APPENDIX 15-6

AVIATION IMPACT ASSESSMENT

Aviation Impact Assessment

Seskin Wind Farm, Co. Carlow

MKO

11 April 2024

CL-5889-RPT-002 V2.0

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1.0	Initial Issue	14 March 2023	Initial Issue
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Executive Summary

The Proposed Project, which will be known as the 'Seskin Wind Farm' renewable energy development which will comprise 7 No. wind turbines, and associated infrastructure in the townlands of Seskin Lea and Ridge and adjacent townlands, in Co. Carlow, and a 38kV on-site substation, battery energy storage system and associated works, including underground 38kV cabling to connect to the national grid at Kilkenny 110kV substation, in the townland of Scart near Kilkenny, Co. Kilkenny.

As detailed in Section 1.1.1 in Chapter 1, for the purposes of this EIAR, the various project components are described and assessed using the following references: 'Proposed Project', 'the site', 'Proposed Wind Farm' and 'Proposed Grid Connection Route'.

The Proposed Wind Farm is located on a ridge of high ground running in a North-East South-West orientation in Co. Carlow.

The Proposed Wind Farm is located within Military Operating Area 3 but is outside of the 20 nautical mile notification distance from Casement Aerodrome as stated in the *Air Corps Wind Farm/Tall Structures Position Paper.* The site is also outside of any low flying areas designated by the Air Corps.

This Impact Assessment provides a qualitative evaluation of the Proposed wind Farm's potential to impact airspace, civil and military flight within the area. It also seeks to assess, and provide expert opinion on, historical objections to wind farms and other tall structures by the Air Corps through a clause within their Paper stating that they object to such structures within 3 nautical miles of specific motorways in Ireland.

The report finds that airspace and civil and/or military aviation is not impacted to any degree that may be deemed unsafe or inconvenient to users. Furthermore, the low flying areas as designated by the Air Corps are substantial distances away from the Proposed Wind Farm and are therefore not impacted to any degree whatsoever.

The Proposed Wind Farm is within the 3 nautical mile buffer associated with a small section of a national motorway i.e. the M9. Assessment shows that an aircraft using the motorway as a visual guide and passing the Proposed Wind Farm, would be less than the prescribed 3 nautical miles from a wind turbine for an extremely limited time.

The potential impact to four receptors - Airspace, Civil Flight, Military Flight and the 3 Nautical Mile Buffer Zone - were risk assessed using a general qualitative methodology employed within many current wind farms Environmental Impact Assessments and, apart from the Buffer Zone, were assessed as *Low Impact*. The Buffer Zone was assessed as *Moderate Impact* due to the potential for some restrictions or non-standard mitigations being required to their internal processes by the Irish Air Corps.

It is this report's opinion that the position adopted by the Irish Air Corps is no longer compatible with the aspirations of the renewables onshore industry in attempting to meet climate change related targets and that the 9-year-old *Air Corps Wind Farm/Tall Structures Position Paper* may no longer be fit for purpose.

Unless this onerous buffer distance can be negotiated with the Air Corps through constructive engagement, the onshore wind farm industry in Ireland is likely to face continued objection by the Defence Forces on at least this one issue.

Abbreviations

AGL	Above Ground Level
AIP	Aeronautical Information Publication
ALT	Altitude
AMSL	Above Mean Sea Level
ATC	Air Traffic Control
EASA	European Union Aviation Safety Agency
FL	Flight Level
FT	Feet
GA	General Aviation
GND	Ground
IAA	Irish Aviation Authority
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
KIAS	Knots Indicated Airspeed
KM	Kilometre
LFTA	Low Flying Training Area
M	Metre
NM	Nautical Mile
SERA	Standardised European Rules of the Air
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
WTG	Wind Turbine Generator

References

- Air Corps Wind Farm/Tall Structures Position Paper, 2014.
- Air Corps – Defence Forces https://www.military.ie/en/who-we-are/air-corps
- SERA https://www.easa.europa.eu/en/regulations/sera-standardised-european-rules-air
- Irish Air Corps – Wikipedia https://en.wikipedia.org/wiki/Irish_Air_Corps
- The Author of the report spent 12 years as an Air traffic Controller, both Military and Civilian, has been an airline and corporate pilot for 23 years, and retains an Airline Transport Pilots Licence.

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1. The Proposed Wind Farm

1.1. Introduction

1.1.1. The Proposed Wind Farm includes for 7 turbines at a tip height between 179.5 metres and 180 metres (m) Above Ground Level (AGL) grouped at a site 9 nautical miles (NM) North-East of Kilkenny as depicted in Figure 1 below.

1.1.2. As detailed in Chapter 2 of the Environmental Impact assessment Report (EIAR), MKO carried out EIA scoping, and a scoping response issued by the Department of Defence was received. It was identified that an expert input regarding the potential impact on aviation in general but, more specifically, operations of the Irish Air Corps, was required.

1.1.3. Historically, wind farm proposals in this wider area have met with objection from the Air Corps which cite 'safety' concerns and/or breach of their '*Air Corps Wind Farm/Tall Structures Position Paper*'[1] in one or more areas.

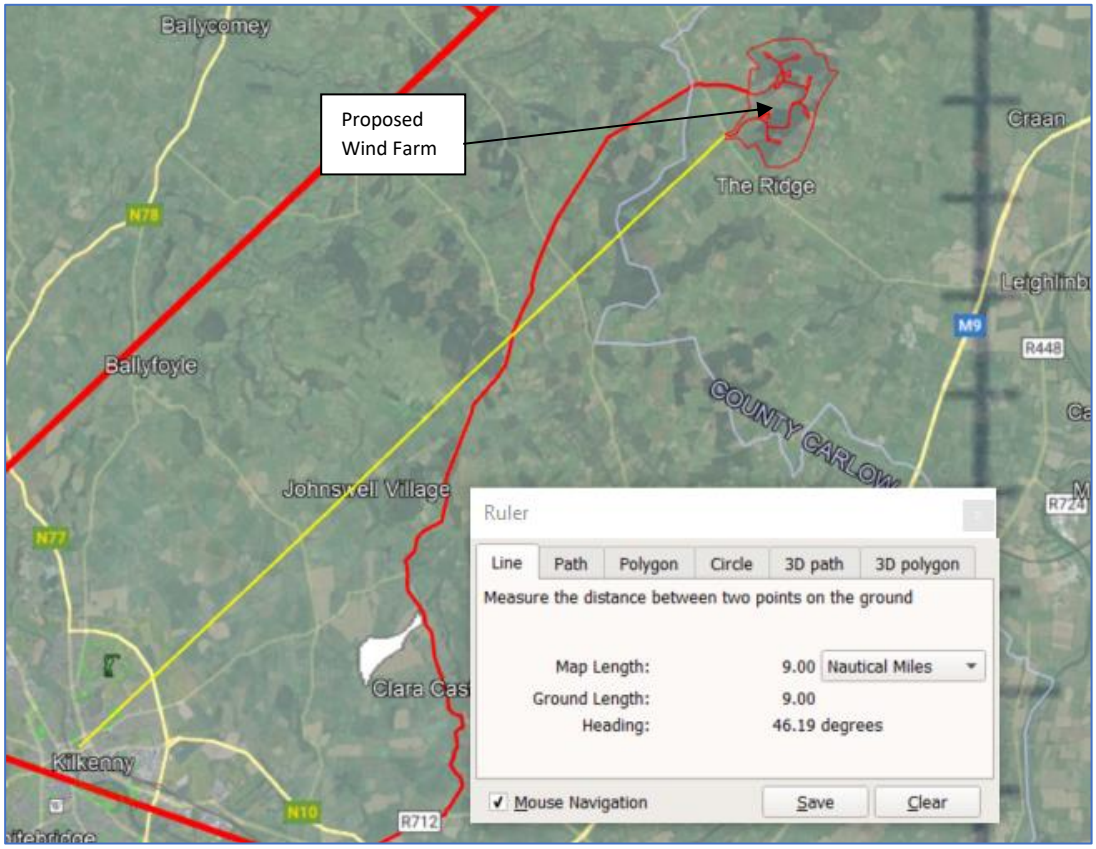

Figure 1: Location of Proposed Wind Farm

[1] Air Corps Wind Farm/Tall Structures Position Paper, Óglaigh na hÉireann, Ceanncheatru an Aer Chor

2. Existing Environment

2.1. Airspace

2.1.1. Airspace is, worldwide, divided into two simple groups – Controlled Airspace and Uncontrolled Airspace.

2.1.2. Essentially, this is whether the pilot of an aircraft is being 'given instructions' by Air Traffic Control (ATC) - Controlled Airspace - or whether they are left to fly at their own volition - Uncontrolled Airspace - , albeit in accordance with general 'Rules of the Air'.

2.1.3. Controlled airspace is further classified into classes within which certain rules exist as to 'how', and to what extent, ATC is used. These classes range from Class A through to Class F.

2.1.4. The Republic of Ireland only use Class A and Class C controlled airspace.

2.1.5. Uncontrolled Airspace is classified as Class G.

2.2. Altitudes and Flight Levels

2.2.1. Aircraft fly at one of two 'heights' – one, which is based on a local pressure setting, known as QNH, which is set on an aircraft's altimetry system, and gives a value referred to as *altitude* - Above Mean Sea Level (AMSL). An altitude is abbreviated as ALT.

2.2.2. The other is a setting which is standard across the world and, when set on an aircraft's altimetry system, is referred to as a *Flight Level*. A Flight Level is abbreviated as FL or F.

2.2.3. The 'border' of these two different altimetry references is known as the Transition Layer.

2.2.4. The lower part of this layer is known as the Transition Altitude and marks the altitude at which *climbing* aircraft, change from referring to their 'height' as an altitude to that of a Flight Level.

2.2.5. The upper part of this layer is known as the Transition Level and marks the Flight Level at which *descending* aircraft change from referring to their 'height' as a flight level to that of an altitude.

2.2.6. Aircraft in the same airspace and/or at similar 'heights' can be separated from each other because they are referencing their 'heights' to the same setting – either QNH (to give an altitude) or the Standard Setting (to give a Flight Level). It becomes very difficult to separate aircraft that are using different altimetry settings which is the reason behind this regulation.

2.2.7. Similarly, airspace vertical limits are published with reference to the two different ways of determining 'heights'.

2.2.8. Therefore, airspace may have a lower limit (a 'base' or 'starting point') of, for example, ALT 2500ft and an upper limit (a 'ceiling') of FL150 – approximately 15000ft.

2.3. Flight Rules

2.3.1. Within both groups of the above airspace, aircraft are required to fly under one of two rules; Visual Flight Rules (VFR) ***or*** Instrument Flight Rules (IFR).

2.3.2. VFR flight is conducted by the pilot literally looking through the windscreen of the cockpit. The aircraft is kept orientated with reference to the natural horizon and navigation is by roads, rivers, towns and prominent landmarks etc. The pilot is completely responsible for their own separation from other aircraft around them, as well as maintaining separation from obstacles, high terrain etc. Generally, VFR flight takes place in Class G (uncontrolled) airspace.

2.3.3. IFR flight is a demanding environment whereby the aircrafts orientation and navigation is established and maintained solely by reference to the aircraft's flight instruments. Special training, testing, and licencing, is required to be permitted to fly in accordance with these rules. The aircraft itself must also meet certain minimum equipment levels in order to be able to, and be permitted, to fly under IFR. All airline scheduled services, as well as most charter and executive (business) flights, fly under IFR. These flights generally occur in controlled airspace as ATC are able to separate aircraft from each other in poor weather. Military flying, although the pilots are trained to fly under IFR, is very often conducted under VFR due to the nature of tasks or missions, undertaken. This is especially true of training flights, particularly during the ab-Initio phases.

2.4. Visual/Instrument Meteorological Conditions

2.4.1. Just as the two flight rules differ significantly from each other so do the meteorological conditions under which they are flown. It must be stressed that these are the *weather conditions* that dictate the flight rules and not about the flight rules per se.

2.4.2. A pilot flying in accordance with VFR must, as explained, be looking out of the windscreen, and flying with visual reference to the ground and the natural horizon. In order to do this the weather conditions must also be able to support that. This is termed Visual Meteorological Conditions (VMC). Thus, an aircraft flying in accordance with VFR flies in VMC.

2.4.3. A pilot flying in accordance with IFR would, as explained, be operating, and navigating the aircraft by sole reference to the flight and navigation instruments fitted in the aircraft. Apart from the obvious exception of thunderstorms and extreme weather, the IFR pilot is not concerned with the weather conditions per se and has no requirement to be able to see outside. The pilot is required to be able to see outside during take-off and in the final stages of landing. Weather that requires this type of instrument flying is termed Instrument Meteorological Conditions (IMC).

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

2.4.5. A flight cannot fly in accordance with VFR If IMC weather exists.

2.4.6. The Standardised European Rules of the Air (SERA) publish a table to enable determination of VMC. Table 1 below shows the conditions that are required for VMC to be determined:

Altitude Band	Airspace Class	Flight Visibility	Distance from Cloud
At and above 3050m (10000ft) AMSL	A thru G	8 KM	1500m horizontally and 300m (1000ft) vertically
Below 3050m (10000ft) AMSL and above 900m (3000ft) AMSL, or above 300m (1000ft) above terrain, whichever is higher	A thru G	5 KM	1500m horizontally and 300m (1000ft) vertically
At and below 900m (3000ft) AMSL, or 300m (1000ft) above terrain, whichever is higher	A thru E	5 KM	1500m horizontally and 300m (1000ft) vertically
	F and G	5 KM*	Clear of cloud and in sight of the surface

Table 1: VMC Visibility and Distance from Cloud Minima

2.4.7. *(*) When so prescribed by the competent authority:*

(a) Flight visibilities reduced to not less than 1500m may be permitted for flights operating:

1) at speeds of 140 Kts IAS or less to give adequate opportunity to observe other traffic or any obstacles in time to avoid collisions; or

2) In circumstances in which the probability of encounters with other traffic would normally be low, e.g. in areas of low volume of traffic and for aerial work at low levels;

(b) helicopters may be permitted to operate in less than 1500m but not less than 800m flight visibility, if manoeuvred at a speed that will give adequate opportunity to observe other traffic or any obstacles in time to avoid collision.

2.5. Minimum Heights

2.5.1. Along with the Class of airspace one flies within, the rules under which the flight is undertaken, and the weather conditions that prevail, a final consideration is required – Minimum Heights.

2.5.2. SERA .3105 Minimum heights states:

'Except when necessary for take-off or landing, or except by permission from the competent authority, aircraft shall not be flown over the congested areas of cities, towns or settlements or over an openair assembly of persons, unless at such a height as will permit, in the event of an emergency arising, a landing to be made without undue hazard to persons or property on the surface. The minimum heights for VFR flights shall be those specified in SERA.5005(f) and minimum levels for IFR flights shall be those specified in SERA.5015(b)'.

This simply means that, in the first instance, any flight must be at such an altitude or Flight Level that will enable it to land clear of any persons or property. Put another way, it means that any aircraft must fly high enough so as to be able to glide or otherwise, away from people or property on the ground if it suffers some kind of emergency.

2.5.3. SERA.5005(f) – (Minimum heights for) **Visual Flight Rules**, states:

f) *Except when necessary for take-off or landing, or except by permission from the competent authority, a VFR flight shall not be flown:*

(1) over the congested areas of cities, towns or settlements or over an open-air assembly of persons at a height less than 300 m (1 000 ft) above the highest obstacle within a radius of 600 m from the aircraft;

(2) elsewhere than as specified in (1), at a height less than 150 m (500 ft) above the ground or water, or 150 m (500 ft) above the highest obstacle within a radius of 150 m (500 ft) from the aircraft.

Both these points may apply to windfarm sites, as (1) mentions 'settlements', which is a subjective term to a large degree, as it is arguable how many houses would constitute a 'settlement'. However, it is reasonable to assume the paragraph in (2) would be of more relevance in the case of the Proposed Wind Farm.

This states that if an aircraft is flying in an area with no obstacles it may fly at a height of 150m or 500ft above the surface of the ground or water. If, however, it is flying within a lateral distance of 150m or 500ft from an obstacle then it must be 150m or 500ft above that obstacle. This would apply to an aircraft in flight under VFR, overflying the Proposed Wind Farm or in its immediate vicinity.

2.5.4. SERA.5015(b) – (Minimum heights for) **Instrument Flight Rules**, states:

(a) Aircraft equipment Aircraft shall be equipped with suitable instruments and with navigation equipment appropriate to the route to be flown and in accordance with the applicable air operations legislation.

(b) Minimum levels Except when necessary for take-off or landing, or except when specifically authorised by the competent authority, an IFR flight shall be flown at a level which is not below the minimum flight altitude established by the State whose territory is overflown, or, where no such minimum flight altitude has been established:

(1) over high terrain or in mountainous areas, at a level which is at least 600 m (2 000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft;

(2) elsewhere than as specified in (1), at a level which is at least 300 m (1 000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft.

(c) Change from IFR flight to VFR flight

(1) An aircraft electing to change the conduct of its flight from compliance with the instrument flight rules to compliance with the visual flight rules shall notify the appropriate air traffic services unit specifically that the IFR flight is cancelled and communicate thereto the changes to be made to its current flight plan.

(2) When an aircraft operating under the instrument flight rules is flown in or encounters visual meteorological conditions it shall not cancel its IFR flight unless it is anticipated, and intended, that the flight will be continued for a reasonable period of time in uninterrupted visual meteorological conditions.

(3) Change from IFR flight to VFR flight shall only be acceptable when a message initiated by the pilot-in-command containing the specific expression 'CANCELLING MY IFR FLIGHT', together with the changes, if any, to be made to the current flight plan, is received by an ATS unit. No invitation to change from IFR flight to VFR flight shall be made by ATS either directly or by inference.

2.5.5. IFR flight then is, generally, highly regulated. It is done by suitably qualified pilots in the first instance and, additionally, has more restrictive separation criteria imposed upon it. Whether this be separation from other aircraft or separation from obstacles. This highly regulated environment is due to the fact that this flying may be done in conditions of limited or zero visibility.

3. Proposed Wind Farm and General Aviation

3.1. Overview

3.1.1. The Proposed Wind Farm is located on high ground approximately 9NM North-East of Kilkenny.

3.1.2. The Proposed Wind Farm is located within Special Use Airspace (SUA) known as Military Operating Area (MOA) 3. This area of airspace has vertical limits of *SFC* (the Surface of the Earth, or ground Level) up to FL450 (approximately 45000ft)

3.1.3. This is non-regulated airspace which requires awareness of the risk of its use at and below 4500ft, and cooperation with military ATC above that altitude.

3.1.4. The 'conditions of use' are set out in the Irish Aeronautical Information Publication (AIP) under ENR 5.2 and read as follows:

'*FL450/SFC. Penetration at own discretion possible by VFR and uncontrolled IFR flights up to 4500ft AMSL. Prior permission required for VFR and uncontrolled IFR penetration above 4500ft AMSL and subject to compliance with any conditions and instructions issued by Military ATS, Casement Aerodrome. ACFT must be operational Mode C transponder equipped. PPR from MIL ATS Casement, 122.000MHz. Controlled IFR flight penetration is coordinated by civil ATS. Information on activity status AVBL from ATS Dublin, ATS Shannon and MIL ATS 122.000MHz.*'

3.1.5. Furthermore, the times when the area may be active as well as the risk potentially faced by civilian aircraft due to activities within the airspace are also set out:

'Use for military flying training, aerobatics, air combat manoeuvres. Active. MON-FRI 0900-1730 UTC (Winter) MON-FRI 0800-1630 UTC (Summer)

May be activated at short notice outside published hours. Restricted for use by State aircraft.'

3.1.6. An airspace consideration in respect of General Aviation (GA) which, generally, prefer to fly in Class G airspace or where their interaction with ATC is limited to the basic requirement (if there is a requirement at all), is the Proposed Wind Farm's potential for forcing overflying aircraft to enter airspace in which they now have to communicate with ATC on a more formal basis and have no desire to fly in.

3.1.7. The 7 proposed turbines at the Proposed Wind Farm would have a maximum height Above Ground Level (AGL) of 180 m (approximately 590ft). With the average height above mean sea level of the 7 turbine positions being approximately 257m AMSL, to which is added the height of the wind turbine generator (WTG) of a maximum tip height of 180m, making a total 'height' of approximately 437m AMSL or 1434ft AMSL.

3.1.8. Using our Minimum Heights regulation noted in 2.5 above, in which an aircraft flying under VFR wished to overfly the Proposed Wind Farm, the required height to operate at in accordance with SERA.5005(f), would be 1434 ft (AMSL height of the Proposed Wind Farm turbines) plus 500ft. This would equal 1934ft – rounded up to 2000ft. An aircraft flying at this altitude would be in compliance with Minimum Height regulations and keep the aircraft

below 4500ft mentioned in 3.4, above which, ATC interaction would be more formal and 'controlled'.

3.1.9. If the pilot were flying under IFR and the Minimum Heights regulation for IFR was being observed, then the same WTG height above mean sea level would apply i.e. 1434ft, to which would be added 1000ft in accordance with SERA.5015(b). This would equal a total 'height' requirement of 2234ft AMSL in order for the aircraft flight to be compliant. This would be rounded up to 2500ft AMSL and, once again, this would enable ethe aircraft to remain below the 'above 4500ft' own discretion threshold to penetrate the MOA, as noted in 3.4.

3.1.10. Therefore, the Proposed Wind Farm would have very little impact to both VFR and IFR flights in respect of allowing them the freedom to fly below the threshold above which their interaction with ATC would be more formalised.

3.1.11. Although the Proposed Wind Farm turbines would be considered an 'Obstacle to Aviation' this does not necessarily disadvantage airspace users, and very importantly, does not necessarily constitute a danger to aircraft.

3.1.12. Aircraft fly daily in areas where obstacles exist. Every airport in the world where buildings, tree's, mountains etc exist have an 'obstacle field'. This is published in a Country's AIP. Obstacles are a managed risk within aviation. If every obstacle in the vicinity of an airport were considered a dangerous flight hazard, then one of two scenarios would exist – either aviation would not exist or any structures of appreciable height would not. The two are required to safely coexist, which they do.

3.1.13. A similar situation exists with en-route obstacles. Air routes are planned around high terrain or the air route has sufficiently high vertical limits to negate the risk. The interaction between obstacles and aircraft is one of adherence to rules and management of risk. This is a daily occurrence in the aviation industry.

3.1.14. A wind turbine is an obstacle, but the same is true of a hill, a forest of trees, or a control tower at an airport. All require managing within the rules and regulation of aviation. Obstacles are either marked or lit and the obstacles details are noted in the AIP and on maps and charts. It is no coincidence that en-route (outside of the vicinity of an airport) obstacles are required to be lit when their height exceeds 150m (~500ft) or more. This is the minimum height an aircraft is allowed to fly over an area not considered to be 'built-up'. If the obstacle is to be overflown, then 500ft would be added to this value giving a minimum height to fly of 1000ft. Aviation, being a safety and risk adverse environment, make sure that the obstacle is lit once it is 500ft or more in height in the event an aircraft has not planned on encountering the obstacle.

3.1.15. In summary, the 7 turbines making up the Proposed Wind Farm would be of negligible impact to IFR and VFR GA air traffic.

4. Proposed Wind Farm and Military Aviation/Airspace

4.1. Overview

4.1.1. Military aviation exists to protect and serve the Country in which it has been established. It has at its heart the unconditional service to its peoples as well as the protection of the Country's borders in the form of its National Airspace.

4.1.2. It responds both in times of civil disaster and during times of war or external threat and therefore has a very focussed operational remit.

4.1.3. Most Air Forces worldwide have as a common statement in their rules and regulations - and this is likely to be published in civilian publications as well – and this is that the 'Rules of the Air' do not necessarily apply to military flight.

4.1.4. This is undisputedly true during times of conflict and emergency, however, is difficult to justify during peacetime and whilst conducting training flights, especially within airspace in which civilian aircraft may, or will be, be encountered.

4.1.5. The Proposed Wind Farm is situated within MOA 3 and its vertical limits, as well as the conditions under which civilian aircraft may enter the airspace, have been noted in section 3.

4.1.6. The Irish Air Corps will use this airspace for general flight and manoeuvring training and the types of aircraft used would be , for the most part, representative of those across the fleet.

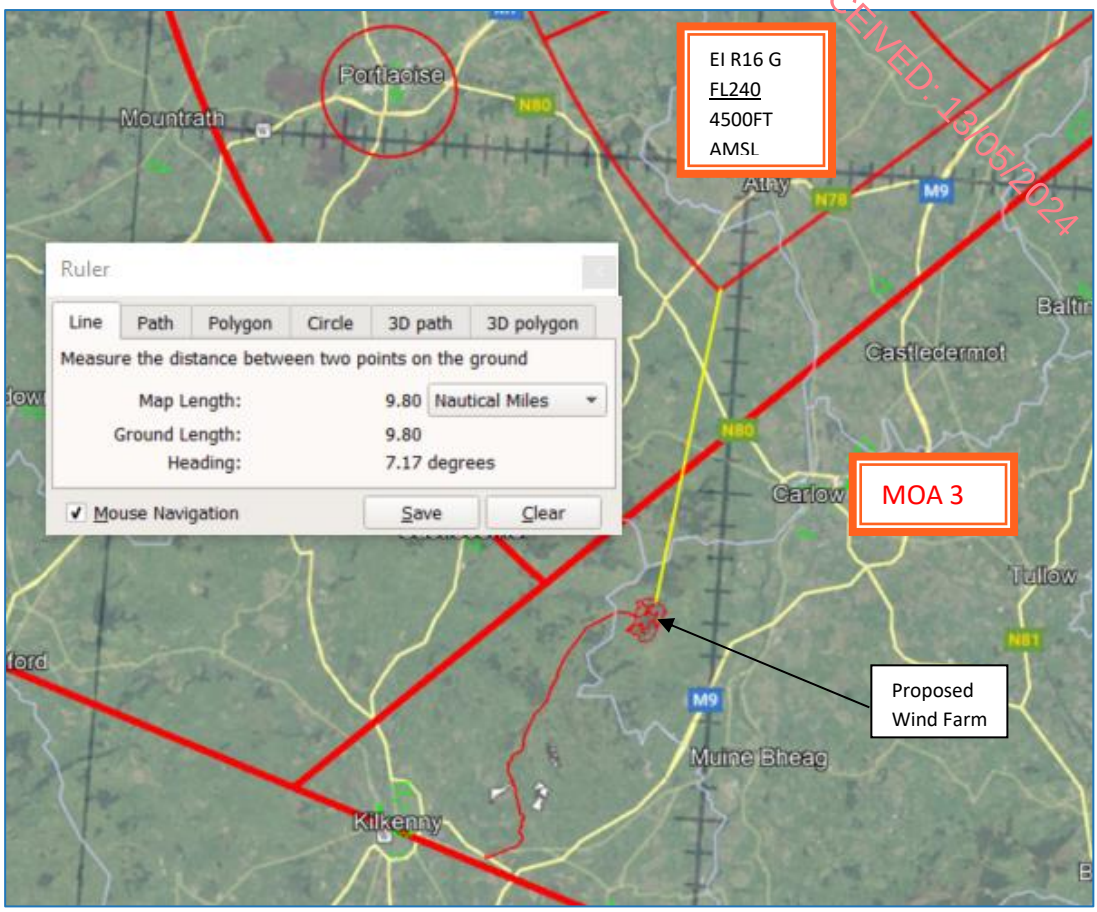

Figure 2: Proposed Wind Farm shown relative to MOA 3 and the closest Restricted Area

4.1.7. The Air Corps is the air component of the Defence Forces of Ireland. It provides military support to the Army and Naval Service through a fleet of fixed and rotary wing aircraft.

4.1.8. Air support is also provided to non-military services and include Garda air support, aeromedical services, fisheries protection, and the Ministerial Air Transport Service.

4.1.9. The roles required of the Air Corps dictate a varied fleet of aircraft. The fleet is made up of fairly modern aircraft which will in all probability have been modified and upgraded over the years to take advantage of new technologies, especially that of avionics.

4.1.10. The Air Corp Fleet, according to on-line sources, is made up of the following:

- Fixed Wing aircraft - Roles such as passenger/VIP transport, maritime patrol and support, surveillance (police operations) and training.
- Rotary Wing aircraft - Roles such as military utility missions, police air support, medevac, and naval support.

4.1.11. Of the 26 aircraft that are operated by the Corp, the majority (16) are fixed wing, with half that number dedicated to training (although this aircraft type has a potential secondary role as a light support platform for ground troops in a time of conflict).

4.1.12. The remaining 10 airframes are helicopters which, due to the versatility of this type of aircraft, are used in a variety of ways.

4.1.13. For ease of reference, a short description of the various types is made below:

Fixed Wing Aircraft;

- 1 x Learjet 45.
  A 'Business Jet' type of aircraft. Will be flown in support of VIP and movement of military personnel on urgent / operational missions.
- 2 x CASA CN-235.
  A small transport aircraft, capable of varying roles but used by the Air Corp in a maritime patrol role.
- 4 x Pilatus PC-12.
  A single engine, multi-role aircraft that is used by the Corp as a general utility aircraft and as a 'Command and Control' platform.
- 1 x B-N Defender
  A twin-engine aircraft used extensively in surveillance by a number of police and civil protection agencies. May be fitted with various camera/sensor equipment.
- 8 x Pilatus PC-9M
  A highly manoeuvrable training aircraft that can be armed for use as a ground support/ light attack aircraft.

Rotary Wing Aircraft;

- 4 x Eurocopter EC-135
  A light, multi-role, twin-engine helicopter used in a utility role. Two of these helicopters appear to be seconded for duties in the GASU (Garda Air Support Unit).

- 6 x AW139
  These AgustaWestland, medium, twin-engine helicopters are also used in a utility role, but their size would enable them to be used for more demanding tasks such as light equipment lifting and transport, as well as personnel winching.

4.1.14. It is the opinion of this report that several aircraft types may be discounted from historical concerns that have been raised by the Irish Air Corp with respect to the generality of safety of its aircraft whilst undertaking flying training etc within the MOAs. These are considered unlikely to be affected due to the nature of their roles within the Corps and subsequently, the training mission of the aircraft is different. It is the opinion of this report that the aircraft that should be discounted from closer examination in their use of, particularly, the low flying training areas are:

- Learjet (LR45)
- CASA CN-235
- Pilatus PC-12
- Britten-Norman Defender

4.1.15. The reasons for this exclusion are briefly described below;

- The **Lear Jet** is a small, fast jet aircraft used for moving passengers (8 or 9) from one airport or airbase to another in a time-efficient manner. The aircraft is designed to be used predominately within the high-level Air Traffic Control (ATC) structure at fuel efficient altitudes of 39000 feet or higher. Training on this aircraft type is generally undertaken at specialist simulator training organisations as it would not be cost effective for an organisation such as the Air Corp to operate its own simulator given that they have only one example of the airframe on their fleet. It is neither efficient, practical, or arguably, safe to train in real-life at low-level in this aircraft. This is simply not what the aircraft is designed to do.
- The **CASA CN-235** is predominantly used throughout the world as a maritime patrol and/or search and Rescue (SAR) aircraft. It may also be used as a light cargo transport or parachuting aircraft. It is unlikely this aircraft would be used in low-level training over land but may possibly be so engaged over the sea in the course of their maritime patrol training.
- The **Pilatus PC-12** is very similar in role to the Lear Jet, but slower and can be used to take-off and land at length restricted airfields and even on dirt or grass runways. Even though it has this capability, it is also able to be easily flown in and out of large commercial airports due to its ability to comply with most ATC speed control instructions. It is able to be flown and manoeuvred at low-level but again, like the Lear Jet, is more efficient at higher altitudes and would not be regularly used for flying at low-level for any sustained length of time.
- The **Britten-Norman Defender** is a twin-engine aircraft of very basic design and is ideally suited for slow, low altitude flight. Utilised n a role of a surveillance platform would dictate that it is used at an altitude of several thousands of feet whilst conducting surveillance that is either covert or as inconspicuous as possible – neither of which require low-level flight.

4.1.16. It is essential that the importance of low-level flight training for military pilots is understood and acknowledged. In times of conflict, low-level flight make aircraft difficult to detect and to target. In peacetime and whilst maintaining pilot currency, it develops confidence in equipment and develops flying skills and is therefore a foundation of military flight training. Every military force with an aviation unit undertakes low-level flying and is not unique to any one country.

4.1.17. Even though this training is of high importance to a Country's military it cannot be done at the expense of safety, whether the aircrews or the publics, and should not be undertaken lightly. Most Militaries conduct this type of training in specially designated airspace but very often have to share these areas, either wholly or partly, with General Aviation (GA) – the 'everyday' flying done, mainly, by small aircraft, for pleasure, business, or sport aviation.

4.1.18. Over the years, GA and military flying world-wide have found a degree of co-operation and through regulation, negotiation and compromise have managed to coexist relatively safely.

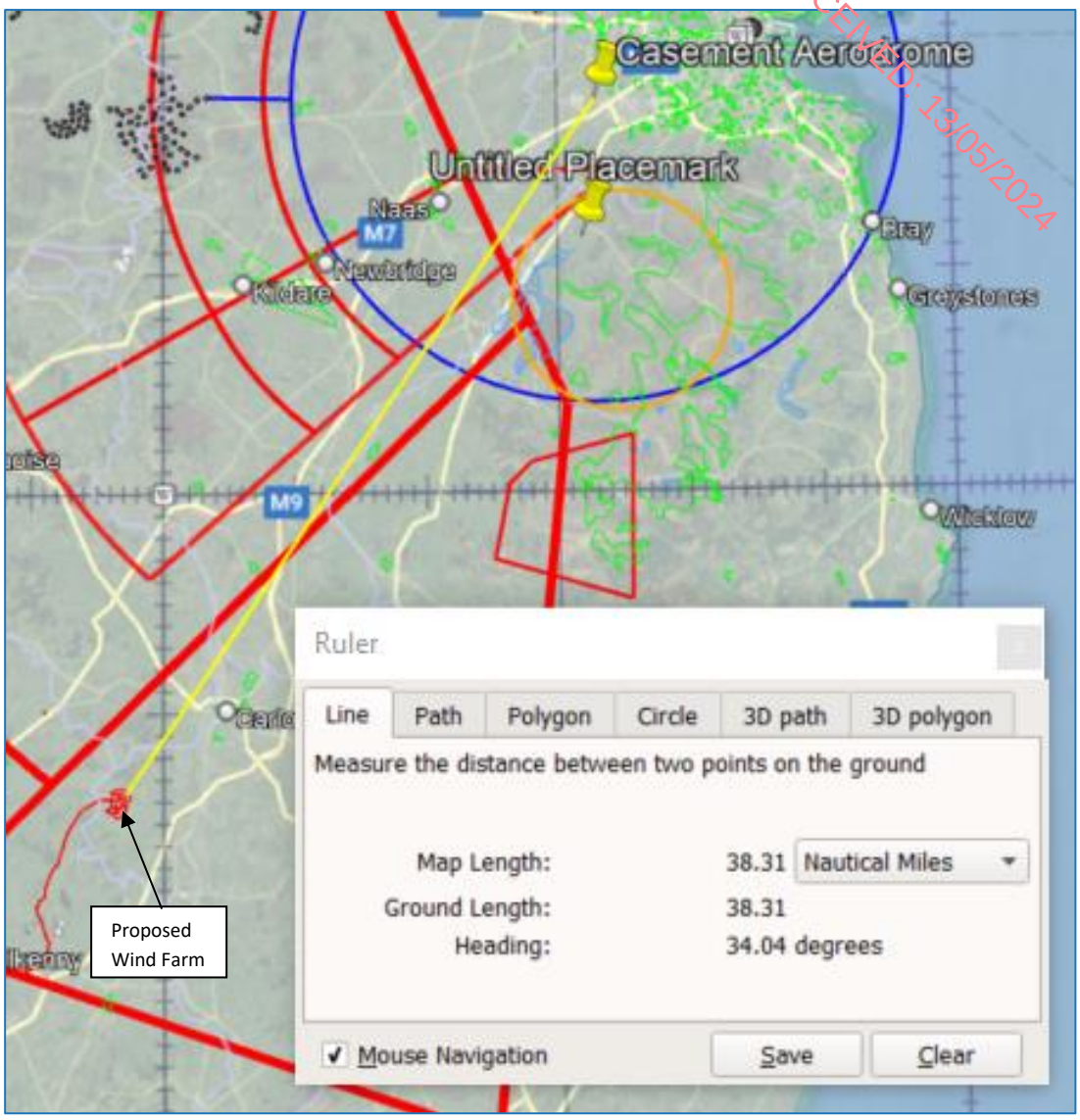

Figure 3: Proposed Wind Farm and distance to Casement Aerodrome

4.1.19. The Irish Air Corps has historically objected to wind farms in the area by citing 'safety' concerns and by presentation of its 'policy' regarding non-acceptance of any tall structures such as masts and wind turbines within 3NM of a Motorway.

5. The Air Corps Wind Farm/Tall Structures Position Paper

5.1. Overview

5.1.1. Cyrrus is familiar with the '*Air Corps Wind Farm/Tall Structures Position Paper*'. This position paper was published in 2014 as a result of an internal Air Corps meeting and puts into place, firstly, the Air Corps position on tall structures and windfarms and, secondly, restrictive distances from the military aerodrome at Baldonnel and roads that form 'critical low-level routes', that the Corps saw fit to impose *at the time*. This paper appears to have no basis in aviation law or regulation and seems to be purely a result of an internal Air Corps process. The paper was then to be forwarded to the Department of the Environment, Heritage and Local government *to 'inform its policies and guidance in respect of windfarms.'*.

5.1.2. The Paper has as its objective, the following:

- *Air Corps operations and training may be accomplished in a safe and economical manner;*
- *Baldonnel remains a viable aerodrome for IFR and VFR traffic;*
- *The ability to train military flying skills is protected;*
- *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.*

5.1.3. The Air Corps states in Section 2 of the Paper, Statement of position, that*;*

a. The Air Corps is opposed the erection of wind farms or other obstacles which will affect its ability to train and operate in a safe and economic manner.

b. The Air Corps is opposed to any wind farms or tall structures in the following areas:

(1) Lands underlying military airspace used for flying activity

(a) The area contained in Danger Area EI-D1.
(b) The area contained in Danger Area EI-D5.
(c) The area contained within Danger Area EI-D6.
(d) The area contained within Danger Area EI-D13.
(e) The area contained within Danger Area EI-D14.
(f) The area contained within Restricted Area EI-R15.
(g) The area contained within Restricted Area EI-R16 within 20NM of Baldonnel.
(h) The area contained within Military Operating Areas, MOAs 3 and 4 within 20NM of Baldonnel.

(2) Areas wherein military flying occurs at low level as identified in the annexes listed below.
(a) Low flying training areas within MOA4 in the areas of
a. Blessington
b. Edenderry/Allenwood/Rathangan
c. Kilmeague/Newbridge
(b) Low flying training area West (LFTA WEST)

(3) *A distance of 5NM or less from military installations*.

(C*) The following routes are identified as critical low level routes in support of Air Corps operational requirements and the Air Corps is opposed to the erection of wind farms or tall structures within 3NM of the route centreline which could affect Air Corps' ability to access regional areas.*

(a) N/M1
(b) N/M2
(c) N/M3
(d) N/M4
(e) N/M6
(f) N/M7
(g) N/M8
(h) N/M9
(i) N/M11
(j) N25
(k) N17 between Sligo and Knock
(l) N15/N13 between Sligo and Letterkenny
(m) N14 from Lifford to Letterkenny and R245 and R2476 from Letterkenny to Fanad Head

Applications or proposals for structures in these areas of a height greater than 45m above ground level at the site of the object must be referred to Irish Air Corps for assessment of potential impact on flight operations.

5.1.4. The proposed wind farm does not appear to 'infringe' on any of the flight training areas or the designated distance from Casement Aerodrome noted in the position paper. As shown in Figure 3, the wind farm is almost twice the distance of the 20NM noted in 5.3 (1) (h).

5.1.5. The position paper notes various low flying areas within MOA 4 and a low flying training area West (LFTA WEST). A search of military publications as well as the Irish Aeronautical Information Publication (AIP) does not show LFTA WEST and it is possible that it is no longer used. The wind farm will not be located within MOA 4.

5.1.6. On the Irish Air Corps publicly available website[2], aeronautical data is available under a heading of *Public Information* and contains information regarding procedures for pilots flying in and out of Casement Aerodrome, as well as information on low flying areas. The publication clearly states that '*Low level flight training is conducted in the IAC Low Flying Training Area (LFTA), in the Wicklow Mountains'* and that '*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*'.

5.1.7. As Figure 4 below shows the proposed wind farm is a *minimum* of 26NM from the low flying route in the Wicklow Mountains/Blessington Lakes area as described in the website of the

[2] https://www.military.ie/en/who-we-are/air-corps/

Air Corps and therefore constitutes no hazard whatsoever to aircraft on these two routes in the Wicklow Mountains.

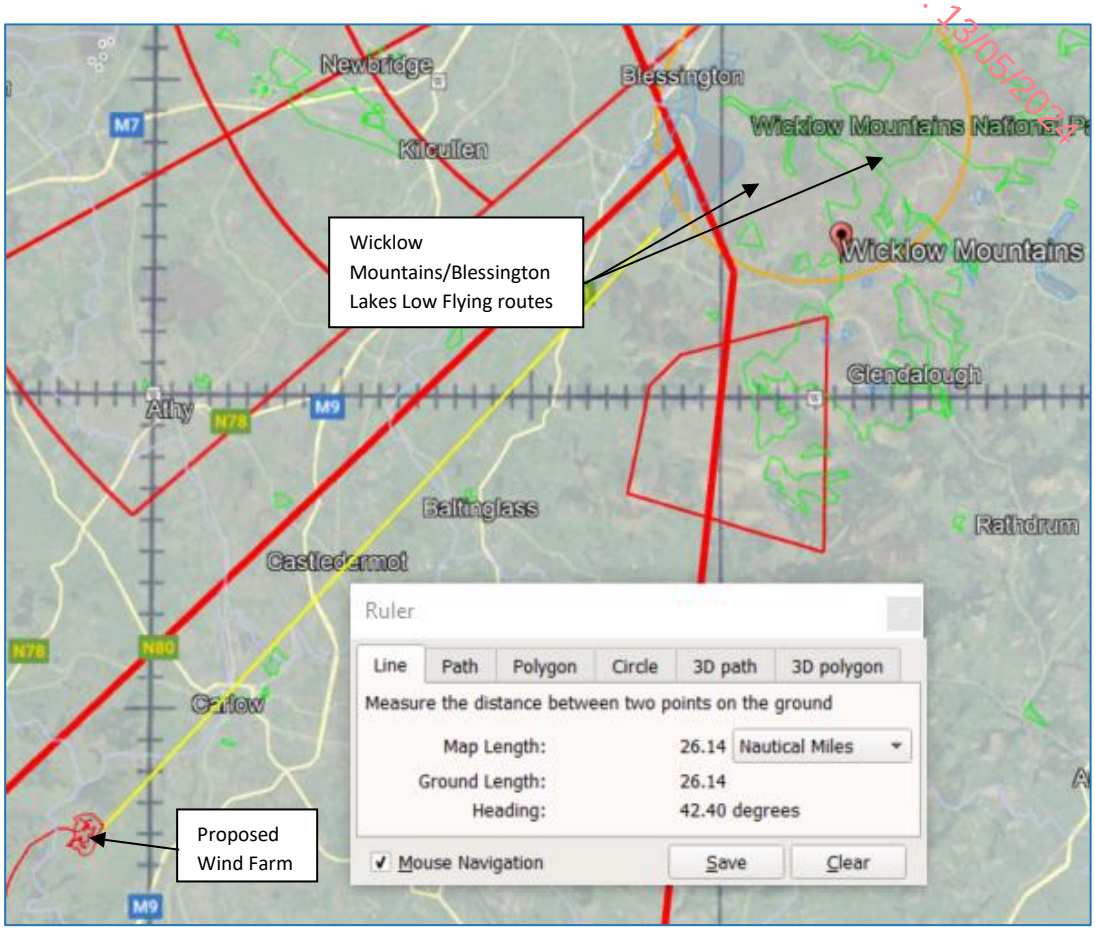

Figure 4: Low flying area in the Wicklow Mountains/Blessington Lakes area

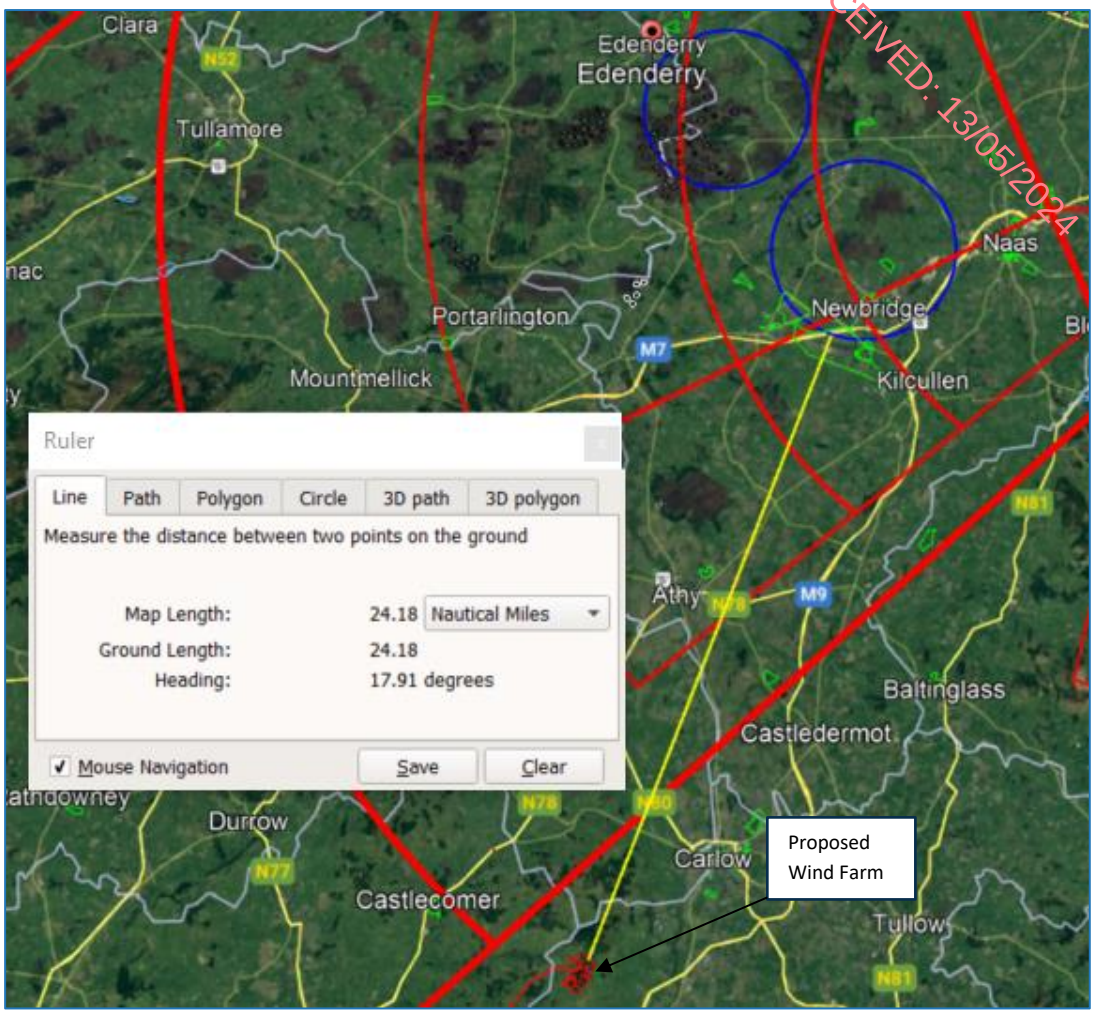

Figure 5: Low Flying Training Area Newbridge distance from Proposed Wind Farm with Edenderry Low Flying Training Area at a greater distance

5.1.8. Figure 5 shows the Proposed Wind Farms to be greater than 24NM from the Newbridge Low Flying Training Area with the other area, Edenderry, at a greater distance still. Both these training areas will be unaffected by the Proposed Wind Farm.

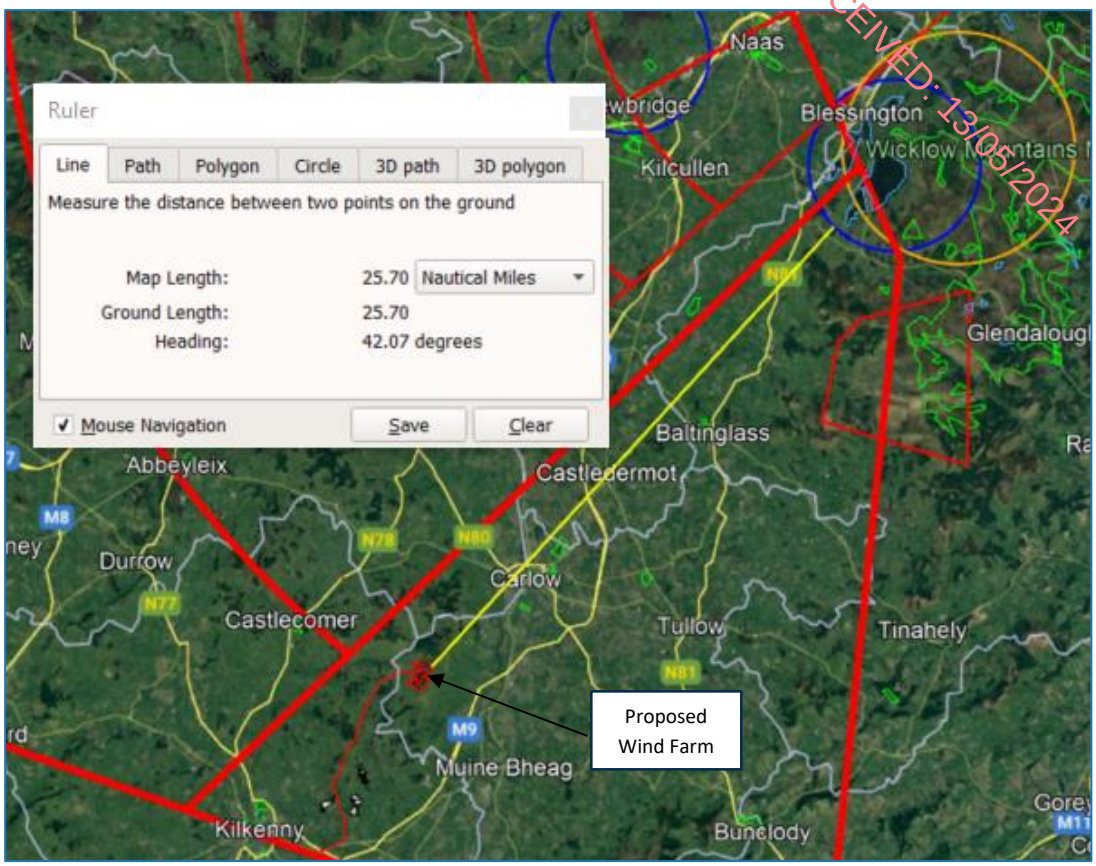

Figure 6: Distance to Blessington Low Flying Training Area from Proposed Wind Farm

5.1.9. Figure 6 above shows the distance, from the Proposed Wind Farm to the Blessington Low Flying Training Area as depicted in the Air Corps Tall Structures Position Paper, to be in excess of 25NM. The Blessington Low Flying Training Area will be unaffected by the Proposed Wind Farm.

5.1.10. The Proposed Wind Farm is located, however, within an area less than the 3NM from a motorway as designated in 5.3 (3) (C) above.

5.1.11. The Proposed Wind Farm is located approximately 2.2NM from the M9 Motorway, as shown in Figure 7 as identified by the Department of Defence in their EIAR scoping response issued on 2nd February 2023.

5.1.12. The position paper states that the motorways '*….are identified as critical low level routes in support of Air Corps operational requirements….*' which could '*…..affect Air Corps' ability to access regional areas'*.

5.1.13. The Irish Air Corps responded to the consultancy on the 2nd February by stating in the first instance that the IAA do not have remit for the regulation of military aviation or installations. This is correct. However, it must be noted that the sharing of airspace between civilian and military aircraft makes it very difficult for the DOD to simply fly according to military rules. Aircraft are required to fly according to a basic standard of flight and if two groups of aviation are using the same airspace using different rules could cause safety issues.

5.1.14. Further comment in the response closely followed text from the *Tall Structures* Position Paper in which the DOD states that they are unable to support any tall structure within 3NM of a named motorwa

5.1.15. Whilst it is appreciated that the aircraft, whether rotary or fixed-wing, could use the motorways as 'routes' the fact remains that these roads - for use by vehicles - have not been designated as *air routes* by the IAA, EASA or ICAO. It has simply become an alternative way for the Air Corps to navigate in marginal weather conditions.

5.1.16. The pilot of an aircraft using a line feature such as a road must be able to see the feature at all times - thus allowing the feature to be followed. Therefore it is logical to assume the pilot is looking through the windshield of the aircraft and manipulating the controls of the aircraft to enable a path following the feature to be flown. This is known as flight according to Visual Flight Rules (VFR). It is immaterial whether the aircraft is military or civilian - the flight is a VFR flight.

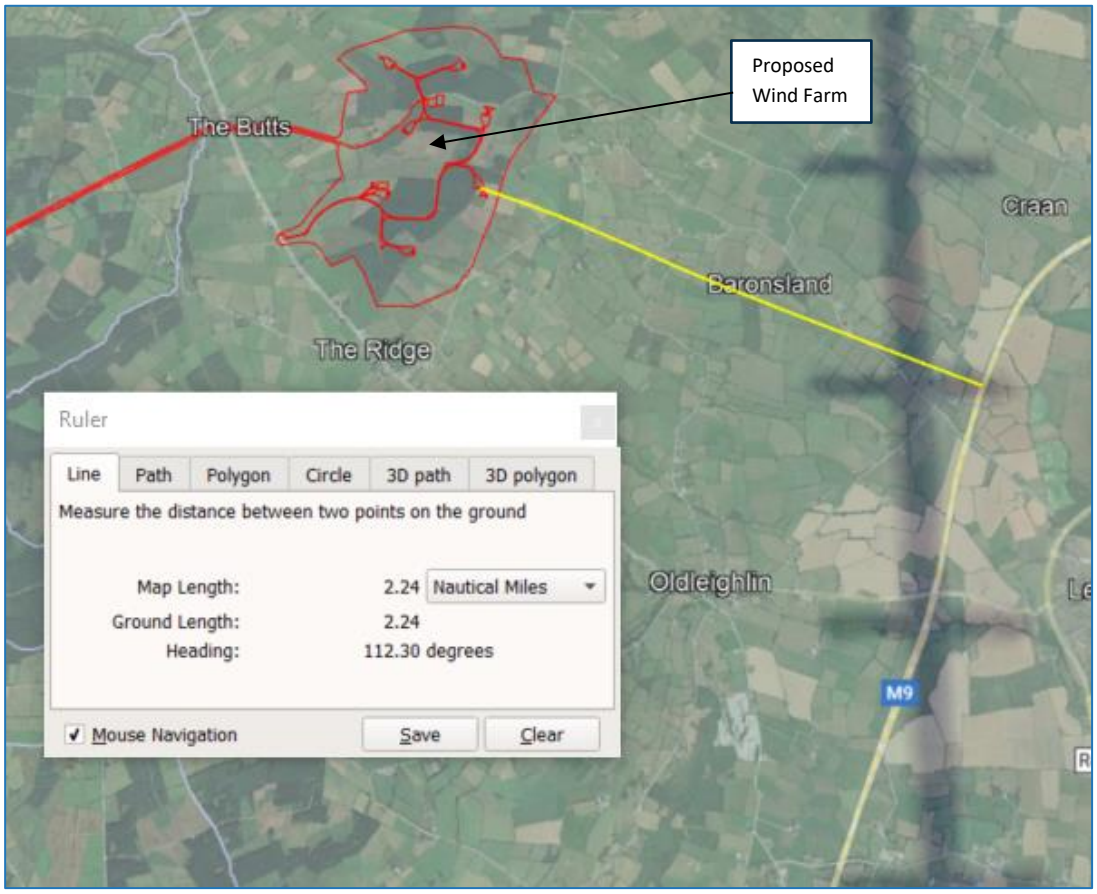

Figure 7: Minimum distance from closest Proposed Wind Farm turbine to M9 motorway

5.1.17. A point to be made regarding the Paper is that it is 9 years old. Training areas and procedures change over time in both military flying as well as within the civilian flying environment . In civilian aviation, changes to airspace, regulation, and industry 'best practice' are quickly notified via official and 'unofficial' channels such as the AIP and flying clubs etc.

5.1.18. As stated, the Department of Defence responded to scoping on the 2nd February by stating that they were unable to support tall structures within 3NM of motorways named in the *Tall Structures* position paper. Turbine layout has been finalised at pre-planning stage and this may aid the Department of Defence in reviewing their stance communicated in their scoping response.

5.1.19. Military institutions are generally very slow to react to changes to the environment in which they operate unless of course it is a direct change or effect to/on their remit such as conflict or a National disaster.

5.1.20. It is undoubtably time for the Paper to be brought up to date and fit for the purpose of applying a pragmatic safeguarding policy between wind farms and the Irish Air Corps.

6. Flight in the Area – Practical Application

6.1. Overview

6.1.1. Obstacles are encountered everywhere in aviation. From airport equipment as the aircraft manoeuvres around an airport, to terrain en-route - obstacle such as trees, buildings, masts and wind turbines in the vicinity of the airport, are, of necessity, required to be avoided by pilots.

6.1.2. Whilst flying VFR, pilots are responsible for identifying obstacles and flying their aircraft a safe distance from them in a process known as 'see-and-avoid'. This, for the most part, applies to avoiding other aircraft in the vicinity as well.

6.1.3. IFR flight is different in that the pilot may be in weather conditions that preclude them from seeing obstacles such as terrain, buildings, masts and, indeed, other aircraft. Therefore far more onerous criteria and regulation is applied to the IFR flight. Flight paths across Countries are safeguarded against high terrain and once the aircraft descends towards an airport it will enter a highly regulated environment of procedures that are safeguarded by very specific criteria, in order to land safely – sometimes in little or zero visibility.

6.1.4. Therefore, there is a completely different mindset when comparing the two different rules under which flight takes place.

6.1.5. The 3NM buffer that the Air Corps require as a condition in their Position Paper can only relate to VFR flight. This is because the requirement directly links it with navigation along motorways. There are no aviation electronic aids established on these roads so the only way to use these roads for navigation is visually – hence this requirement can only be applied to VFR flight.

6.1.6. Whilst military aviation the world over generally publishes a caveat to its flight documentation that military aircraft do not always adhere to civil flight rules, it nevertheless remains incumbent on the military flight to operate in a safe a manner as possible. Whilst this is easily done in an area where no civil aircraft are allowed and the flight is responsible simply to itself, it becomes a somewhat more complex issue when civil aircraft may be in the vicinity. And more importantly, entitled to be in the area.

6.1.7. Military aircraft are under the same obligation as civil flights when flying under VFR to utilise the 'see-and-avoid' principle, especially when in airspace that may be used by both. In such airspace it would be potentially unsafe to fly in contravention of civilian regulation as the civil flights would be adhering to that convention.

6.1.8. Some Country's Air Forces have an additional caveat that notes that military aircraft will not conform to civil regulation *only* in times of war or National emergency. For example, the national airspace of the USA was cleared of civil flights, and the military given 'free rein' within the airspace, during the '9/11' terror attacks.

6.1.9. As stated in 2.5.3, certain minimum heights must be observed whilst operating an aircraft under VFR. This, quite simply, states that if an aircraft is being flown within 500ft laterally or vertically of an obstacle, it must ensure it is 500ft above that obstacle.

6.1.10. Therefore if an aircraft were flying at 500ft above ground level near the Proposed Wind Farm and then wished to fly on a route over the turbines it would need to climb to a height that ensured it was 500ft above the highest turbine whilst transiting the Proposed Wind Farm. Once clear of the turbines it could descend once again to 500ft above the ground.

6.1.11. This sometimes causes problems whereby the turbine heights are very close to the base of controlled airspace. This may prevent a pilot who wishes to stay clear of such airspace the opportunity to do so, by forcing them to climb as they pass over a wind farm and forcing the pilot to enter that airspace.

6.1.12. In the Proposed Wind Farm's case this situation does not present itself. In 3.4, it shows that flights are possible below 4500ft altitude without prior permission from military ATC. With the maximum tip heights of the Proposed Wind Farm turbines at 180m AGL and the elevation of the Proposed Wind Farm at approximately 260m we have a maximum tip 'altitude' of approximately 440m AMSL. This is equivalent to 1444ft AMSL. For comparison with an aircraft in flight, this would be rounded up to 1500ft.

6.1.13. Should an aircraft be flying at 1500ft altitude and wish to fly directly overhead the Proposed Wind Farm it would be required to add 500ft to its altitude for obstacle clearance in accordance with *2.5.3.SERA.5005(f) – (Minimum heights for) Visual Flight Rules*. This would then dictate the aircraft flies at an altitude of 2000ft. The 'boundary' at which the pilot would require prior permission from military ATC is at 4500ft, and therefore is still 2500ft below the altitude at which that would occur. The presence of the Proposed Wind Farm turbines would create no undue inconvenience to the pilot with regard to forcing the pilot to fly at an altitude whereby they would be forced to request permission or 'clearance' from military ATC.

6.1.14. A possible situation that *may* arise from the presence of the Proposed Wind Farm turbines, however, is one of flight visibility and distance from cloud regulation. This requirement is shown in *Table 1: VMC Visibility and Distance from Cloud Minima.* The altitude band for our example aircraft above is *'At and below 900m (3000ft) AMSL, or 300m (1000ft) above terrain, whichever is higher'* and in F or G airspace. The visibility and distance from cloud requirements are a flight visibility of 5KM and to remain clear of cloud and in sight of the surface.

6.1.15. Therefore our example aircraft may be approaching the Proposed Wind Farm at 1500ft altitude with a flight visibility of 5Km, but be flying just underneath cloud cover. If the pilot wished to fly overhead the Proposed Wind Farm, they would need to add 500ft to their altitude to remain in compliance with minimum heights regulation whilst traversing the Proposed Wind Farm. If the added 500ft placed the aircraft in the cloud this would, under VFR, be illegal, and secondly, be potentially very dangerous. Pilots receive special training and require specific licensing, in order to fly in cloud (IFR) - should a pilot not trained in IFR flight find themselves in cloud, it could result in a very serious emergency situation.

6.1.16. In the circumstances above, the VFR pilot would be obliged to fly around the Proposed Wind Farm maintaining their altitude, in this example, of 1500ft, and remaining clear of the cloud above them.

6.1.17. Given the ridge of high ground on which the Proposed Wind Farm would be constructed, a VFR flight such as the example above, would be more likely to fly to the east of the Proposed

Wind Farm over lower ground, avoiding this North-East South-West orientated area of higher terrain. The onus is on the pilot to operate the aircraft in accordance with the rules and criteria associated with the flight rules under which the flight is being conducted.

6.1.18. In the case of military aircraft using the motorway system in Ireland for navigation the same criteria would apply as the chances of encountering civilian aircraft would be high.

6.1.19. In general, it can be assumed that an Air Corps helicopter, as well as its fixed-wing training fleet, would be using the motorway system for navigation in order to *'….access regional areas'*.

6.1.20. Using minimum heights regulation, albeit civil air law, the aircraft would need to be 500ft above the highest obstacle within 500ft laterally of the aircraft. Quite why the Irish Air Corps are applying an 'obstacle buffer' of 3NM is unclear and does not appear to be anything other than criteria decided in an internal meeting.

6.1.21. On the M9 motorway – a portion of which would most likely be under scrutiny in this assessment – an aircraft following this section of road would be no less than *13,395ft* away from the closest Proposed Wind Farm turbine.

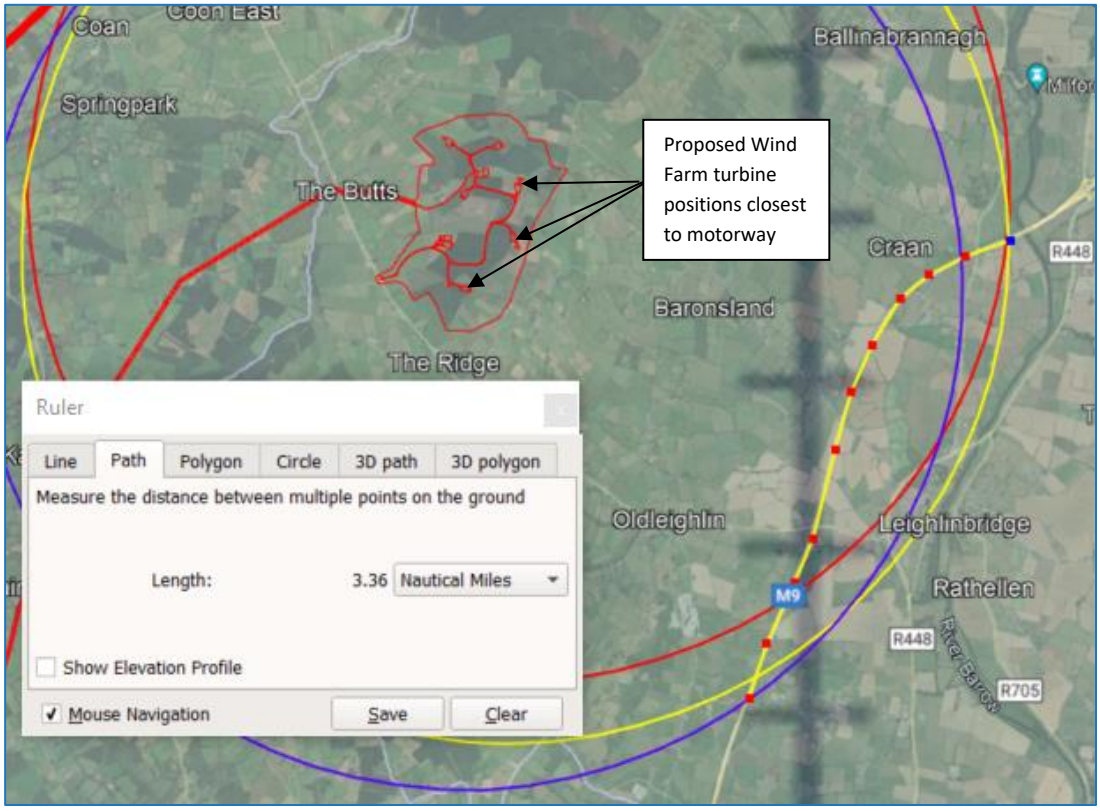

Figure 8: Portion of M9 where the 3NM 'buffer' is reduced to a minimum of 2.2NM

6.1.22. In figure 8 above, 3NM radius rings were drawn from each of the three closest Proposed Wind Farm turbines, intersecting the M9. This resulted in a portion of motorway, 3.36NM in length, where the 3NM 'buffer' as noted by the Air Corps in their Paper, is reduced from 3NM to 2.2NM, or a reduction of 26.6% in 'buffer' distance.

6.1.23. In terms of the length of time an aircraft would be within this 'reduced buffer zone' an example of a helicopter can be used as this would be calculated at a lower speed than the fixed-wing training aircraft and therefore give a longer 'exposure' time. Using a pragmatic speed of the smallest of the two helicopters the Air Corps has at its disposal, of 130 knots Indicated Airspeed (KIAS), the distance of 3.36NM is flown in 93 seconds, or a little over one and a half minutes in still air conditions.

6.1.24. Similarly, if we use a speed of 220 KIAS for the fixed-wing training aircraft flying along the motorway, the distance is completed in a time of 55 seconds in still air conditions.

6.1.25. In both cases this represents a reduction of 26.6% – one for 93 seconds and the other for 55 seconds – in terms of the 'buffer' required by the Air Corps being reduced slightly.

6.1.26. A flight along this portion of the M9 would also need to take into account the sharply rising terrain to the west of the motorway and, to a practical degree, the Proposed Wind Farm is shielded somewhat by the ridge of high ground running North-East South-West to the west of the motorway.

6.1.27. Flying along a motorway at low level and in reduced visibility is not without risk. The biggest risk, at the extremes of risk possibility, would be bridges and overhead gantries. Telecoms masts and High Mast Lighting (HML) would also pose a threat. However, any flight in such weather would also have to remain in sight of the motorway as the Air Corps have stated they use it for navigation. Also a consideration is that aircraft should, when following a line feature, for example, roads, railway lines, rivers etc, keep the line feature on their left. This provides a small degree of separation between opposite-direction flights. This does not, however, allow pilots to stop using the see-and-avoid technique and they would remain responsible for the aircraft's separation from terrain, obstacles, and other aircraft.

6.1.28. It is appreciated that the Air Corps provide vital support to communities, especially the more rural ones, in terms of emergency medical support and search and rescue flights. These flights would, at times, operate in poor weather conditions across the Country and the motorway system may very well be helpful. However, with the common usage of Global Positioning Systems (GPS), modern aircraft – even small, privately owned ones – have navigation capabilities far greater than large passenger jets of just a few years ago.

6.1.29. The Irish Air Corps provide helicopters and crews for Guarda duties and for emergency medical evacuation tasking. Therefore these helicopter missions are flown by highly trained and experienced crews, and it would be unusual for helicopters engaged on such missions to be following roads and not flying direct routes to hospitals etc.

6.1.30. Taking the Air Corps position into account one may form the view that the motorways would provide an 'obstacle-free' zone instead of needing to avoid obstacles such as wind turbines if a more direct route were flown. The environment that the modern aircraft and their pilots operate in have numerous obstacles. The VFR pilot is required to adhere to a 'see-and-avoid' regime. Obstacles are marked and/or lit and they are published within flight documentation by the IAA. Pre-flight planning is a requirement of any flight and pilots are required to make themselves familiar with the route, airspace, weather, airport details and any obstacles en-route such as high terrain, wind farms or high masts.

7. Addressing the Reduction of the 3NM Buffer

7.1. Overview

7.1.1. It is unreasonable for the Air Corps to expect a completely obstacle-free environment in which to both train and, more pointedly, to carry out their daily tasks. All pilots, civil and military, are trained to plan their flights in accordance with National regulations, taking note of obstacles, airspace, and altitude restrictions and to fly accordingly. Military pilots are among the most highly trained pilots in the aviation industry and very often have to operate in extremely adverse conditions. An environment in which obstacles would have to be mitigated against by appropriate flight planning should not present any undue operational difficulties to military pilots.

7.1.2. The Position Paper was published in 2014 as a result of an internal Air Corps meeting, appears to have no basis in aviation law, and seems to be purely a result of an internal Air Corps process. The paper was then to be forwarded to the *Department of the Environment, Heritage and Local government* to 'inform its policies and guidance in respect of windfarms.'. It is assumed that these departments are consultees during any planning process by developers of proposed windfarms. Apart from being presented with this Paper it is not known whether any clarification was requested by this Department in order for it to better understand what it was being asked to consider when forming *'… it's policies and guidance in respect of windfarms'*.

7.1.3. As part of the EIAR process, the Department of Defence was scoped with and responded in February 2023. Turbine locations will be issued to the DOD at the pre-planning stage.

7.1.4. Similarly, the Paper states '*The AC (sic) position contained within this paper should be notified to planning authorities including An Bord Pleanála*'. It is as important, and probably more so, that, as with the department mentioned in 7.1.2 above, the planning authorities have access to a challenging view on the tall structures paper.

7.1.5. Helicopters are very often engaged in aeromedical missions and are ideally suited to this role. Many smaller Countries, such as the Republic of Ireland, operate these services, which are critical to rural communities, through the Country's Defence Forces. From landing on roads in the presence of power lines and signage, to landing at hospitals which are very often in urban areas, helicopters on these types of tasks safely deal with a complex obstacle environment on a daily basis.

7.1.6. From a practical point of view there is very little, if anything, a developer can do when a project is being considered within the 3NM buffer of a named motorway. Redesign of a turbine layout may well be an option as would, or in addition to, removal of certain turbines within the wind farm site. This option would obviously only be available should the wind farm site be a certain distance from the motorway. If a site was for example straddling the 3NM buffer zone border, the number of turbines requiring deletion from the plan may make the project commercially unviable. Even at a distance at which these options could be considered, the deletion of one or two turbines may make a wind farm project commercially unviable.

7.1.7. If the amount of 'breach' of the 3NM buffer were small as in this case, then a revised turbine layout *may* make a difference of a magnitude to which the Air Corps could potentially withdraw any objection it may have had in place. Such a proposal would need to be presented to the Air Corps for consideration.

7.1.8. In respect of a wind farm, the commercial considerations *may* be such that it would *theoretically* be possible to redirect a small portion of motorway, although this would be hugely expensive and would probably make this an unfeasible and unreasonable option.

8. Impact Assessment Methodology

8.1. Overview

8.1.1. The following section outlines the methodology used to assess the potential impacts on Civil and Military Aviation.

8.1.2. In assessing the significance of the effects from the Proposed Project it was necessary to identify whether or not there will be an impact on aviation operations. The aviation industry is highly regulated and subject to numerous mandatory standards, checks and safety requirements, many of which are international in nature (ICAO) and requiring the issue of operating licences.

8.1.3. In all cases, the sensitivity or magnitude of the impact on operations can only be identified by the organisation conforming to the appropriate aviation Risk Classification Scheme used to quantify and qualify the severity and likelihood of a hazard occurring. The Risk Classification Scheme is a fundamental element of an aviation organisation's Safety Management System (SMS), which must be acceptable to, and approved by, the IAA or any Military Authority, as appropriate.

8.1.4. As such, for the purposes of this assessment, no detailed grading has been made of the magnitude of the impact or sensitivity of the receptor on the basis that any potential reduction in aviation safety cannot be tolerated. Instead, the following definitions of basic impact have been used as defined in Table 2 below.

8.1.5. In light of this, a simpler methodology that is more commonly used in wind farm EIA Aviation and Radar chapters is employed – a table of which is shown below;

SIGNIFICANCE	DEFINITION
High Impact	Receptor unable to continue safe operations or safe provision of air navigation services (radar) or effective air defence surveillance in the presence of the Wind Turbine Generators. Technical or operational mitigation of the impact is required.
Moderate Impact	Receptor able to continue safe operations but with some restrictions or non-standard mitigation measures in place.
Low Impact	The Project will have little impact on the aviation stakeholder, or the level of impact will be acceptable to the aviation stakeholder.
No Impact	The Project will have no impact on the aviation stakeholder and will be acceptable to the aviation stakeholder

Table 2: Risk Assessment Table - Impact Significance

8.1.6. The relationship between the Proposed Wind Farm and the aviation environment in which it is proposed will be 'risk assessed'. This will entail identifying the key issues and measuring them against the Risk Assessment Table in terms of their potential impact on the aviation environment. The Aviation Environment considered will be:

- the Airspace in the vicinity of the Proposed Wind Farm;
- the degree of impact to civil aviation (General Aviation); and
- the Irish Air Corps envisaged day-to-day flying activities.
- The location of the Proposed Wind Farm being within 3NM of a motorway as noted in the Air Corps position paper.

9. Risk Assessment

9.1. Airspace

9.1.1. The wind farm lies within the Military Operating Area (MOA) 3. This constitutes unregulated airspace wherein aircraft may penetrate the MOA at their own discretion up to an altitude of 4500ft. Above that altitude an aircraft is obliged to engage with military ATC or, if flying IFR, with civil ATC (who would coordinate with their military counterparts). For the Proposed Wind Farm - the majority of GA is likely to be small aircraft flying at or below the 4500ft 'ceiling', above which engagement with military ATC is required.

9.1.2. The height of the turbines at 180m (591ft) above ground level, added to the average ground elevation of the Proposed Wind Farm turbine positions of approximately 258m (846ft) results in a height above sea level of the turbines of 1437ft. If one adds the required 500ft above that in order to comply with (VFR) minimum heights regulation then an aircraft must fly at 1937ft or rounded up as would be the case, 2000ft. This would give ample space between passing over the turbines legally and, having to engage with military ATC at 4500ft. Therefore the VFR pilot flying for pleasure at 2000-4500ft in the vicinity of the Proposed Wind Farm, may do so without being inconvenienced. Even IFR flights, which are required to add 1000ft to obstacle heights would only be required to fly at 2437ft (rounded up would be 2500ft). Although, due to minimum heights available for IFR flight, would probably fly at a minimum of 3000ft. Outside of a lateral distance of also 500ft from the turbines, the VFR pilot may fly (subject to not being over a 'congested area or settlement') at 500ft above the ground. This would arguably be considered ill-considered flying as low-level flight such as this constitutes high risk.

9.1.3. Therefore the potential impact of the location of the wind farm on Airspace is assessed as **Low Impact.**

9.2. General Aviation

9.2.1. As noted above, the average aircraft flying in the vicinity of the Proposed Wind Farm will not be forced into airspace in which they may not wish to operate. However, the Proposed Wind Farm will constitute an 'obstacle to aviation' in that 7 turbines at heights of 591ft above the ground do constitute a collision risk for an aircraft that may be flying at 500ft above the ground. Notwithstanding the fact that such operation at low level may well go against the better judgement of the average pilot, it would be completely legal for a pilot to fly at such a level – providing, of course, they were not flying over a settlement or congested area. The Proposed Wind farm's turbine tops would be approximately 100ft *above* the pilot if they were flying at 500ft above the ground. This is potentially dangerous. It is important to note however, that the aviation industry and regulation recognise that it is impossible to have a completely obstacle-free environment set aside for aviation, and therefore such obstacles are mandated to be notified in various official documentation. In addition to this, appropriate lighting on the Proposed Wind Farm's turbines will be required. It is obvious then that structures that constitute obstacles to aviation are an accepted risk by the industry and are managed accordingly.

9.2.2. The VFR pilot is obliged to fly according to a 'see and avoid' principle. Obstacles including masts, wind turbines, powerlines (electrical transmission lines) and cables are a known quantity, and the pilot is obliged to be aware of these and to include it in pre-flight planning.

9.2.3. Similarly, a pilot flying in accordance with IFR must plan their flight to be separated from obstacles by 1000ft above the highest obstacle within 8KM of the obstacle. It is generally not common for flights to fly in airspace where there is not direct engagement with Air Traffic Control when operating under IFR and *in general* this type of flight is operated, for the most part in controlled airspace or in which they are receiving some degree of service from ATC. The reason for this is that under IFR the pilot may be flying in meteorological conditions that do not allow the visual acquisition of obstacles and other aircraft.

9.2.4. Due to the regard and compliance with regulation that is the norm within the aviation industry and the fact that there is no reason why the Proposed Wind Farm would require pilots to adopt any measure other than what is normally prescribed for obstacle avoidance, the impact to General Aviation is assessed as **Low Impact.**

9.3. Irish Air Corps Activities within MOA 3

9.3.1. A Country's Air Force must train. Military flying is heavily geared towards training and is the reason military pilots are highly regarded. A critical part of this training is low level flight which develops critical flying skills and confidence in training and equipment. Many countries generally set aside large areas of airspace for military flight training and exercises. These are generally restricted to various degrees ranging from prohibiting general aviation to allowing civil flights to operate within the areas subject to certain conditions. Military flying worldwide sometimes coexists uneasily with its civil counterpart due to being seen to 'take up' large areas of what would otherwise have been 'free to use' uncontrolled airspace. This is mostly true of lower types of airspace in which general aviation operates. Higher military airspace tends to operate on a 'Flexible Use of Airspace' principle which is being increasingly used throughout the world. This is where civil ATC will take control of, and use, the airspace for civilian flights when not required by the military.

9.3.2. Aerobatics training is also very important to military flight. This would be undertaken in areas that were deemed to suit the Air Corps needs but, in general, would be areas of level terrain, away from built-up areas. Recovery from aerobatic manoeuvres would also be concluded in excess of 500ft above ground level.

9.3.3. Turbines, as explained in previous paragraphs, are obstacles to aviation. This is especially so when low level flight is involved. Low level flight, other that highly-specialised terrain-following radar flying, must be conducted in conditions of visibility that enable the pilot to see and avoid obstacles and, in shared airspace, other aircraft. The Air Corps would, and has, designated specific areas within, and just outside, MOA 3. This is for flight at 500ft and below. The Proposed Wind Farm does not encroach on any of these areas. Risks associated with low flying, especially at higher speeds, cannot be taken lightly by any organisation and the designation of specific areas for this mitigate the risk to a large degree as civilian pilots would, generally, plan to avoid such areas.

9.3.4. It is unlikely that the Proposed Wind Farm will inconvenience or, more importantly, inhibit the Air Corps from its normal, everyday flying training. Flights, if they must route over the Proposed Wind Farm, would be able to adjust their altitude easily to comply with civil

regulation (if required) before descending again. This also assumes that the flying is being undertaken at a low level in the first instance.

9.3.5. Due to the Air Corps not having to change, modify, or cease its general flying activities within the MOA and the Proposed Wind Farm being a substantial distance from the nearest dedicated low flying area, the potential impact on Air Corps flight is assessed as **Low Impact.**

9.4. The Air Corps 3NM Buffer Zone from Motorways

9.4.1. Air Corps flight support may include missions to provide assistance to various communities, persons in distress, or to any Government- mandated task. Well-developed military aviation support can be crucial in these instances. During such taskings, which may occur in poor weather conditions, a network of motorways that can enable Air Corps aircraft to access various parts of the Country may be of help in low level, poor weather flight.

9.4.2. However, this is still predicated on visual flying – if one is stating that aircraft are using the motorways '..as *vital navigation routes*…', then one cannot conclude otherwise. This would then require the pilot to not only be keeping the motorway in sight (for navigation) but looking for obstacles as well. This may take the form of lighting at junctions or telecoms masts, etc. It is still unclear where the 3NM distance originates. If any low level flight in poor weather was being carried out with visual reference to these motorways, then having an aircraft displaced 3NM from the road would preclude any chance of flight with visual reference to it.

9.4.3. In the particular instance of the Proposed Wind Farm, the turbines would be on a high ridge running North-East South-West. Although not shielded by the peak of this ridge, the terrain would, in poor weather, represent a significant threat to any aircraft flying low level along the M9 motorway and would tend to force a pilot nearer the motorway in that instance. The high ground would be avoided, especially in poor weather. Therefore, in respect of the motorway being used as a 'visual flight route' the high ridge of ground certainly provides a significant degree of physical 'barrier' from the motorway.

9.4.4. Today's generation of aircraft, both rotary and fixed wing, have navigational and crew situational awareness capabilities far in excess of that of previous generations. The Air Corps fleet appears to be fairly modern and would have modern avionic systems. The aircraft could easily make use of point to point navigation, saving time in critical situations and it is assumed this is the normal way of operating. It may be the case that flying visually with reference to the motorway network is a training exercise employed during ab-initio flying training phases.

9.4.5. The Proposed Wind Farm turbines would have to be lit in accordance with regulation and is highly probable that the Air Corps would also require infra-red lighting installed. This is a completely normal request and would likely be a condition imposed by the Air Corps safeguarding department.

9.4.6. The extant situation is that the Irish Air Corp have published their position with regard to wind farms and tall structures. This is relevant to all areas of Ireland as, although the main body of this paper is regarding the MOAs, the fact is that wind farms or other tall structures in a large part of the Country, may inadvertently fall within 3NM of the many motorways

during planning and design. Indeed, there are wind farms currently operational within 3NM of a motorway.

9.4.7. The Proposed Wind Farm falls within the 3NM buffer zone of the M9 motorway in breach of the Air Corps published position on the subject. The Air Corps may take a position that this places their aircraft in an unsafe situation. However, it is this reports view that such a position should be challenged. The Air Corps, in accordance with their internal flight policies, may very well have to put a non-standard or minor restrictive clause into place for its aircraft passing the Proposed Wind Farm whilst following this particular piece of motorway. It would be disingenuous if any suggestion were forthcoming that flight operations would no longer be able to take place along the route as a result of the Proposed Wind Farm. Taking the above into consideration, the potential impact on the Air Corps is assessed as **Moderate Impact.**

9.4.8. The Table below is a summary of the four Impact Receptors and the Assessed Impact Significance.

Receptor	Assessed Impact
Airspace	**Low Impact**
General Aviation	**Low Impact**
Irish Air Corps Activity within MOA 3	**Low Impact**
The Air Corps 3NM Buffer Zone from Motorways	**Moderate Impact**

Table 3: Impact Receptors and Assessed Impact

10. Conclusion

10.1. Overview

10.1.1. Although wind turbines do constitute an obstacle to aviation, the risk is managed through regulation and the regulated dissemination of obstacle information to the sector.

10.1.2. Although the Proposed Wind Farm would be established within the boundaries of the MOA 3, the activities likely to take place in those MOAs, either military or civil, are unlikely to be significantly affected by the Proposed Wind Farm.

10.1.3. VFR flight is conducted using a see and avoid regime. The onus, in unregulated and uncontrolled airspace, is firmly on the pilot to fly in such a way that the aircraft is safely separated from risk of collision with other aircraft and a regulated distance, both vertical and laterally, from obstacles. A military aircraft is no different. Despite the Air Corps possible intention of using the right of military aircraft to fly contrary to civil regulation to justify their policies, the military will always endeavour to fly safely. It is not in their interest to disregard their crew's safety along with the safety of civilian aircraft and the general public.

10.1.4. The airspace within which the Proposed Wind Farm is located would not be affected by the turbines other than the introduction of a grouped site of seven obstacles. Aircraft that may be obliged to engage with military ATC above 4500ft AMSL, would also have a choice of flying lower than that whilst maintaining a legal vertical distance from the Proposed Wind Farm, should they also choose to overfly the site. This will limit their engagement with ATC if that is their choice. The Proposed Wind Farm will not cause inconvenience to aircraft wishing to remain below an altitude above which engagement with ATC is required.

10.1.5. The Air Corps have set aside specific areas for low level flying. The Proposed Wind Farm is substantial distances - in the order of 24NM (44KM) or more - from these areas. Low level flying carries a high degree of risk which is managed by the Air Corps through intensive training and the designation of specific areas. Low level flight below 500ft AGL is not undertaken lightly due to the high risks. Risks include increased potential for bird and drone strike, wire/cable strike and collision with other aircraft. Civilian aircraft are, or should be, aware of specific low flying areas and routes and would, generally, avoid these areas. Low level flight at other places within the wider MOA may carry unacceptably high risk due to the presence of general aviation aircraft of which military ATC may very well be unaware.

10.1.6. The Proposed Wind Farm is located within the MOA 3, however is almost twice the distance from Baldonnel/Casement Aerodrome of that which is required to be notified to the Air Corps.

10.1.7. The Proposed Wind Farm is within the 3NM buffer zone that the Air Corps have noted in its Air Corps Wind Farm/Tall Structures Position Paper. The site is approximately 2.24NM from the M9 motorway, which is one of the designated roads noted in the Paper. It is unclear as to the origins of this buffer and its intention is not made clear by the Air Corps other than that of an obstacle-free zone near motorways that are apparently used as navigation routes.

10.1.8. If one places a 3NM arc on the turbine positions nearest the motorway it shows a small section of motorway that would be inside the buffer zone. If an aircraft flying at 130 KIAS

flew along this 'compromised' section of road, the 'time of exposure' of the aircraft not being 'protected' by the 3NM buffer would be just over 1 minute, 30 seconds. If a higher speed were used, such as which may be relevant for one of the Air Corps fixed-wing training aircraft, the time would drop to approximately 55 seconds. These times certainly do not represent a high degree of 'risk exposure time', and flight along this small section of road could be pre-planned by pilots in accordance with any internal procedures put into place by the Air Corps.

10.1.9. It is unreasonable for the Air Corps to expect a completely obstacle-free environment in which to both train and, more pointedly, to carry out their daily tasks. As society evolves along with its way of producing energy, so must institutions such as the Air Corps.

10.1.10. It is this reports contention that the Air Corps Wind Farm/Tall Structures Position Paper is no longer fit for purpose in the era of climate change and renewable energy Government targets. If the motorways are actually being used as navigational routes by the Air Corps, then some form of obstacle-free zone either side of the road median may be a good idea. However, given the enormous task facing Ireland, along with other Nations, in meeting the targets of a carbon-free future, onerous buffers like these which presently prevail, may prevent this being achieved. A more pragmatic solution should be developed by the Air Corps.

10.1.11. Unless this buffer distance can be negotiated with the Air Corps through constructive engagement, the onshore wind farm industry in Ireland is likely to face continued objection by the Defence Forces on at least this one issue.

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