Overlap of the Aviation Study Area with the Edenderry/Allenwood/Rathangan Low Flying Training Area (LFTA);
- Proximity to the Casement Aerodrome (i.e., 20 nautical miles (nm))

As noted in Section 16.6.1, the Aviation Study Area contains all structures at height (i.e., the Proposed Turbines, Proposed Onsite Substation, Proposed Offsite Substation, 2 no. met masts, relay mast, and 2 no. telecom towers). It has been considered that structures at height with the potential to affect aviation are those in excess of 45m, i.e., those which require notification to the IAA prior to construction.

The Proposed Onsite Substation, Proposed Offsite Substation, 2 no. met masts, relay mast, and 2 no. telecom towers, along with the Proposed Construction Haul Routes, and all Proposed Wind Farm infrastructure (not including the Proposed Turbines) have been screened out of this assessment as the proposed heights will not result in any identifiable effects on aviation.

The interaction with the aviation constraints by the Proposed Turbines has been largely defined by the Draft Position Paper. The Draft Position Paper was produced in 2014 in response to an internal meeting of the Air Corps at Casement Aerodrome. Further detail relating to the Draft Position Paper are set out in Section 16.5.5 above.

16.7.2.1 Restricted Airspaces

The entirety of the Aviation Study Area is located within MOA 4 and beneath EI-R16 (Sectors C and H). It is currently not known how the Air Corps view the limitation of '*The area contained within Restricted Area EI-R16...*' as stated in the Draft Position Paper as it is a piece of airspace which has a lower limit, or 'base', of between 1,000 feet AMSL and 4,500 feet AMSL which extends upwards to considerable altitudes (refer to Plate 16-1 and 16-2 below). The Aviation Study Area lies within MOA 4 and, as defined in Section 16.6.1 and extends to the lower limit of this airspace.

EI-R16

The R (Restricted) 16 area has different sections, designated B through H and have the following vertical limits:

- EI R16 B 1000 feet AMSL to FL240[23]
- EI R16 C 1500 feet AMSL to FL240
- EI R16 D 1500 feet AMSL to 4500ft AMSL
- EI R16 E 2500 feet AMSL to FL240
- EI R16 F 2500 feet AMSL to FL240
- EI R16 G 4500 feet AMSL to FL240
- EI R16 H 2500 feet AMSL to FL240

Penetration of EI-R16 is possible by civil aircraft provided prior permission obtained from, and subject to compliance with any conditions and instructions issued by Military Air Traffic Service of Casement Aerodrome.

No Proposed Turbine tip heights exceed the lower limit of 1,000ft AMSL for EI-R16 airspace (maximum Proposed Turbine height being 968 ft ASML as per Table 16-4) as the lower limit for EI-R16C and EI-R16H airspace is 1,500ft AMSL and 2,500ft AMSL, respectively. Therefore, there will be no penetration of the Restricted airspace from the Proposed Turbines.

Military Operational Areas

The entirety of the Project Site is located within MOA 4. The vertical limits of this airspace extend from the Surface (SFC) to FL450 (approximately 45,000 feet AMSL). Airspace has both lateral and vertical limits. The lower limit is generally a value given as AMSL such as 5000 feet AMSL. The upper limit may also be such a figure. However, it is equally probable that the figure is given as a Flight Level (FL);

[23] *FL250 equates to approximate 24,000ft ASML*

i.e., a figure that approximates AMSL but is referenced against an internationally used common pressure setting.

Operationally, this airspace is available to be flown within by civilian aircraft. Only once the aircraft wishes to climb above 4,500 feet AMSL is military ATC to be contacted and thereafter operated in accordance with any instructions they deem necessary.

The limits of the above identified airspaces are:

- MOA 4 - SFC to FL450 (approx. 45,000 feet AMSL);
- EI-R16C – 1500 feet AMSL to FL240 (approx. 24,000 feet AMSL): and
- EI-R16H – 2500 feet AMSL to FL240 (approx. 24,000 feet AMSL)

The conditions and restrictions under which an aircraft must fly if requiring flight within the MOA is detailed in the Irish AIP ENR (en-route) 5.2 Military Exercise and training Areas[24]. Penetration of the airspace is possible at the pilots own discretion within altitudes up to 4,500 feet AMSL. Should the pilot wish to fly higher than 4,500 feet AMSL then this is subject to requesting permission and adherence to instructions from military ATC at Casement Aerodrome.

Flight above 4,500 feet AMSL remains at the discretion of military ATC and therefore flight at this altitude or above may be denied due to operational reasons. Pilots are cognisant that they are in an airspace that has been set aside predominantly for military activities and, in essence, a civilian pilot operates in this airspace at their own discretion and therefore at their own risk. Both civilian and military aircraft will employ the principle of see-and-avoid relating to both obstacles and other aircraft. The pilot will simply be looking out of the windows of the aircraft in order to spot obstacles and other aircraft. This technique is a core foundation of visual flight.

The majority of military flying in aircraft, such as those operated by the Irish Air Corps, is done under VFR. This allows general aircraft handling training and low altitude flight, both of which require the see and avoid technique. Military aircraft would be sharing the airspace within the greater MOA with civilian aircraft being flown in training or pleasure roles.

VFR flight, both military and civilian, requires a strict adherence and discipline of a continuous visual vigilance to avoid other aircraft and obstacles. Controlled IFR flight penetration is coordinated by civil Air Traffic Service. As presented in Table 16-5, a VFR flight is required to pass at least 500 feet horizontally from an obstacle. If this is not possible, or unwanted, then the aircraft must pass at least 500 feet above the obstacle.

Significant effects of the presence of a wind farm or other such structure within the wider airspace include the potential for collision with a turbine and airspace limitations that require aircraft to operate in airspace in which they do not want to fly or, more importantly, in airspace in which they are not entitled to fly. This may require an aircraft to divert around a wind farm rather than fly across it.

An example would be a wind farm with turbines of a height of 900 feet AMSL. Should a VFR flight wish to pass over them then the aircraft would be required to fly at an altitude of 1,400 feet (900+500). Should the airspace above have a lower limit or 'base' of 1,500 feet AMSL then the aircraft could traverse the wind farm without needing to enter the airspace above.

The same methodology would be applied to an IFR flight, however, in this case a value of 1,000 feet would be added to the turbine height. The resultant required altitude of 1,900 feet would, in this example, require the aircraft to enter airspace it may not wish to, thereby requiring the aircraft to fly around a wind farm.

[24] https://www.airnav.ie/AIRAC_MAY_2026/2026-05-14-AIRAC/html/eAIP/EI-ENR-5.2-en-IE.html

It is normal for an aircraft to be instructed to remain clear of military restricted airspace whilst military flying or testing is in progress. A pilot must be able to navigate away from such airspace if required. Very often, formal agreements exist between military and civilian ATS units which detail when civilian ATC may use the airspace under a 'Flexible Use of Airspace' policy. This is prevalent worldwide in order to use airspace efficiently.

Unintentional collisions with high structures are very rare due to the high degree of regulation applied to the aviation industry. Obstacles on, or in the vicinity of, aerodromes where precisely-designed procedures for the use of IFR flights are in use, are strictly published in documentation and surveyed regularly. This gives pilots flying in poor weather conditions the confidence of a properly documented and surveyed obstacle field.

Other airspace, including Class G, as defined in Section 16.7.1 above, have the same criteria applied to obstacles but the manner in which the VFR flight interacts with the obstacles is very different. VFR pilots practice a technique known as 'see and avoid'.

The airspace in which the Proposed Wind Farm lays is not classed according to common convention but is a Special Use Airspace (SUA). This is common when airspace has been set aside for military, research or other specialised use. The essence of this type of airspace is it's restricted or conditional use nature. Very often this airspace can be used by non-participatory flights but will in all probability be subject to certain conditions of use or acceptance of a higher risk.

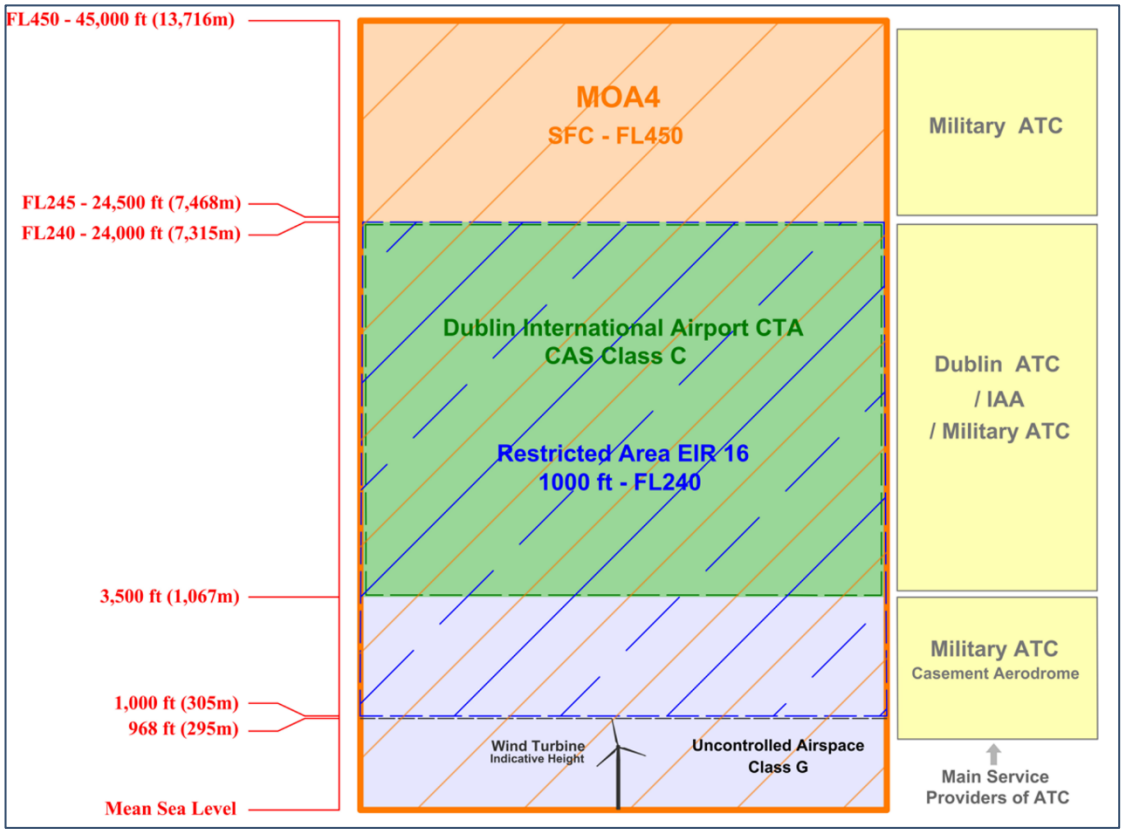


Plate 16-1: Restricted Airspace Vertical Extents

16.7.2.2 Low Flying Training Areas

The Proposed Wind Farm is located within a large portion of an area identified as Edenderry/Allenwood/Rathangan LFTA.

The Irish Air Corps in EIME AD 2.24 and AD 2-23[25] states that '*Low level flight training is conducted in the IAC (sic) Low Flying Training Area (LFTA), situated in the Wicklow Mountains*'

This low-level training route starts at Manor Kilbride, County Wicklow and ends at Blessington Lakes. This route is approximately 18 NM (33.3km) to the east of the Proposed Turbines and therefore is of no potential for impact on the LFTA in the Wicklow Mountains. No mention is made of any other low flying area/s within the MOA within EIME AD 2.24 and 2-23.

The Draft Position Paper notes several LFTAs.

- Low flying training areas within MOA 4 in the areas of:
  - Blessington
  - Edenderry/Allenwood/Rathangan
  - Kilmeague
- Low flying training area West:
  - LFTA WEST

Through detailed review and consultation with the DoD, IAA, and Irish Air Corp, it has been established that the Edenderry/Allenwood/Rathangan LFTA has been in use primarily for military training of helicopters below 500ft (see Section 16.4.2 above).

The LFTAs are depicted at Annex A in the Draft Position Paper. The LFTAs are not formally regulated airspaces but have been 'identified' as a result of an internal Air Corps process. The areas are of unknown precise vertical and lateral dimensions and the extent and type of flight within these areas is difficult to ascertain.

However, within EIME AD 2-24[26] the following is noted:

'9. Low Flying Training

a. Low level flight training is conducted in the IAC Low Flying Training Area (LFTA), situated in the Wicklow Mountains.

b. The LFTA consists of two (2) routes known as EAGLE and FALCON. These routes lie wholly within Civil Class G airspace. The standard route is for aircraft to initially fly FALCON and then fly EAGLE (i.e. clockwise) at 500ft AGL. This will help create awareness for any civilian operators in the area of the military activity and allows for a route reconnaissance.

c. Both routes are then flown at 250 ft AGL, terminating over the southern part of BLESSINGTON LAKES. It takes approximately 8 minutes to fly a route during which time, the aircraft will have no radio communications with ATS.'

The above text indicates that the de facto low level flight training areas are situated within the Wicklow Mountains. No mention is made of the Edenderry/Allenwood/Rathangan LFTA or what activities may take place in the area.

[25] https://www.military.ie/en/public-information/aeronautical-data/
[26] https://www.military.ie/media/dnmf2fxu/eime-aerodrome-information_190326_amdt-0126_version-3.pdf?usp=drive_link

However, the importance of low flying training to the Air Corps must be acknowledged. Low flying is a fundamental and core skill of military aviators worldwide.

Low-level flight and wind farms are incompatible within the same segment of airspace. This statement should not be confused with the term Airspace used to describe a large defined area, but rather the immediate surroundings of a localised structure or group of structures.

During discussions with the DoD it was confirmed that military low-level flight in the Aviation Study Area would potentially be conducted at altitudes of 500 feet AGL and, in some instances, at 250 feet AGL.

16.7.3 Radar

The Aviation Study Area is located outside the controlled airspace of Dublin Airport's Control Zone (CTR) which extends from the SFC to 5,000 ft AMSL but situated under a control area designated "DUBLIN CTA FL245 /4500". This control area states that airspace is above ground with a base of 4,500 ft AMSL and extending up to 24,500 ft in Class C Controlled Airspace (see Plate 16-1 below).

The Aviation Study Area would be below the altitude of the controlled airspace (CTA) and therefore, would be located in uncontrolled Class G airspace. In Class G airspace, pilots must maintain separation from other aircraft and obstacles using the "see and avoid" principle, and pilots are ultimately responsible for their own terrain and obstacle clearance. This is achieved by prudent planning (e.g. using published aviation charts/ instructions).

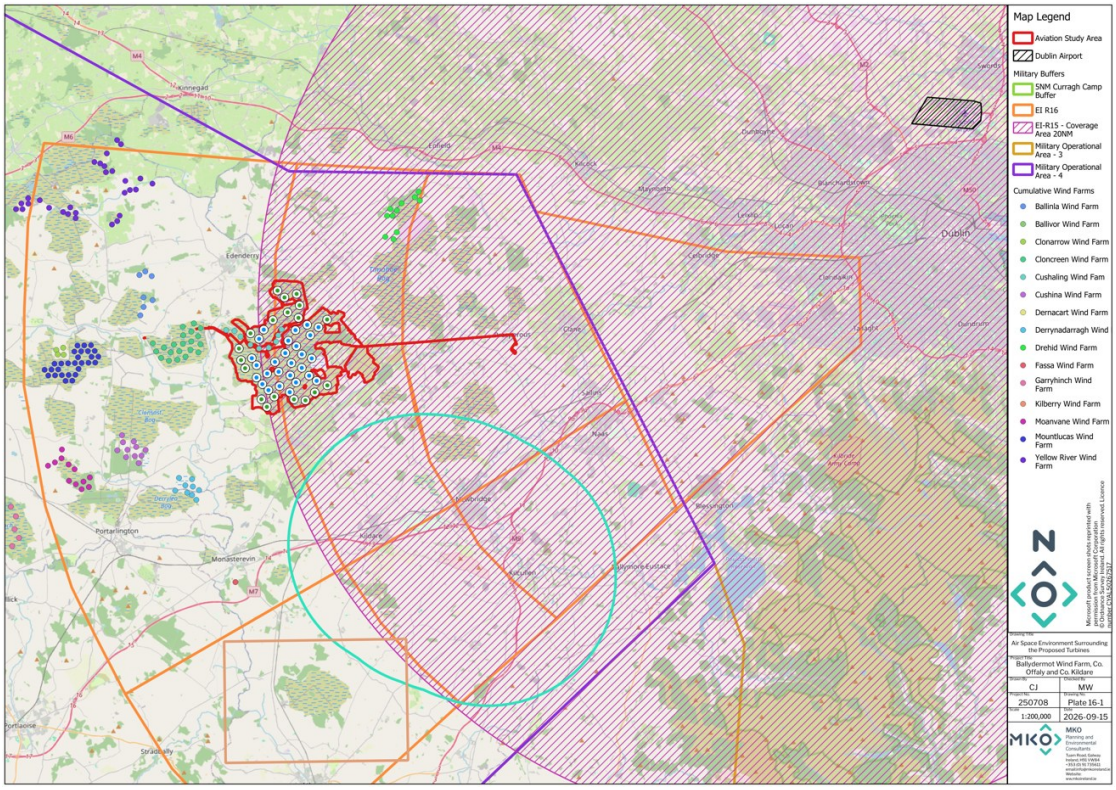


Plate 16-2: Air Space Environment Surrounding the Proposed Turbines

AirNav Ireland operate ten radar stations (PSR and SSR) that are installed at several locations throughout the country. In addition to the ten radar stations operated by AirNav, the Irish Air Corps (IAC) have an Airport Surveillance Radar (ASR) radar station located at Casement Aerodrome. A description of each of the nearest radar stations serving the airspace over the Aviation Study Area (Forrest Little, Dublin 3, Tooman and Casement) is provided in Section 2.1.1 to 2.1.4 of Appendix 16-3.

16.7.3.1 Primary Surveillance Radar

Unidentified aircraft such as Air Corp aircraft, which may not have transponders, may cause potentially unsafe situations by penetrating controlled airspace. A PSR gives the ATC an opportunity to track these infringing aircraft and, if necessary, move aircraft under their control, out of the way.

PSR utilises an old technology of a pulse of radio energy transmitted from a revolving antenna which are frequently seen on an airfield. The radio energy is transmitted outwards at the speed of light until it strikes an object at which moment it is reflected back to the antenna. Knowing the speed of light, and what time it took for the pulse to be received back at the antenna, the distance of the object which reflected the pulse can be calculated. Knowing the position of the antenna, the objects direction from the antenna can be shown. Subsequent pulses and reflections show the objects direction of movement.

PSR can be affected by rotating wind turbine blades. The moving blades are very often interpreted by PSR radar processors as moving targets and are presented as false targets or 'clutter' on a radar screen. Most modern-day ATC radar is SSR, however the PSR still provides ATC with, not only a back-up should the SSR fail, but also a means of monitoring unidentified aircraft.

Potential PSR impact by moving turbine blades is considered to be determined, in general, by whether or not the radar can 'see' an operational wind farm. This assessment is known as a Radar Line of Sight (RLoS) assessment and is a study to determine the probability of the radar having an unobstructed view of a wind farm. Although various factors may have influence on the results it is generally taken that if the RLoS assessment shows the radar has 'sight' of the Proposed Turbines, then there will be an associated impact on radar. Appendix 16-3 details the RLoS results.

A very important use of PSR is in an Air Defence (AD) application. Modern, long range PSRs positioned strategically around a country can provide a real-time situational picture of potentially unfriendly aircraft and provide the military with early warning. Ireland does not currently have AD radars but this may change in the near future.

There are three PSR radar stations providing radar cover in the airspace in the vicinity of the Aviation Study Area. The PSR radar sensors at Dublin3 and Tooman are used for both civil and military aircraft tracking and monitoring. The PSR radar at Casement is used solely for military aircraft tracking and monitoring.

16.7.3.2 Secondary Surveillance Radar

SSR, does not rely on a reflected signal from the object but relies on a cooperative electronic arrangement. An interrogation pulse is transmitted to which a special piece of equipment installed on an aircraft, known as a transponder, replies. This reply to the radar antenna can carry different types of information about the aircraft including its altitude and flight identification. This, in general, is the type of radar used by ATC to control the worlds air traffic to and from airports.

Unidentified aircraft, as introduced above, which may not have transponders, may cause potentially unsafe situations by penetrating controlled airspace. A PSR gives ATC an opportunity to track these infringing aircraft and, if necessary, move aircraft under their control, out of the way.

EUROCONTROL Guidelines states that an SSR radar should be technically safeguarded against large structures within 16km of the antenna. Given that the closest SSR radar antenna to the Aviation Study Area is at Dublin Airport, approximately 45.3km (25NM), any impact on radar coverage is not expected to be significant.

There are three SSR radar stations providing radar cover in the airspace in the vicinity of the Aviation Study Area. The SSR radar sensors at all three locations (i.e., Forest Little, Dublin3 and Tooman) are used for both civil and military aircraft tracking and monitoring.

16.7.3.3 Meteorological Radar

Meteorological radars are also vulnerable to moving turbine blades. The moving blades reflections are received by the radar and can be mistakenly displayed as severe weather clouds. In the WMO paper from their Fifteenth session held in Helsinki in September 2010[27], it was stated that '*The range between wind turbines and the weather radar can be used to generally describe the impact on radar data quality and also used to provide a mitigation strategy for cooperative siting of weather radars and wind turbines'*.

See Table 16-6 below for further detail on the ranges and associated guidelines as defined in the WMO paper from their Fifteenth session held in Helsinki in September 2010.

In the WMOs paper from their Fifteenth session held in Helsinki in September 2010[28], it was stated that '*The range between wind turbines and the weather radar can be used to generally describe the impact on radar data quality and also used to provide a mitigation strategy for cooperative siting of weather radars and wind turbines'*.

Various ranges, as well as suggested courses of action for developers to take, were tabled, this table is provided below as Table 16-6.

Table 16-6: General Guidelines on Zone of Impact from Radar and Wind Farms. Source: WMO

Range (km)	Potential Impact	Guidelines
0-5 km	The wind turbine may completely or partially block the radar and can result in significant loss of data that cannot be recovered.	Definite Impact Zone: Wind turbines should not be installed in this zone.
5-20km	Multiple reflection and multi-path scattering can create false echoes and multiple elevations. Doppler velocity measurements may be compromised by rotating blades.	Moderate Impact Zone: Terrain effects will be a factor. Analysis and consultation is recommended. Re-orientation or re-siting of individual turbines may reduce or mitigate the impact.
20-45km	Generally visible on the lowest elevation scan; ground-like echoes will be observed in reflectivity; Doppler velocities may be compromised by rotating blades.	Low Impact Zone: Notification is recommended.
>45km	Generally not observed in the data but can be visible due to propagation conditions.	Intermittent Impact Zone Notification is recommended.

The nearest meteorological radar to the Aviation Study Area is Casement Aerodrome. As previously stated, the Proposed Turbines are 20nm (i.e., c. 37km) from the Casement Aerodrome. Therefore, the Proposed Turbines fall into the range of 20 – 45km, i.e., the 'Low Impact Zone' where 'Notification is recommended'.

The next nearest meteorological radar to the Aviation Study Area is Dublin Airport. The weather radar at Dublin Airport is approximately 45.3km from the Proposed Turbines. Therefore, the Proposed

[27] https://library.wmo.int/records/item/32298-commission-for-instruments-and-methods-of-observation-fifteenth-session#.Xir7MTJKiUk
[28] https://library.wmo.int/records/item/32298-commission-for-instruments-and-methods-of-observation-fifteenth-session#.Xir7MTJKiUk

Turbines fall into the range of >45km, i.e., the 'Intermittent Impact Zone' where 'Notification is recommended'.

16.7.4 Aerodrome Safeguarding

The OLS at a large airport such as Dublin Airport and Casement Aerodrome would have as its 'final' surface extending away from the more complex surfaces that are close to the runway, a surface known as the 'Outer Horizontal Surface' (OHS). This would be 150m high and extend out to 15,000m (15km).

IFR and VFR flight requires Technical, Physical and Procedure safeguarding to be carried out and, thereafter, maintained at airports. The following elements make up the safeguarded environment at an airport:

Technical Safeguarding – The navigational equipment installed on or close to an airport which enables IFR flights to land in poor weather. This includes Instrument Landing Systems (ILS) and various navigational beacons such as Very High Frequency Omni-Range (VOR), Non-Directional beacons (NDB) and Distance Measuring Equipment (DME).

Physical Safeguarding – This refers to a complex series of invisible sloping and horizontal surfaces that emanate from a runway, known as the Obstacle Limitation Surface (OLS). This series of surfaces protect the immediate flying vicinity of an airport from the proliferation of obstacles near modern airports. Due to the requirement to inform the airport of any planned obstacle within this area, the airport can maintain a surveyed record of the 'obstacle field' within its immediate vicinity. Generally, the impact and mitigation requirement become less as the distance from the airport increases. Obstacles may not be allowed very close to the runway or within its direct take-off and landing paths (although such obstacles are generally on the airport itself or within the airport boundary). Obstacles that are proposed further away usually require notification within the Regulators obstacle database and the requirement of an Approved Lighting Scheme. Impact to flight operations by distant obstacles is usually minimal.

Unless the obstacle lies within a defined 'safeguarded area', 'sterile area', or a 'Building Restricted Area' the technical navigational aids at an airport will be unaffected by an obstacle. The Aviation Study Area lies well outside of any technically safeguarded area and therefore would not impact any of the navigational aids at Casement Aerodrome which is the nearest airport to have such aids.

The radar installation at Casement Aerodrome is an airfield surveillance radar (ASR) which provides the Surveillance Radar Approach (SRA) system which is used in assisting ATC controllers to guide incoming aircraft to the aerodrome runway.

ASR radar systems such as the one at Casement Aerodrome are typically found at military aerodromes. The ASR supports air traffic controllers, who control aircraft leaving the airways out of, and arriving into Casement Aerodrome. The terminology that is widely encountered and adopted for the ASR type of radar is PSR.

ASR radar systems offer guidance on the horizontal axis, with the pilot controlling the descent based on ATC instructions and altimeter readings.

When Military Radar and Approach Control is provided from Dublin ATCC (Air Traffic Control Centre), the callsign is '*Military Radar*', and when provided by Casement ATC the call sign is '*Baldonnel Radar*'.

Instrument approaches to runways RWY22 and RWY24 are conducted primarily in Civil Class C airspace. Dublin ATC provides a control service until the aircraft is established on final approach. Aircraft are then transferred to the Baldonnel Tower frequency when established on final approach and the ASR provides vectors to the Final Approach Fix (FAF).

With many of the IFP have initial approach altitudes of 2,000 feet AMSL or higher it may be that turbines with a general height of less than 1,000 feet AMSL would not infringe on the 1,000 feet obstacle clearance height required. The complex nature of the protective areas surrounding actual IFPs would require a specialised undertaking for impact (if any) to be determined. An IFP Safeguarding Assessment has completed by Sagentia Aviation. The IFP Safeguarding Assessment is summarised in Section 16.9.3.6 and provided as Appendix 16-4.

Map Legend

- Aviation Study Area
- Proposed Turbines
  - 200
  - 220
- Dublin Airport
- Military Buffers
  - 5NM Curragh Camp Buffer
  - EI R16
  - EI-R15 - Coverage Area 20NM
  - Low Flying Area
  - Military Operational Area - 3
  - Military Operational Area - 4
  - Military Operational Area - 5

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Drawing Title
Airspace Constraints at within the Aviation Study Area

Project Title
Ballydermot Wind Farm, Co. Offaly and Co. Kildare

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Project No.	Drawing No.
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Scale	Date
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16.7.5 Private Airstrip

Private airstrips are prevalent throughout the Republic of Ireland and are set up on an individual basis by private landowners, without requiring an aerodrome licence from the IAA. As such private airstrips fall outside the IAA's regulatory oversight and are not subject to the aerodrome safeguarding requirements that apply to licensed aerodromes, including the preparation of Aerodrome Safeguarding Maps. No private airstrips are identified within the Aviation Study Area. The private airstrip closest to the Aviation Study Area is located approximately 0.7km south of the nearest Proposed Turbine.

Due to the private nature of the airstrip no defined obstacle limitation surface are applicable. Therefore, due to the setback from the Proposed Turbines and the location of this private airstrip within Class G airspace, as set out in Section 16.7.1 above, it is not expected that any impact will occur on the activities at this airstrip as a result of the Proposed Project. Any other private airstrips would be further setback from the Proposed Turbines, and therefore the Proposed Project will not result in any effects on private airstrips. On this basis, private airstrips have not been progressed for assessment in Section 16.9 below.

16.7.6 Aviation and Wind Farms

Structures at height, including bridges, buildings, antennae, powerlines, trees and mountains all constitute obstacles to aviation. An area devoid of obstacles is the preferred scenario for aviation, however this is not a realistic or possible scenario which can be observed. Aviation as an industry is required to adapt to obstacles.

Two existing, operational wind farms are located adjacent to, and within the vicinity of, the Aviation Study Area, i.e., the existing Cloncreen Wind Farm and existing Cushaling Wind Farm. The Aviation Study Area is therefore already located within a recognised obstacle field, published in the relevant aeronautical charts and in the IAA/AirNav Ireland Air Navigation Obstacle Data Set, with which pilots operating in the area are required to be familiar and around which established flight-planning and route-avoidance practices are already applied; i.e., in an area where wind farms are already operational, any flying activity in the area will take into account the routes and minimum heights to be flown in order to legally and safely avoid wind farms.

Obstacles to aircraft exist everywhere, not only en-route, but also in the vicinity of, and within the boundaries of aerodromes. Obstacles are dealt with in aviation by an industry system of notification, lighting and marking as well as procedure design. Obstacles are not necessarily man-made and include trees and high terrain. Furthermore, numerous buildings, and even ATC towers, penetrate the various invisible protective surfaces around a runway. This directly influences flight procedure design.

A flight in accordance with of IFR enjoys the designed-in protection from obstacles when IFP are established at airports. Whilst this arguably contributes to making IFR flight one of the world's safest means of transportation, it confines the IFR flight to very specific routes and manner of operation. This is due to the fact that the entire IFR flight system is based on the premise of being in weather conditions that preclude outside visibility.

The VFR pilot, generally, has a great deal more latitude as to where they fly, and at what altitude. The premise of this manner of operation is that the weather conditions must be such that the pilot is able to see and avoid other aircraft and any obstacles. Navigation during VFR flight is accomplished by visually following or confirming ones position on a map using roads, rivers, terrain features and railway lines.

Obstacle notification by developers provides the IAA with the opportunity to allow the Aeronautical Information System (AIS) to publish both temporary and permanent information regarding obstacles. Should the obstacle be temporary in nature, for example, a crane, a NOTAM (Notice To Airmen) will be issued. This is an electronic means of disseminating information to pilots worldwide. If the structure

is to be a permanent feature, for example, a wind turbine or meteorological mast, the information is published in the Irish AIP. Pilots must be able to have access to both types of information.

The pilots of both VFR and IFR flights are required by the National Regulator to make themselves familiar with their route, airspace they will be flying within, and current NOTAM and IAP information

Obstacles are required to be notified to the IAA with position, height and marking/lighting information.

16.7.6.1 Planning History within Aviation Designations

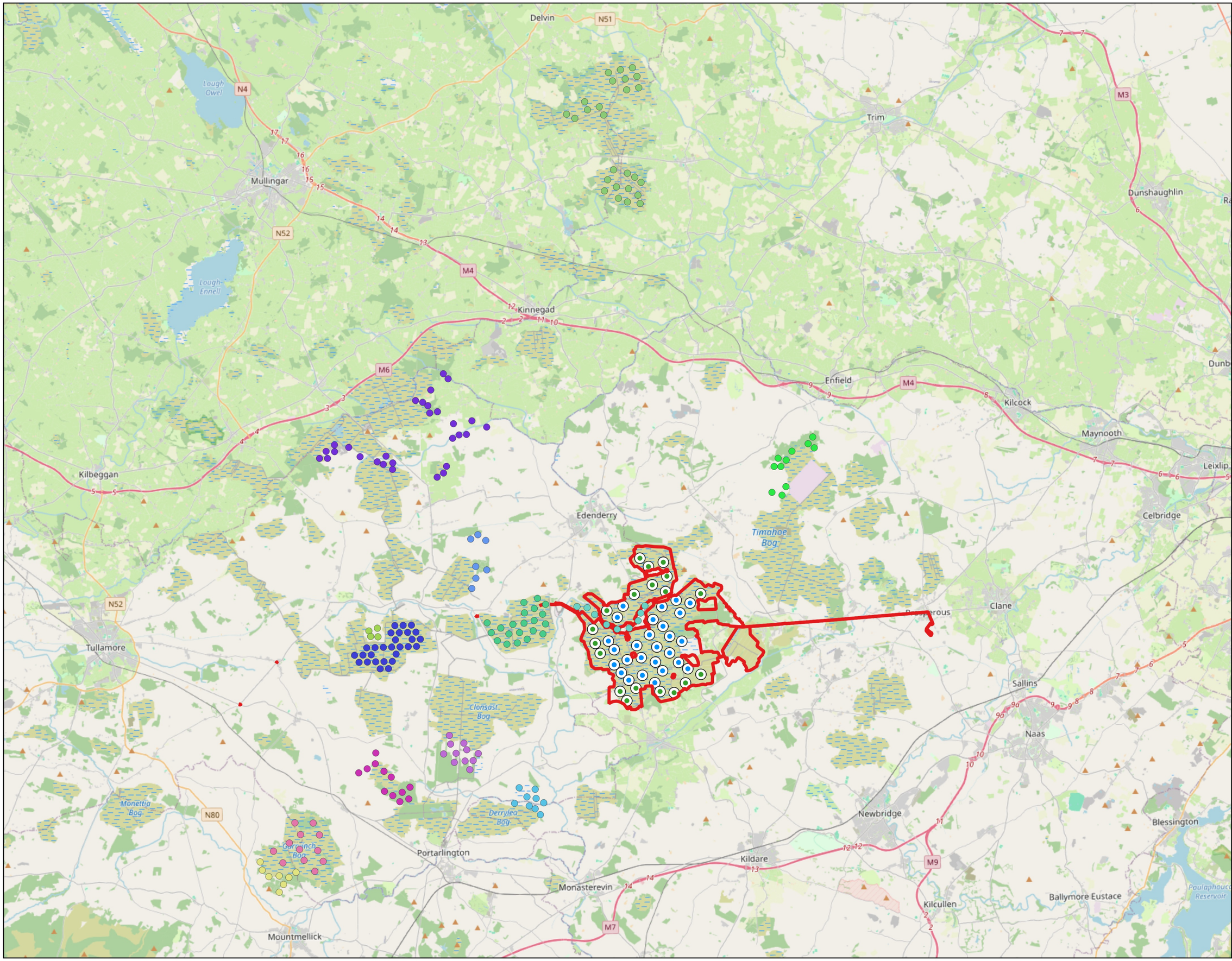
To date, several wind farms have been consented and are operational or under construction within EI-R16 and/or MOA 3 and 4. Additionally, the existing Cushaling Wind Farm and existing Cloncreen Wind Farm are located adjacent to the Aviation Study Area and are 0.7km, and 2.8km away from the nearest Proposed Turbines, respectively. Cushaling Wind Farm is located within the Edenderry/Allenwood/Rathangan Low Flying Training Area and both wind farms are located within MOA4 and EI-R16 restricted airspace. Both wind farms and have been consented, built, and are now operational. Refer to Table 16-7 for details and refer to Section 16.9.5 below for the detailed cumulative assessment of the Proposed Project and other existing, permitted and proposed projects.

Table 16-7: Planning History of Wind Farms within Aviation Restricted Areas

Wind Farm	Within Aviation Constraint			Department of Defence Commentary	Irish Aviation Authority Comment	Local Authority Decision	An Coimisiún Pleanála Decision	Status
	EI-R16	MOA 4	Low Flying Area					
Proposed Wind Farm 46 no. Proposed Turbines; 19 no. at 200m Tip Height, 27 no. at 220m Tip Height	Y	Y	Y	**2021** *The proposed development lies on lands underlying military airspace EI-R16 and MOA 4 within the 20 nautical miles (NM) area of Casement Aerodrome that is protected against tall structures. At its nearest, the wind farm boundary is 16NM from Casement Aerodrome. The approximate center point is 19.5NM from Casement Aerodrome.* *The proposed development lies within the EI-R16 and MOA 4 and the Edenderry/Allenwood/Rathangan Low Flying Training Area. The proposed wind farm would negatively impact Air Corps low level pilot training in the area.* *The routes taken by Air Corps aircraft to multiple training areas in the MOA 4 and MOA 5 pass through the area of the proposed development. The proposed development will reduce aircraft navigability in a large portion the EI-R16 and MOA 4.* *Military and civil aircraft transiting the EI-16 are often instructed by Military Air Traffic Control (ATC) to track underneath the base level of the relevant EI-R16 sector to provide required separation from aircraft above that are flying under Instrument Flight Rules (IFR). This required standard aircraft separation is a minimum of 1000 feet with the base level of restricted airspace above the proposed wind farm at 1500ft above mean sea level (AMSL). The proposed wind farm may impact the ability of aircraft to transit underneath and clear of military restricted airspace to provide IFR separation to traffic above.* *The Scoping document refers to other wind farms already in the Kildare/Offaly area in support of the development. Conversely the cumulative impact of wind farms will negatively affect navigability for civil and military aircraft operating underneath and in the EI-R16 and MOA's.* **2025** *Having consulted with the Military authorities, the Department of Defence wishes to make the following observations:* › *A portion of the proposed Ballydermot Wind Farm lies within 20NM of Casement Aerodrome DVOR/DME.* › *The proposed development also lies within the Edenderry/Allenwood/Rathangan (Lullymore) Air Corps Low Flying Training Area. The cumulative effect of wind turbines and meteorological masts will make the area unusable for Irish Air Corps low flying training.* › *Development of wind turbines or other tall structures above 45m above ground level within the Edenderry/Allenwood/Rathangan (Lullymore) Air Corps Low Flying Training Area and within 20NM of Casement Aerodrome has the potential to significantly impact on Air Corps flight operations.* › *The cumulative effect of renewable energy developments has the potential to impede the Irish Air Corps operability.*	Engage with Clonbullogue Airfield located 4km to the west Notify the IAA ANSD within intentions to erect objects or cranes taller than 45m. In the event of a planning consent, the applicant should be conditioned to contact the IAA to: 1. *agree an aeronautical obstacle warning light scheme for the wind farm development* 2. *provide as constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location*	N/A	N/A	Proposed
Existing Cushaling Wind Farm	Y	Y	Y	No observation made on wind farm application. Observation made to application to An Coimisiún Pleanála (formally An Bord Pleanála) to determine whether an increase in MW without increasing turbine model or wind farm scale is exempted development.	Observation on wind farm application:	Kildare County Council 19/1323 **Refusal** – unrelated to aviation.	PL19.306924; PL09.306748 **Grant**	**Operational**

9 no. Turbines; 187m Tip Height				*'The proposed development lies within an area where low flying training takes place. The area is regularly used for helicopter and low level fight training. IF the proposed wind farm proceeds, this low level training in the area will have to cease.* *A portion of the proposed development likes on lands underlying miliary airspace EI-R16 and MOA 4 within the 20 nautical miles (NM) area of Casement Aerodrome that is protected against tall structures. At its nearest, the wind farm boundary is 19.8NM from Casement Aerodrome.* *A tall structure does not have to penetrate restricted airspace to impact Air Corps flight operations. The ability of transiting aircraft to fly underneath the lower level of restricted airspace so remaining clear of restricted airspace is a standard method by Military Air Traffic Services to provide separate from Instrument Flight Rules traffic operating above. The proposed development while not penetrating the EI-R16 will effect transiting aircraft to remain clear and below the restricted airspace* *The routes taken by Air Corps aircraft to multiple training areas in the MOA 4 and MOA 5 pass through the area of the proposed development. The proposed development will reduce aircraft navigability in a large portion the EI-R16 and MOA 4'*	*In the event of a planning consent, the applicant should be conditioned to contact the IAA to:* *1) agree an aeronautical obstacle warning light scheme for the wind farm development* *2) provide as constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location* No observation made on increase in MW application.	Offaly County Council 19/606 **Refusal** – unrelated to aviation.		
Existing Mountlucas Wind Farm 24 no. Turbines, 150m Tip Height	Y	Y	N	No Submission	No Submission	Offaly County Council N/A	PL2/09/453 **Grant**	**Operational**
Existing Cloncreen Wind Farm 21 no. Turbines, 170m Tip Height	Y	Y	N	No Submission	No Submission	N/A	19.PA0047 **Grant**	**Operational**
Proposed Drehid Wind Farm 11 no. Turbines, 167m Tip Height	Y	Y	N	*The proposed development is located within 2NM of Irish Air Corps HQ (which is located at Casement Aerodrome, Baldonnel) and in MOA4* *The proposed development is situated beneath restricted airspace (EIR-16) which serves to protect military aircraft operating to and from A significant number of the proposed turbines are in close proximity to the M4 motorway (the nearest appears to be approx. 1.4NM) which is identified as critical route for access by the Irish Air Corps to regional areas of the state, particularly in poor meteorological conditions or at night.* *The negative impacts that may arise for Air Corps tasking include in respect of operational flights (including national security tasks), aeromedical service missions and training flights particularly at lower altitudes.*	*In the event of a planning consent, the applicant should be conditioned to contact the IAA to:* *1) agree an aeronautical obstacle warning light scheme for the wind farm development* *2) provide as constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location*	Kildare County Council 18/1534 **Refusal** – unrelated to aviation	PL09.306500 **Grant** Subsequently quashed for reasons unrelated to aviation PA09.322845 / PC09.31446 **Proposed**	**Proposed**
Existing Yellow River Wind Farm	Y	Y	N	No Submission	No Submission	N/A	PA0032 **Grant**	**Operational**

29 no. Turbines; 11 no. at 156m Tip Height and 18 no. at 166m Tip Height								
Existing Moanvane Wind Farm 12 no. Turbines, 169m tip Height	Y	Y	N	No Submission	No Submission	Offaly County Council 17/335	PL19.301619 **Grant**	**Under Construction**
Refused Ummeras Wind Farm 5 no. Turbines, 169m tip Height	Y	Y	N	*With a blade tip height of 169m (554 feet(the wind turbines are considered an en-route obstacle to aircraft in flight. Air Corps aircraft will routinely operate at similar levels above the ground in this area.* *The proposed development site lies wholly within a route identified as a critical low level route in support of Air Corps operational requirements. This air Corps low level route is a 3NM corridor either side of the M7 centreline. Obstacles to aircraft within this corridor could affect Air Corps aircraft's ability to access the regions especially in poor weather conditions.* *Typical flight operations to regional areas that may be affected include: 1) security missions in support of the Defence Forces in aid to the civil power 2) Air Ambulance missions in support of the HSE. 3) Garda Air Support (GASU) mission sin support of the Garda Síochána.* *As safe airspace operation is dictated by ensuring that aircraft do not fly close to an obstacle, there would be an immediate impact on navigability in the area.*	*It is the observations of the Irish Aviation Aerodromes Department the applicant/developer should engage with Clonbulloge Airport with regard to the proposed development and any associated crane operations with a view to ensuring that there is no adverse impact on the safety of flight operations at Clonbullogue Aerodrome. In the event of a planning consent, the applicant should be conditioned to contact the IAA to:* *1) agree an aeronautical obstacle warning light scheme for the wind farm development* *2) provide as constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location*	Kildare County Council 2184 **Refusal:** *...Aviation safety concerns within critical low-level flight route used by the Air Corps... .169m tip height is considered an en-route obstacle to aircraft along this route....*	ABP PL09.309953 **Refusal:** *is within a route identified as a low level route in support of Air Corps operational requirements...Obstacles to aircraft within a 3NM corridor of the M7 Motorway could affect aircraft ability.... windfarm site is located beneath EI-R16 airspace and within MOA 4 airspace... proposed development would endanger or interfere with the safety of aircraft or the safe and efficient navigation thereof, and would be contrary to the proper planning and sustainable development of the area*	**Refused**



Map Legend

- Aviation Study Area

Cumulative Wind Farms

- Ballinla Wind Farm
- Ballivor Wind Farm
- Clonarrow Wind Farm
- Cloncreen Wind Farm
- Cushaling Wind Fam
- Cushina Wind Farm
- Dernacart Wind Farm
- Derrynadarragh Wind
- Drehid Wind Farm
- Garryhinch Wind Farm
- Kilberry Wind Farm
- Moanvane Wind Farm
- Mountlucas Wind Farm
- Yellow River Wind Farm

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Drawing Title: Cumulative Wind Farms

Project Title: Ballydermot Wind Farm, Co. Offaly and Co. Kildare

Drawn By	Checked By
CJ	MW
Project No.	Drawing No.
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Scale	Date
1:200,000	2026-10-16

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16.8 Likely Future Receiving Environment

This section considers the future receiving environment relating to aviation likely to exist at the Proposed Wind Farm site at the commencement of the construction phase. In accordance with the approach set out in Section 1.8.4 in Chapter 1, the assessment utilises the information presented in the baseline environment, Section 16.7 above, and uses any observed change over the survey period to inform, the likely future receiving environment.

The Project Site is located predominantly on former industrial peat extraction lands within the Allen Bog Group. Industrial peat extraction ceased in June 2020. Since then, environmental conditions across these lands have continued to develop through natural revegetation, alongside ongoing site management, decommissioning works and environmental monitoring undertaken in accordance with IPC Licence P0503-01.

These changes relate primarily to ground-level conditions and would not alter the location, function or operational characteristics of the aviation asset present within the Aviation Study Area and associated activities established in Section 16.7 above. The continued natural revegetation, and the continuation of existing site management, decommissioning works, and environmental monitoring, would not introduce structures at height or other physical features capable of affecting restricted airspace, radar, the Edenderry/Allenwood/Rathangan LFTA or aerodrome safeguarding.

Accordingly, the likely future receiving environment at commencement of the construction phase will remain materially comparable to the existing baseline environment with respect to aviation.

The assessment of likely significant effects presented in Section 16.11 has therefore been undertaken against this likely future receiving environment. As the aviation conditions predicted at commencement of construction are materially comparable to those described in the existing baseline environment presented in Section 16.7 remains representative of the aviation receiving environment against which the Proposed Project is assessed.

16.8.1 Future Environmental Trends

This section identifies the future environment trends relating to aviation likely to exist within the Aviation Study Area following implementation of the targeted rehabilitation measures within the Draft Rehabilitation Plans throughout the operational phase.

Continued natural revegetation, ongoing site management, decommissioning works and environmental monitoring, and implementation of the Draft Rehabilitation Plans, as required under Condition 10 of IPC Licence Reg. No. P0503-01, would not introduce structures at height or otherwise alter the aviation assets, activities or operating conditions identified within the Aviation Study Area. There is therefore no pathway through which these processes could materially alter future trends relating to aviation.

Accordingly, notwithstanding the continued natural revegetation, and implementation of the targeted rehabilitation measures, the future trends of the receiving environment for aviation will remain materially comparable to the aviation conditions described above and do not require separate consideration elsewhere in the aviation impact assessment.

The continuation of the aforementioned activities in the absence of the Proposed Project is considered in the Do-Nothing Scenario in Section 16.91 and assessed in Section 16.9.5 below.

16.9 Likely Significant Effects

16.9.1 Do Nothing Scenario

If the Proposed Project were not to proceed, there would be no potential for the Proposed Project infrastructure to impact on aviation or aviation assets.

If the Proposed Project were not to proceed, the Proposed Wind Farm site would continue to be managed under the requirements of the IPC licence (P0503-01) and therefore the ongoing decommissioning works, site management and environmental monitoring would continue as detailed in Chapter 4 Section 4.6.7.

The lands required for the Proposed Project not located within lands under IPC Licence would continue to function as it does at present. The Proposed Wind Farm site would continue to be used as a low flying training area by the Air Corp.

Under a 'Do-Nothing' scenario, continued natural revegetation, ongoing site management, decommissioning works and environmental monitoring, and compliance with the IPC License will proceed irrespective of whether the Proposed Project is permitted.

If the Proposed Project were not to proceed, the opportunity to capture a significant part of County Offaly's, County Kildare's and Ireland's valuable renewable energy resources would be lost, as would the opportunity to contribute to meeting Government and EU Targets for the production and consumption of electricity from renewable resources and the reduction of greenhouse gas emissions. The opportunity to generate local employment and investment and to diversify the local economy would also be lost.

16.9.2 Construction Phase

16.9.2.1 Restricted Airspace

Pre-Mitigation Impact

During construction, there will be no potential for penetration of restricted airspace EI-R16 or MOA4 through temporary crane usage. Constructed turbines will not penetrate restricted airspace EI-R16 or MOA4.

Should an aircraft wish to overfly the portion of Proposed Turbines, following installation, that lays beneath EI-R16H whilst remaining compliant with obstacle minimum height regulation it would be accomplished with approximately 1,000 feet of leeway available. Therefore, under a precautionary scenario, pre-mitigation there will be a slight, short-term negative effect, which is Not Significant.

Mitigation

Any use of tall structures including cranes above 45m such are subject to notification to the IAA 30 days prior to erection. As per Table 4-28 in Chapter 4, it is proposed that Proposed Turbine erection will take 21 months to be completed.

Flight within the airspace above the Aviation Study Area would be conducted via IFR or VFR, both require following the regulation applicable to IFR or VFR Flight.

Residual Effect

Based on the above, residual effects during the construction phase are considered to have an imperceptible, short-term negative effect on EI-R16 and MOA4 restricted airspace during the construction phase.

Significance of Effects

There will be no significant effect on EI-R16 and MOA4 during the construction phase of the Proposed Project.

16.9.2.2 Low Flying Areas

Pre-Mitigation Impact

As outlined in Section 16.7.2.1 above, only one low flying area is mentioned which is Wicklow Mountains. This area is 16.4km southeast of the Aviation Study Area and will therefore not be impacted by the construction phase of the Proposed Project (i.e., use of temporary cranes and erection of the Proposed Turbines).

At the DoD meeting, detailed in Section 16.4.2 above, the Air Corps stated that the Edenderry/Allenwood/Rathangan LFTA was used for helicopter off-airfield landing training. The proximity of the construction phase activities may constitute a hazard to helicopters engaged in off-airfield landing training. Due to the unknowns associated with the exact activities taking place within the LFTA an associated impact cannot be confirmed. Under a precautionary scenario, a long-term, significant negative impact on low flying helicopter training activities has been identified during the construction phase.

Mitigation

The Edenderry/Allenwood/Rathangan LFTA cannot be mitigated directly as the use of tall structures (i.e., cranes and Proposed Turbine erection) during the construction phase will present a hazard to the identified training activities. The Applicant are committed to continuing engagement with DoD/Irish Air Corps to facilitate continued consultation, further detail can be found in Appendix 16-2 Impact to Proposed Wind Farm Planning and Irish Air Corps Review. If an alternative area can be confirmed there will be no impact on the Edenderry/Allenwood/Rathangan LFTA.

Appendix 16-2 *Impact to Proposed Wind Farm Planning, Ballydermot Wind Farm* outlines the possibility of moving areas such as Edenderry/Allenwood/Rathangan LFTAs. Furthermore continued engagement and consultation with the Irish Air Corps could potentially identify suitable areas for a new low flying area to be established. Taking the current landcover and constraints of the Edenderry/Allenwood/Rathangan LFTA, it is considered the following elements are a requirement for a suitable LFTA:

1. *A relatively low population density for public safety and minimise noise emission impacts.*
2. *Predominately obstacle-free i.e., no masts, power lines, wind turbines.*
3. *No airfields (especially ones that cater for drone, model aircraft, micro light activities).*
4. *An area that is not conducive to the formation of local adverse weather such as fog, low cloud, or abnormal turbulence; and*
5. Terrain that may be able to accommodate a forced landing with a reasonable possibility of a successful outcome i.e., no large expanse of heavily wooded or rocky terrain.

Residual Effect

Should an agreement be made with the DoD to move the low flying area to an alternative suitable area, residual effects are considered to be reduced to an unlikely, permanent imperceptible negative effect.

In the absence of mitigation (agreement of the DoD to move the LFTA to an alternative location), under a precautionary scenario, a long-term, significant negative effect has been identified during the construction phase.

Significance of Effects

Should an agreement be made with the DoD to move the low flying area to an alternative suitable area, there will be no significant effect on LFTAs due to the Proposed Project.

In the absence of mitigation (agreement of the DoD to move the LFTA to an alternative location), under a precautionary scenario, there will be a significant effect on LFTAs due to the Proposed Project.

16.9.2.3 Primary Surveillance Radar, Secondary Surveillance Radar, and Meteorological Radar

Pre-Mitigation Impact

During the construction phase there is no potential for interference with PSR, SSR, or meteorological radar systems. Impacts on radar require movement, during the construction phase the only movement on site at a height to impact on radar will be the use of cranes as the Proposed Turbines will only move following energisation in the operational phase. Erection of the Proposed Turbines itself will not impact on radar; furthermore, cranes do not move at sufficient speed to impact on radar and therefore there is no potential for impacts on radar during the construction phase.

Mitigation

None proposed.

Residual Effect

There is no potential for impact on radar systems during the construction phase therefore there is no residual effect.

Significance of Effects

There will be no significant effect on radar systems during the construction phase of the Proposed Project.

16.9.2.4 Aerodrome Safeguarding

Pre-Mitigation Impact

Following consultation with the DoD and Irish Air Corp, an IFP Safeguarding Assessment was carried out by Sagentia Aviation to ascertain the effects of the Proposed Wind Farm on published IFPs at Casement Aerodrome. The procedures assessed are as follows:

- EIME AD 2.24-8 [29]
- EIME AD 2.24-9[30]
- EIME AD 2.24-10[31]
- EIME AD 2.24-11[32]
- EIME AD 2.24-15[33]
- EIME AD 2.24-16[34]
- EIME AD 2.24-17[35]
- EIME AD 2.24-20[36]
- EIME AD 2.24-22[37]
- EIME AD 2.24-25[38]
- EIME AD 2.24-30[39]
- EIME AD 2.24-31[40]
- EIME AD 2.24-32[41]
- EIME AD 2.24-33[42]
- EIME AD 2.24-35[43]

Following assessment under the above procedures, it was determined that 1 no. turbine (T47) was within the 1,800ft radar vectoring 3NM buffer area from Casement and had a minimum obstacle clearance altitude (MOCA) of 1,894ft and therefore in excess of the established limit of 1,800ft. This turbine was removed from the layout and therefore there is no potential for the Proposed Turbines to impact IFP at Casement Aerodrome.

The OLS at a large airport such as Dublin Airport and Casement Aerodrome would have as its 'final' surface extending away from the more complex surfaces that are close to the runway, a surface known as the OHS. This would be 150m high and extend out to 15,000m (15km). At approximately 33km from Casement Aerodrome, the Proposed Turbines are more than double the distance of the OHS from the Casement Aerodrome and at an even greater distance from Dublin Airport (i.e., 45.3km at its closest point (T46). Therefore, the Proposed Turbines will not penetrate the OHS. Under a precautionary scenario, there will be a long-term slight negative impact, which is Not Significant.

Mitigation

Any use of tall structures including cranes above 45m such are subject to notification to the IAA 30 days prior to erection. As per Table 4-28 in Chapter 4, it is proposed that Proposed Turbine erection will take 21 months to be completed.

As outlined above, The Proposed Turbines are located at a in excess of 30km from both Casement and Dublin airports which mitigates the potential for significant effects. Flight within the airspace above the Aviation Study Area would be conducted under IFR or VFR, both of which require compliance with Rules of the Air.

[29] https://www.military.ie/media/iozjj5ke/eime-ad-224-8_sid-bal-28-10-22-04-cat-a-b-_301025.pdf?usp=drive_link
[30] https://www.military.ie/media/43idoatd/eime-ad-224-9_sid-bal-28-10-22-04-cat-c-d-_301025.pdf?usp=drive_link
[31] https://www.military.ie/media/jqrjea1b/eime-ad-224-10-ils-z-10-cat-a-b-_301025.pdf?usp=drive_link
[32] https://www.military.ie/media/e5rltla1/eime-ad-224-11-ils-y-10-cat-c-d-_301025.pdf?usp=drive_link
[33] https://www.military.ie/media/5frhvf1y/eime-ad-224-15-vor-10_301025.pdf?usp=drive_link
[34] https://www.military.ie/media/l4wlieio/eime-ad-224-16-vor-28_301025.pdf?usp=drive_link
[35] https://www.military.ie/media/opche33p/eime-ad-224-17-vor-22_301025.pdf?usp=drive_link
[36] https://www.military.ie/media/bjshpo0k/eime-ad-224-20-sra-10_301025.pdf?usp=drive_link
[37] https://www.military.ie/media/v1teg2z0/eime-ad-224-22-radar-vectoring_301025.pdf?usp=drive_link
[38] https://www.military.ie/media/w3yfzpt3/eime-ad-224-25_missed-approach-comms-failure_180925.pdf?usp=drive_link
[39] https://www.military.ie/media/dx0fkbab/eime-ad-224-30_sid-dap-28-10-22-04-cat-a-b-_031024.pdf?usp=drive_link
[40] https://www.military.ie/media/kfrboazy/eime-ad-224-31_sid-dap-28-10-22-04-cat-c-d-_031024.pdf?usp=drive_link
[41] https://www.military.ie/media/0h3ewfog/eime-ad-224-32-ils-x-rwy-10-ab_271125.pdf?usp=drive_link
[42] https://www.military.ie/media/avujijny/eime-ad-224-33-ils-w-rwy-10-cd_271125.pdf?usp=drive_link
[43] https://www.military.ie/media/ohnoy1su/eime-ad-224-35-rnp-rwy-28_301025.pdf?usp=drive_link

Residual Effect

Following implementation of the above mitigation measures, there will be no residual effects on aerodrome safeguarding from the Proposed Turbines.

Significance of Effects

There will be no significant effect on aerodromes during the construction phase of the Proposed Project.

16.9.3 Operational Phase

While the Proposed Project will introduce 46 no. turbines into this landscape, this addition is to be considered in the context of an established wind energy resource area, rather than as an isolated new obstacle within a previously unobstructed volume of airspace. Subject to compliance with the obstacle registration, notification, marking and lighting requirements that will be agreed with the IAA, the Proposed Turbines are not considered to represent a material alteration to the aviation obstacle environment of the area, but rather an extension of an already-established wind energy obstacle field to which aviation activity in the vicinity is already required to have consideration of.

16.9.3.1 Restricted Airspace

Pre-Mitigation Impact

The Proposed Turbines present as obstacles within the airspace in which they are situated. Without notification to the IAA they would impact on all flights as pilots would be unaware of their presence. Obstacles without lighting pose a hazard to aircraft flying during the hours of darkness or in low light conditions.

Approximately 60% of the Proposed Project lays below EI-R16C and 40% below EI-R16H. Whilst it would be possible to pass over the portion of the wind farm that lay beneath the EI-R16C without entering the airspace above, the available space to complete this legal pass over the turbine with the greatest height ASML (i.e., 968ft ASML) is approximately 31ft. As demonstrated in Section 16.7.2.1, the Proposed Turbines do not penetrate the restricted airspace of EI-R16 Section C or Section H.

The Restricted airspace in EI-R16C has a base or 'starting level' of 1,500ft AMSL. Using the greatest proposed tip height of 220m / 968 feet ASML as per Table 16-4 and comparing that value with the height the airspace begins at, at 1,500ft ASML, demonstrates that the Proposed Turbines would not penetrate the restricted airspace. However, the physicality of the Proposed Turbines would create an 'obstacle field' in the airspace below the Restricted Airspace which would require notification to the IAA as well as being subject to lighting regulation.

The Proposed Turbines are located in MOA 4 where VFR and IFR flying occurs. For VFR flight, a minimum of 500 feet clearance above an obstacle is required. IFR requires flying 1,000 feet above known recorded obstacles. Combined with the Proposed Turbine heights, VFR and IFR flight in these airspaces would need to be at a minimum of approximately 1,468 feet and 1,968 feet AMSL in order to comply with 'Minimum Heights' regulation Therefore, theoretically, a VFR flight could pass over the Proposed Turbine in full compliance of Minimum Heights regulation and not be in the Restricted Airspace above. The pilot would also have the option to change their flight path slightly and fly around the Proposed Turbines. The extra distance and time to do this would be negligible as outlined in Section 16.7.1 above (less than 5 minutes in the example provided).

Prior permission is required for VFR and uncontrolled IFR penetration above 4,500 feet AMSL and subject to compliance with any conditions and instructions issued by Military Air Traffic Service of Casement Aerodrome. Controlled IFR flight penetration is coordinated by civil Air Traffic Service.

Under a precautionary scenario, a long-term, slight, negative impact, which is Not Significant, has been identified on restricted airspace during the operational phase.

Mitigation

The IAA will be contacted to:

1. *agree an aeronautical obstacle warning light scheme for the wind farm development*
2. *provide as constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location*

The Proposed Turbines will be subject to an approved lighting scheme being established and final positions and heights will be forwarded to the IAA for publishing in the AIP. As outlined in Appendix 16-2 should the Irish Air Corps require the fitment of Infra-Red lighting compatible with the use of Night Vision Goggles NVG, there are many types available, and a list of compatible lighting should be obtainable from the Air Corps technical services command. It is not known whether the Air Corps use NVG systems operationally, or during training, but their popularity in military, medevac and search and rescue (SAR) missions would suggest there is a high probability of use.

In addition to the above measures, pilots of both VFR and IFR flights are required by the National Regulator to make themselves familiar with their route, airspace they will be flying within, and current NOTAM and IAP information.

Residual Effect

With the implementation of the above measures, the residual effects during the operational phase are considered to be a long-term, imperceptible negative effect.

Significance of Effects

There will be no significant effect on EI-R16 and MOA 4 during the operational phase of the Proposed Project.

16.9.3.2 Low Flying Areas

Pre-Mitigation Impact

Within the Air Corps website, only one low flying area is mentioned which is Wicklow Mountains. This area is 16.4km southeast of the Aviation Study Area and will therefore not be impacted by the Proposed Turbines.

The Proposed Turbines are located within the Edenderry/Allenwood/Rathangan LFTA. Flying in accordance with the Rules of the Air[44] would require aircraft to maintain certain heights above obstacles in their vicinity but flying in Class G airspace calls for pilots to abide by simple rules which place the responsibility of terrain, obstacle, and aircraft to aircraft separation on the pilot. The DoD have identified that military aircraft in the airspace may not be flying in compliance with the Rules of

[44] *S.I. No. 266/2019 - Irish Aviation Authority (Standardised Rules Of The Air) Order, 2019* <https://www.irishstatutebook.ie/eli/2019/si/266/made/en/print>

the Air however it still remains a requirement for pilots to avoid obstacles and to exercise the principle of 'see and avoid' other aircraft. The majority of militaries worldwide will have this proviso regarding the Rules of the Air but due to safety, the Rules of the Air are rarely completely disregarded. Military aircraft are cognisant of the fact that there may be civilian aircraft operating in the airspace at the same time.

At the DoD meeting, detailed in Section 16.4.2 above, the Air Corps stated that the Edenderry/Allenwood/Rathangan LFTA was used for helicopter off-airfield landing training. The proximity of the Proposed Wind Farm may constitute a hazard to helicopters engaged in off-airfield landing training. Due to the unknowns associated with the exact activities taking place within the LFTA an associated impact cannot be confirmed. Under a precautionary scenario, a long-term, significant negative impact on low flying helicopter training activities has been identified during the operational phase.

Mitigation

The Edenderry/Allenwood/Rathangan LFTA cannot be mitigated directly (assuming that the activities do occur in the area of the Proposed Turbines) and therefore an alternative site will be required for this activity. The Applicant are committed to continuing engagement with the DoD/Irish Air Corps to facilitate an alternative location for LFTAs if feasible. If an alternative area is confirmed there will be no impact on the Edenderry/Allenwood/Rathangan LFTA.

Appendix 16-2 *Impact to Proposed Wind Farm Planning, Ballydermot Wind Farm* outlines the possibility of moving areas such as Edenderry/Allenwood/Rathangan LFTAs. Further continued engagement and consultation with the Irish Air Corps could potentially identify suitable areas for a new low flying area to be established. Taking the current landcover and constraints of the Edenderry/Allenwood/Rathangan LFTA, it is considered the following elements are a requirement for a suitable LFTA:

1. *A relatively low population density for public safety and minimise noise emission impacts.*
2. *Predominately obstacle-free i.e., no masts, power lines, wind turbines.*
3. *No airfields (especially ones that cater for drone, model aircraft, micro light activities).*
4. *An area that is not conducive to the formation of local adverse weather such as fog, low cloud, or abnormal turbulence; and*
5. *Terrain that may be able to accommodate a forced landing with a reasonable possibility of a successful outcome i.e., no large expanse of heavily wooded or rocky terrain.*

Residual Effect

Should an agreement be made with the DoD to move the low flying area to an alternative suitable area, residual effects are considered to be reduced to an unlikely, permanent imperceptible negative effect.

In the absence of mitigation (agreement of the DoD to move the LFTA to an alternative location), under a precautionary scenario, a long-term, significant negative impact has been identified during the operational phase.

Significance of Effects

Should an agreement be made with the DoD to move the low flying area to an alternative suitable area, there will be no significant effect on LFTAs due to the Proposed Project.

In the absence of mitigation (agreement of the DoD to move the LFTA to an alternative location), under a precautionary scenario, there will be a significant effect on LFTAs due to the Proposed Project.

16.9.3.3 Primary Surveillance Radar

Pre-Mitigation Impact

Moving turbine blades can cause control software in modern PSR systems to falsely identify the moving blades as an aircraft target. This may cause 'clutter', false and corrupt target information on ATC displays.

Of the Proposed Turbines, 19 no. have a tip height of 200m and 27 no. have a tip height of 220m. As the EUROCONTROL Guidelines are applicable to wind turbine design, between 30-200 m tip height, therefore, to ensure appropriate coverage of all Proposed Turbines a detailed radar impact assessment (Appendix 16-3) was carried out as recommended by the EUROCONTROL Guidelines.

As outlined in Appendix 16-3, there are three PSR radar stations providing radar cover in the airspace in the vicinity of the Aviation Study Area. The PSR radar sensors at Dublin3 and Tooman are used for both civil and military aircraft tracking and monitoring. The PSR radar at Casement is used solely for military aircraft tracking and monitoring. RLoS conditions do exist between the Dublin3 and Tooman PSR. However, the Proposed Turbines are more than 15 km from the PSR radar station and therefore are located in PSR Assessment Zone 3. For Proposed Turbines in PSR Zone 3, a "Simple Assessment" is required under EUROCONTROL Guidelines as the impact is likely to be imperceptible. Given the distance from the Dublin3 and Tooman PSR and the fact that there is overlapping PSR radar coverage the impact due to the Proposed Turbines is not expected to be significant. Under a precautionary approach, a long-term imperceptible negative effect, which is Not Significant, is identified on PSR at Dublin3 and Tooman during the operational phase.

RLoS conditions do exist between the ASR at Casement and 19 no. of the Proposed Turbines, with 13 no. Proposed Turbines having the potential to impact PSR. The 13-no. impacting Proposed Turbines impacting are below the 2,000ft ASML threshold of the radar vectoring coverage provided to the 20 nm. As outlined in Table 16-4 above, there are several wind farms that have been consented and are operational or under construction in the vicinity of the Proposed Wind Farm site. The existing Cushaling Wind Farm and existing Cloncreen Wind Farm are the closest cumulative winds farms and are located adjacent to the Aviation Study Area and are 0.7km, and 2.8km away from the nearest Proposed Turbines, respectively. Cushaling Wind Farm is located within the Edenderry/Allenwood/Rathangan Low Flying Training Area and both wind farms are located within MOA4 and EI-R16 restricted airspace. Both wind farms and have been consented, built, and are now operational. Cushaling Wind Farm (9 no. turbines) is visible to the air traffic controllers at Casement, and it is anticipated that these are operationally tolerable (refer to Section 16.9.5 below for a detailed cumulative impact assessment). Therefore, under a precautionary scenario, a long-term imperceptible, negative impact, which is Not Significant, has been identified during the operational phase on the PSR at Casement.

Mitigation

The Applicant will notify the radar operators of the consented turbine locations and dimensions to allow for mitigation measures to be raised by the radar operators and implemented if required.

Residual Effect

The scale of mitigation will be agreed with radar operators as required. Under a precautionary scenario, the residual effect on PSR is considered to be a long-term, imperceptible negative effect on PSR at Dublin Airport, Tooman, and Casement aerodromes.

Significance of Effects

There will be no significant effect on PSR at Dublin3, Tooman, and Casement aerodromes as a result of the Proposed Project.

16.9.3.4 Secondary Surveillance Radar

Pre-Mitigation Impact

EUROCONTROL Guidelines states that SSR radar should be technically safeguarded against large structures within 16km of the antenna. The closest SSR radar antenna to the Proposed Turbines is at Dublin Airport, approximately 45.3km (25 nm) northeast. At this distance a Detailed Radar Assessment is unlikely to be required by radar operators.

Of the Proposed Turbines, 19 no. have a tip height of 200m and 27 no. have a tip height of 220m. As the EUROCONTROL Guidelines are applicable to wind turbine design, between 30-200 m tip height, therefore, to ensure appropriate coverage of all Proposed Turbines a detailed radar impact assessment (Appendix 16-3) was carried out as recommended by the EUROCONTROL Guidelines.

As outlined in Appendix 16-3, all Proposed Turbines are greater than 16 km from the SSR at Forrest Little, Dublin3 and Tooman and therefore would be in SSR Assessment Zone 4. As all of the Proposed Turbines would be in Zone 4, a Radar Assessment will not be required for the SSR Radar at Forrest Little, Dublin3 or Tooman and no significant effect will occur. Under a precautionary scenario, a long-term imperceptible negative impact, which is Not Significant will occur on secondary surveillance radar.

ASR radar systems such as the installation at Casement Aerodrome are primarily based on PSR and not SSR. From the publicly available information it is understood that there is no SSR facility in operation at Casement Aerodrome and no desktop assessment against impacts to SSR sensors has been conducted on that basis.

Mitigation

Should the project be consented, the Applicant will inform Dublin Airport, and any other relevant SSR radar locations, of the turbine locations and dimensions and they would decide if a Detailed Assessment was required in order to develop mitigation measures.

Residual Effect

Based on the above, under a precautionary approach, there will be a long-term imperceptible negative effect from the Proposed Turbines on SSR at Forrest Litte, Dublin3, and Tooman SSR.

Significance of Effects

There will be no significant effect on SSR due to the Proposed Project.

16.9.3.5 Meteorological Radar

Pre-Mitigation Impact

As outlined in Section 16.7.3.3 above the nearest meteorological radar to the Aviation Study Area is Casement Aerodrome. As previously stated, the Proposed Turbines are 20nm (i.e., c. 37km) from the Casement Aerodrome. Therefore, the Proposed Turbines fall into the range of 20 – 45km, i.e., the 'Low Impact Zone' where 'Notification is recommended'.

The next nearest meteorological radar to the Aviation Study Area is Dublin Airport. The weather radar at Dublin Airport is approximately 45.3km from the Proposed Turbines. Therefore, the Proposed Turbines fall into the range of >45km, i.e., the 'Intermittent Impact Zone' where 'Notification is recommended'.

A range of 20 to 45km in the WMOs paper identifies this as an 'Low Impact Zone', where 'Notification is recommended'. Therefore, it can be determined that radar at Casement, and at Dublin Airport which is located in the 'Intermittent Zone' (the lowest potential for impact), is unlikely to be affected by the Proposed Turbines. Under a precautionary approach, a long-term slight negative effect, which is Not Significant, is identified on meteorological radar during the operational phase.

Mitigation

The WMO's paper identifies this as an 'Intermittent Zone' and also recommends Notification to the Met Éireann station at Dublin Airport is required for proposed wind farm developments at distances greater 45km. The Applicant is committed to engaging with Dublin Airport/Met Éireann in relation to meteorological radar.

Residual Effect

Based on the above, effects from the Proposed Turbine on the meteorological radar at Dublin Airport is considered to be an long-term imperceptible negative effect.

Significance of Effects

There will be no significant effect on the meteorological radar at Dublin Airport due to the Proposed Project.

16.9.3.6 Aerodrome Safeguarding

Pre-Mitigation Impact

Following consultation with the DoD and Irish Air Corp, an IFP Safeguarding Assessment was carried out by Sagentia Aviation to ascertain the effects of the Proposed Wind Farm on published IFPs at Casement Aerodrome. As outlined in Section 16.9.2.4 above, following assessment under the above procedures, it was determined that 1 no. turbine (T47) was within the 1,800ft radar vectoring 3NM buffer area from Casement and had a minimum obstacle clearance altitude (MOCA) of 1,894ft and therefore in excess of the established limit of 1,800ft. This turbine was removed from the layout and therefore there is no potential for the Proposed Turbines to impact IFP at Casement Aerodrome.

The OLS at a large airport such as Dublin Airport and Casement Aerodrome would have as its 'final' surface extending away from the more complex surfaces that are close to the runway, a surface known as the OHS. This would be 150m high and extend out to 15,000m (15km). At approximately 33km from Casement Aerodrome, the Proposed Turbines are more than double the distance of the OHS from the Casement Aerodrome and at an even greater distance from Dublin Airport (i.e., 45.3km at its closest point (T46). Therefore, the Proposed Turbines will not penetrate the OHS. Under a precautionary scenario, there will be a long-term slight negative impact, which is Not Significant.

Mitigation

The Proposed Turbines are located at a significant distance from both Casement and Dublin airports which mitigates the potential for significant effects. Flight within the airspace above the Aviation Study Area would be conducted under IFR or VFR, both of which require compliance with Rules of the Air.

Residual Effect

Following implementation of the above mitigation measures, there will be no residual effects on IFP from the Proposed Turbines

Significance of Effects

There will be no significant effect on aerodromes during the operational phase of the Proposed Project.

16.9.4 Decommissioning Phase

The Proposed Turbines are expected to have a lifespan of approximately 35-years. Following the end of their useful life, the equipment may be replaced with a new technology, subject to planning permission being obtained, or the Proposed Wind Farm may be decommissioned fully.

Upon decommissioning the Proposed Onsite Substation and Proposed Offsite Substation will form part of the national grid infrastructure and operate in perpetuity as part of Transmission System and TAO assets and will remain in-situ. The assets transferred to the TAO will not form part of the decommissioning works.

The works required during the decommissioning phase are described in Section 4.12 of Chapter 4.

A Decommissioning Plan is included as Appendix 4-7 of this EIAR for the decommissioning of the Proposed Project, the detail of which will be agreed with the local authority prior to any decommissioning. Any impact and consequential effect that occurs during the decommissioning phase will be similar to that which occur during the construction phase, albeit of lesser impact. The mitigation measures prescribed for the construction phase of the Proposed Wind Farm will be implemented during the decommissioning phase thereby minimising any potential impacts. The potential for effects during the decommissioning phase of the Proposed Wind Farm has been fully assessed in this EIAR.

16.9.5 Cumulative Impact Assessment

In relation to aviation, only other structures at height have the potential to result in cumulative effect. Therefore, other plans and projects as outlined in Section 2.10 of Chapter 2 have been screened out and only proposed, permitted or existing wind farms are considered in combination with the Proposed Turbines.

One or more wind farm developments in an area may have effects on aviation due to the cumulative effect. This may range from creation of a larger obstacle environment than would a single wind farm in a particular area to a larger impact on radar in the area.

Whilst a group of wind farms can alter pilot workload due to creating obstacles to be avoided, it can also make flight planning in such an area easier. This is because an area of wind farms, or other obstacles, is easier to plan to avoid, rather than the avoidance of individual wind farms or obstacles. An example of this is the avoidance of several mountains grouped closely together by flying around them rather than trying to fly over the lower ground in between them. Several aviation maps show groups of turbines in a particular area which facilitates easier route planning. This is also a safer approach, contributing to a greater situational awareness of an overall greater altitude required for obstacle clearance, rather than the possibility of varying altitude several times whilst avoiding individual wind farms.

Other proposed, permitted and existing wind farms within 20km of the Proposed Turbines are listed in Table 16-8 below and illustrated on Figure 16-3 above. As outlined in Section 2.10.1 of Chapter 2 the selection of a 20km geographical boundary for the aviation cumulative assessment is founded on

established radar and aviation assessment practice as outlined in the EUROCONTROL Guidelines for Assessing the Potential Impact of Wind Turbines on Surveillance Sensors. The EUROCONTROL Guidelines identify a Zone 2 extending to 15km from a surveillance sensor within which a specific impact assessment is required, and this threshold has been applied in the assessment of Irish radar installations, whereby a 16km distance is generally taken as the boundary beyond which detailed radar assessment is not required for an individual development. The 20km cumulative boundary extends beyond this individual assessment threshold on a precautionary basis, in recognition that a cluster of permitted, proposed and existing wind farms may present a combined radar clutter, false-target or line-of-sight effect that would not arise from any one development considered in isolation.

The various impact assessments, included in Appendix 16-1 to 16-4 and as summarised above discuss and consider the other wind farms in the vicinity of the project in detail and where relevant to the impact assessment generally.

Table 16-8: Cumulative Wind Farm Projects within 20km and associated Restricted Airspaces

Wind Farm	Status	Location	Airspace
Ballinla Wind Farm	Permitted	7.2km northwest from the nearest Proposed Turbine	› Under EI-R16; › Under MOA4
Clonarrow Wind Farm	Permitted	12.9km west from the nearest Proposed Turbine	› Under EI-R16; › Under MOA4
Cloncreen Wind Farm	Existing	2.8km west from the nearest Proposed Turbine	› Under EI-R16; › Under MOA4
Cushaling Wind Farm	Existing	0.7km from the nearest Proposed Turbine	› Under EI-R16; › Under MOA4 › Under Edenderry/Allenwood/Rathangan Low Flying Training Area
Cushina Wind Farm	Proposed	9.4km southwest of the nearest Proposed Turbine	› Under EI-R16; › Under MOA4
Derrynadarragh Wind Farm	Proposed	7.6km southwest from the nearest Proposed Turbine	› Under EI-R16; › Under MOA4
Drehid Wind Farm	Proposed	7.4km northeast from the nearest Proposed Turbine	› Under EI-R16; › Under MOA4
Garryhinch Wind Farm	Proposed	20km southwest from the nearest Proposed Turbine	› Under MOA4
Kilberry Wind Farm	N/A	N/A	N/A

Moanvane Wind Farm	Existing	13.9km southwest from the nearest Proposed Turbine	› Under EI-R16; › Under MOA4
Mountlucas Wind Farm	Existing	10.3km west from the nearest Proposed Turbine	› Under EI-R16; › Under MOA4
Yellow River Wind Farm	Existing	12.8km west from the nearest Proposed Turbine	› Under EI-R16; › Under MOA4

Restricted Airspace

EI-R16 and MOA4

As outlined in Table 16-8 above, of the 12 no. permitted proposed and existing wind farms within 20km of the Proposed Turbines, 1 no. wind farm (Kilberry Wind Farm) is not located within any airspace under military restriction and therefore there is no potential for cumulative effects on restricted airspace when considered with the Proposed Turbines. The remaining wind farms are all located within restricted airspace, 5 no. of which are operational. As outlined in Section 16.7.6 there are 2 no. wind farms in proximity to the Aviation Study Area (i.e., Cloncreen Wind Farm and Cushaling Wind Farm), therefore, the Aviation Study Area is already located within an that is a recognised obstacle field, published in the relevant aeronautical charts and in the IAA/AirNav Ireland Air Navigation Obstacle Data Set, with which pilots operating in the area are required to be familiar and around which established flight-planning and route-avoidance practices are already applied; i.e., in an area where wind farms are already operational, any flying activity in the area will take into account the routes and minimum heights to be flown in order to legally and safely avoid wind farms.

Therefore, it can be determined, under a precautionary approach, that the Proposed Turbines will, in combination with all other permitted, proposed, or existing wind farms within EI-R16 and MOA4 as per Table 16-8 will have a long-term imperceptible negative effect on aviation, which is Not Significant.

Low Flying Training Area

As outlined in Table 16-8 above, of the 12 no. permitted proposed and existing wind farms within 20km of the Proposed Turbines, 1 no. wind farm (Cushaling Wind Farm) is located within the Edenderry/Allenwood/Rathangan LFTA. The remaining 11 no. wind farms are located outside of the Edenderry/Allenwood/Rathangan LFTA and therefore there is no potential for cumulative effects.

The Cushaling Wind Farm is operational with 6 no. turbines located within the Edenderry/Allenwood/Rathangan LFTA. There is no available information regarding consultation with Department of Defence and Irish Air Corps in relation to potential impacts on the Edenderry/Allenwood/Rathangan LFTA from the 6 no. Cushaling turbines available in the public domain. Under a precautionary approach, it is considered that the addition of the Proposed Turbines extends extensively into the Edenderry/Allenwood/Rathangan LFTA, results in significant negative cumulative effects on the Edenderry/Allenwood/Rathangan LFTA. As outlined in Section 16.9.3.2 the Edenderry/Allenwood/Rathangan LFTA cannot be mitigated directly (assuming that the activities do occur in the area of the Proposed Turbines) and therefore an alternative site will be required for this activity. The Applicant continue to engage with the DoD/Irish Air Corps to facilitate an alternative location for LFTAs if feasible. If an alternative area is confirmed there will be no impact on the Edenderry/Allenwood/Rathangan LFTA.

Radar

Should primary radar be impacted by a particular wind farm, with the potential for 'clutter' showing on ATC radar screens, the cumulative effect may very well increase that impact on ATC screens. It is possible that a single wind farm causing some clutter on ATC radar screens would be acceptable to the ATC provider using that radar. This may depend on the distance from the radar, the class of airspace within which the ATC service is being provided, and what type of service is being provided i.e. an 'advisory' type of service, or a 'control' service, under which adherence to instructions is mandatory.

The radar impact assessment outlined in Section 16.9.3.3 and Section 16.9.3.4 above, and contained within Appendix 16-3, concludes that the Proposed Turbines won't have significant effects on radar primarily due to distance from receptors. Those receptors are all located to the east of the Proposed Turbines. As can be seen in Figure 16-3 above, the majority of the other wind turbines in the area are located to the west, i.e., at even greater distance to the radar operators. Furthermore, dedicated mitigation to reduce the impact of the Proposed Turbines is outlined in the aforementioned sections.

Therefore, it can be determined, under a precautionary approach, that the Proposed Turbines will, in combination with all other permitted, proposed, or existing wind as identified in Table 16-8 will have a long-term imperceptible negative effect on radar which is Not Significant.

Aerodrome Safeguarding

Should a group of wind farms in such an area create a cumulative impact on ATC radar screens the effect may become unacceptable to the ATC provider. However, one must bear in mind that wind farms sited behind other wind farms may effectively be 'blocked' from radar line of sight and thus the effect on the radar. Terrain between the radar antenna and an area of wind farms may result in only one, or a few wind farms, being visible to the radar, rather than all of them. This may produce a different, and ultimately, acceptable, impact for the ATC provider to consider. The aerodrome impact assessment set out in Section 16.9.2.4 and Section 16.9.3.6 and above concludes that the Proposed Turbines won't have significant effects on aerodrome safeguarding primarily due to distance from receptors. Those receptors are all located to the east of the Proposed Turbines. As can be seen in Figure 16-3 above, the majority of the other wind turbines in the area are located to the west, i.e., at even greater distance to the aerodrome operators.

Therefore, it can be determined, under a precautionary approach, that the Proposed Turbines will, in combination with all other permitted, proposed, or existing wind farms within EI-R16 and MOA4 as per Table 16-8 will have a long-term imperceptible negative cumulative effect on aerodrome safeguarding.

16.10 Summary

The Proposed Project would not create a barrier to general aviation in terms of restricting the flying amenity of the typical Private Pilot during the construction, operation or decommissioning phases. A private pilot would be able to visually fly around or transit across the Proposed Wind Farm without undue concern about needing to fly in airspace they may not necessarily wish to enter. However, an IFR flight may be required to seek clearance from military ATC at Casement to climb into the Restricted Airspace above, in order to comply with Minimum Heights regulation. The amount of IFR flying in completely uncontrolled airspace is considered low as the risk increases when 'see-and-avoid' practices cannot be utilised. Most IFR flights try, where possible, to use ATC guidance, which generally requires flight in Controlled Airspace.

The Proposed Turbines do not penetrate the Restricted Airspace EI-R16 and MOA4 and there is space to fly over the Proposed Turbines without entering into the restricted airspace. Therefore, there will be no significant effect on these airspace or military flight through these areas during the construction, operation and decommissioning phases.

There will be no significant effect on primary, secondary or meteorological radar or aerodromes, including on IFPs from Casement Aerodrome, during the construction, operation or decommissioning of the Proposed Project.

In general, the IAA will be contacted to:

- agree an aeronautical obstacle warning light scheme for the wind farm development
- provide as constructed coordinates in WGS84 format together with ground and tip height elevations at each wind turbine location

The Proposed Turbines will be subject to an approved lighting scheme being established and final positions and heights will be forwarded to the IAA for publishing in the AIP which will facilitate safe air traffic management.

There is potential for impact on the Edenderry/Allenwood/Rathangan LFTA. Due to the unknowns associated with the exact activities taking place within the LFTA an associated impact cannot be confirmed and therefore a precautionary approach has been taken.

The Applicant will engage with the DoD/Irish Air Corp ahead of construction to facilitate an alternative location for LFTAs within their landbank. If an alternative area is confirmed there will be no impact on the Edenderry/Allenwood/Rathangan LFTA.