Report

Lissinagroagh Wind Farm

Aviation Review Statement

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Executive Summary

Ai Bridges Ltd have been commissioned to review the possible impacts of the proposed wind farm on aviation systems in the vicinity of the proposed wind farm development at Lissinagroagh. As part of the review, the following subjects were considered:

- Annex 14 - Obstacle Limitation Surfaces (OLS)
- Annex 15 – Aerodrome Surfaces
- Building Restricted Areas (BRA)
- Minimum Sector Altitudes (MSA)
- Instrument Flight Procedures
- Permitted Wind Farms in vicinity of Proposed Wind Farm
- Communications, Navigation and Radar Surveillance Systems Safeguarding
- Flight Inspection and Calibration
- Aeronautical Obstacle Warning Light Scheme
- Irish Air Corps / Department of Defence Safeguarding
- Garda Air Support Unit (GASU) and Emergency Aeromedical Service (EAS)

Annex 14 - Obstacles Limitation Surfaces (OLS)

A review shows that the proposed wind farm would be located outside the Outer Horizontal Surface of the Sligo Airport Runway Obstacle Limitation Surfaces (OLS), as defined in ICAO (International Civil Aviation Organization) Annex 14.

As the proposed wind farm is situated outside the Outer Horizontal Surface and there is no penetration of the take-off or approach surfaces, it is unlikely that there will be any impacts to the OLS surfaces for Sligo Airport.

Annex 15 - Aerodrome Surfaces

Following a review of “Terrain and Obstacle Requirements” as defined in ICAO Annex 15, turbines at the proposed development would need to be registered if they are more than 100 meters above terrain. The distance from the centre point (ARP – Airport Reference Point) of an airport to the boundary of Area 1 of the Annex 15 Aerodrome Surface is 45km. This area encloses the TMA area i.e. Total Maneuvering Area and this is used for circling and maneuvering by aircraft. Should the proposed wind farm be permitted, turbines would be within 45 km of the ARP at Sligo Airport and would be greater than 100 m in height. Therefore the turbines would be required to be included in the IAA Electronic Air Navigation Obstacle Dataset.

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Building Restricted Areas (BRA)

A Building Restricted Area is the airspace surrounding an aviation facility that needs to be clear from physical intrusions. The purpose of the safeguarded areas is to identify developments with the potential for causing unacceptable interference to navigation facilities. A review shows that the proposed wind farm is over 20 km from the BRA surfaces at Sligo Airport. At this distance there will be no impacts to the BRAs due to wind turbines at Lissinagroagh.

Minimum Sector Altitudes (MSA)

The Minimum Sector Altitudes (MSA) is the lowest altitude which may be used that will provide a minimum obstacle clearance of 1000 ft above all obstacles within 25 nautical miles (46km) of the NDB at Sligo Airport. The maximum tip-height of the highest of the proposed turbines (T05) would be 1768 ft AMSL. This is below the relevant MSA threshold (2700 ft), therefore the Minimum Sector Altitude will not be affected and there will be no impact on the published MSA altitude figures for Sligo Airport.

Instrument Flight Procedures

There are seven published Instrument Flight Procedures for flights to/from Sligo Airport. Due to the distance of the proposed wind farm from the airport, and as there are existing obstacles nearer to the airport than the proposed development, there should be no impacts to these flight procedures.

Communications, Navigation and Surveillance System Safeguarding

As the proposed wind farm is approximately 29 km from the Localizer and transmitting antennas at Sligo Airport, it is very unlikely that wind turbines at the proposed development will have any impact on these ATS communications and radio navigational aids.

For Radar Surveillance Systems, EUROCONTROL Guidelines require a 16 km safe distance from the surveillance radar system (SSR), for a "*Zone 4 - No Assessment*" condition. It has been highlighted in the analysis that turbines located at the proposed farm would be located at a minimum distance of 109 km from the SSR radar station at Dooncarton and in Assessment Zone 4 of the EUROCONTROL Guidelines. As turbines at the proposed development would be located in Assessment Zone 4, a detailed impact assessment on Radar Surveillance Systems will not be required by the IAA.

Flight Inspection and Calibration

Flight checks are conducted annually to ensure that flight procedures and associated navigational aids are safe and accurate. These flight checks are carried out by an IAA approved Flight Inspection Service Provider. The checks are carried out during annual inspections consisting of radial and orbital test flights around Sligo Airport for calibration of instrument landing systems. It is unlikely that the Flight Inspection Procedures will be impacted as the test flight path and flight altitude is sufficiently far from the proposed development. In addition, the Flight Inspection Procedures should already account for existing obstacles.

Aeronautical Obstacle Warning Light Scheme

In the event of a grant of planning consent the IAA are likely to request lighting of the proposed wind turbines in the interest of aviation safe-guarding as the proposed development would be considered as an en-route obstacle.

Irish Air Corps / Department of Defence (DoD) Safeguarding

The Irish Air Corps position on wind farms / tall structures are outlined in the paper which was published in 2014: "*Air Corps Wind Farm/ Tall Structures Position Paper*". In the position paper the Irish Air Corps outlines restricted areas where they would object to the installation of wind turbines /tall structures. The areas defined by the Air Corps have been mapped and analysis shows that proposed wind farm site is located outside the restricted areas. As the proposed wind farm is not located in a restricted area it should have no impacts on the Irish Air Corps activities.

Garda Air Support Unit (GASU) and Emergency Aeromedical Service (EAS)

The standard concerns that are being raised in recent consultations with the Irish Air Corps also highlight the potential for obstacles that could impact the operations of the Garda Air Support Unit (GASU) and the Emergency Aeromedical Service (EAS). An assessment of GASU and EAS operations indicates that they are unlikely to be impacted by the proposed wind farm development.

Abbreviations

AGL	Above Ground Level
AMSL	Above Mean Sea Level
ARP	Airport Reference Point
BRA	Building Restricted Area
DME	Distance Measuring Equipment
DoD	Department of Defence
EAS	Emergency Aeromedical Service
GASU	Garda Air Support Unit
GP	Glide Path
HLS	Helicopter Landing Site
ICAO	International Civil Aviation Organization
IFP	Instrument flight Procedure
ILS	Instrument Landing System
OLS	Obstacle Limitation Surface
PSR	Primary Surveillance Radar
RWY	Runway
SID	Standard Instrument Departure Route
STAR	Standard Arrival Route
SSR	Secondary Surveillance Radar
NATS	National Air Traffic Services (UK)
NM	Nautical Miles
VOR	VHF Omni-directional Range Station

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1. Introduction

This section provides a brief summary of the proposed wind farm development at Lissinagroagh and of the nearest significant aviation installation at Sligo Airport.

1.1 Wind Farm Site Information

The proposed wind farm development is located in County Leitrim approximately 30 km northeast of Sligo Airport.

The boundary for the study area was supplied to Ai Bridges in geo-referenced shapefiles format and part of the initial aviation constraint mapping process. This shapefile was used during the aviation screening process.

This study area boundary, together with the aeronautical surfaces and surrounding airspace, constitutes the assessment area used within this report. As part of the review, the aeronautical network infrastructure (aerodromes, radar sites, NAVAIDs, etc.) that is used to manage aviation activities in the vicinity of the proposed development has also been considered.

The study area for the proposed wind farm development is shown below in Figure 1 which includes the proposed location of the wind farm site with respect to Sligo Airport and the IAA radar station at Dooncarton. The coordinates and dimensions of the proposed turbines are provided in Appendix A.

Figure 1. Location of proposed wind farm at Lissinagroagh

It should be noted that there is an aerodrome in Northern Ireland, approximately 6 km north of Enniskillen, which licensed by the CAA (UK Civil Aviation Authority). This aerodrome is known as Enniskillen/St Angelo and flights to/from this aerodrome operate under Visual Flight Rules (VFR). There are no published IFPs (Instrument Flight Procedures) for this aerodrome, and as the runway is over 25 km from Lissinagroagh, the proposed wind farm development would have no impacts of the aviation activities at the aerodrome.

1.2 Sligo Airport

Table 1 below shows the co-ordinates of Sligo Airport and the distance from the Airport reference Point (ARP) to the proposed wind farm site. Sligo Airport operates in Class C controlled airspace with Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) Flight rules.

Location	Installation	Description	Airport Ref. Point ARP	ARP Distance to Proposed Wind Farm
Sligo Airport, Strandhill, Co Sligo.	Regional Airport	Single Asphalt Runway Airspace: Class C	54 16 49 N 08 35 57 W (Mid-point of Runway 10/28).	29.2 km

Table 1. Sligo Airport Details

The aeronautical navigation aids at the aerodrome include NDB and DME.

Figure 2. Sligo Airport - Aerial View

2. Aviation Review

In this section a review of the following a review of the following Aviation topics is provided.

- Annex 14 - Obstacle Limitation Surfaces (OLS)
- Annex 15 – Aerodrome Surfaces
- Building Restricted Areas (BRA)
- Minimum Sector Altitudes (MSA)
- Instrument Flight Procedures
- Permitted Wind Farms in vicinity of proposed Wind Farm
- Communications, Navigation and Radar Surveillance Systems Safeguarding
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- Irish Air Corps / DoD Safeguarding
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2.1 Annex 14 Obstacle Limitation Surfaces (OLS)

A review of the Annex 14 Obstacles Limitation Surfaces (OLS) was first was carried out by first plotting the proposed wind farm location and the airport obstacle surfaces. The obstacle limitation surfaces for Sligo Airport are plotted based on the following:

- Annex 14 to the Convention on International Civil Aviation Aerodromes Volume I - Aerodrome Design and Operations Seventh Edition July 2016"
- Certification Specifications and Guidance Material for Aerodromes Design CS-ADR-DSN Issue 4, 8th of December 2017

Figure 3 below shows the OLS in relation to the proposed Lissinagroagh wind farm. The distance from the ARP at Sligo Airport (i.e. the runway centre-point), to the nearest point of the proposed wind farm is 29 km. The analysis of the OLS plots indicates that turbines at the proposed wind farm would not penetrate the Outer Horizontal Surface which extends to 15 km from the Airport Reference Point (ARP) or runway centre-point.

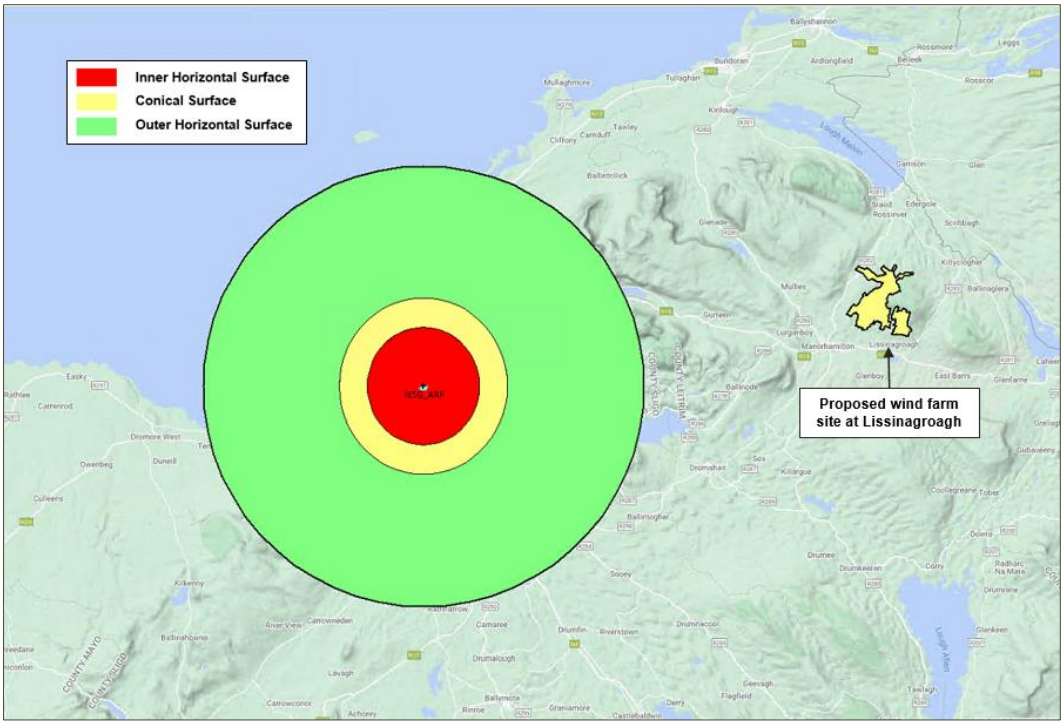

Figure 3. Lissinagroagh Wind Farm in relation to Ireland Sligo OLS.

2.2 Annex 15 Aerodrome Surfaces

Turbines at the proposed wind farm would not penetrate the ICAO Annex 15 Aerodrome Surface as shown in Figure 4. The “Terrain and Obstacle Requirements Area” is defined in ICAO Annex 15 as an area of up to 45km from the Aerodrome ARP. (An illustration of ICAO Annex 15 Area 1 and Area 2 Surface is provided in Appendix A).

As the proposed wind farm site is 29 km from the ARP at Sligo Airport, there is penetration of the Annex 15 surfaces. All obstacles, if they are more than 100 meters above terrain for a distance of up to 45 km from the ARP, need to be registered in the IAA Air Navigation Obstacle Data Set. This area is known as the TMA area i.e. Terminal Maneuvering Area and is used for en-route circling and maneuvering and is shown in Figure 5.

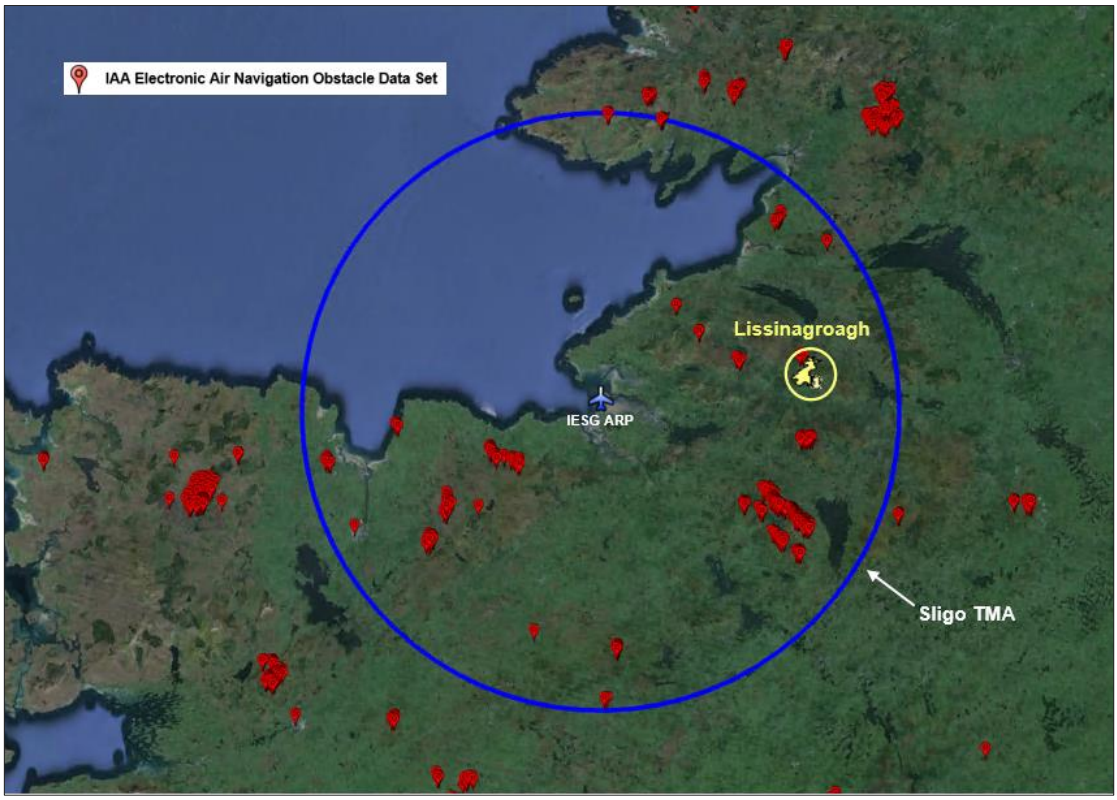

Figure 4. Annex 15 Aerodrome Surface and IAA Electronic Air Navigation Obstacle Data Set

It should also be noted that there are other existing tall structures (obstacles) nearer to the airport, e.g. the operational wind farms at Carrikeeny and Duneill and the 2RN Telecommunications transmitter on Truskmore Mountain

These existing obstacles would shield any potential impacts from the proposed wind farm at Lissinagroagh. The IAA Electronic Air Navigation Obstacle Data Set permitted obstacles are shown relative to the proposed wind farm in Figure 5.

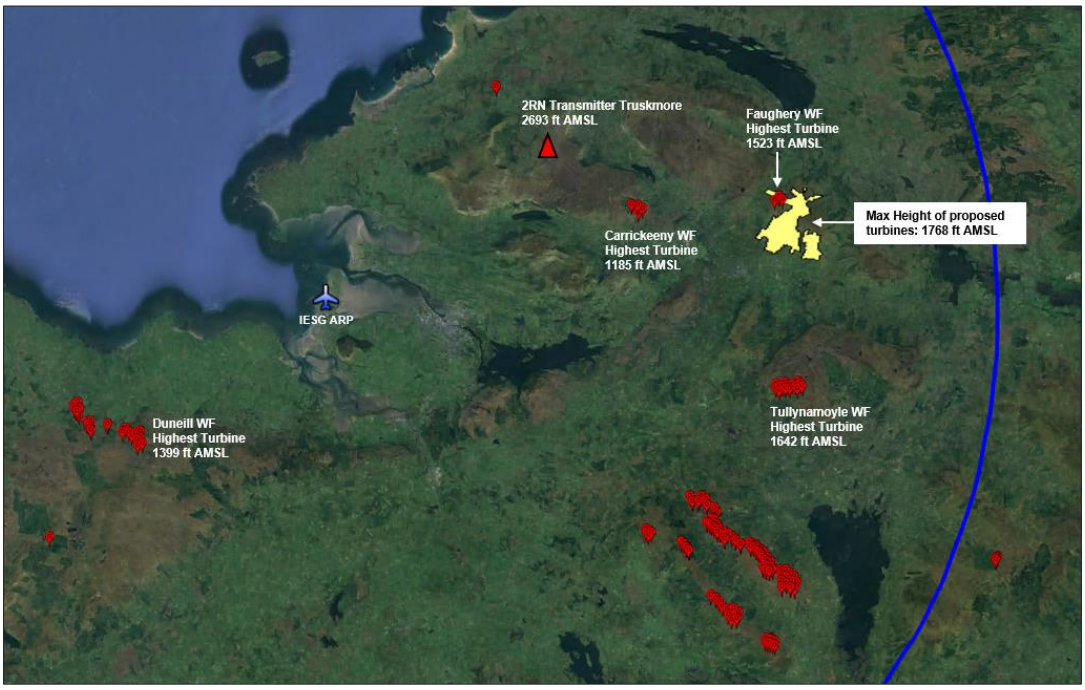

Figure 5. Permitted Obstacles in vicinity of Lissinagroagh Wind Farm

Although there are other obstacles closer to the airport than the proposed wind farm, all new obstacles must be considered and assessed to see if they cause a “hazard to air navigation” and all Terrain Obstacle Data (including man-made obstacles) have to be considered by the relevant Aviation Authorities.

2.3 Building Restricted Areas (BRA)

A Building Restricted Area is the airspace surrounding an aviation facility that needs to be clear from physical intrusions. The purpose of the safeguarded areas is to identify developments with the potential for causing unacceptable interference to navigation facilities.

The navigation facilities to be considered at Sligo Airport are the ILS Localisers, Glidepaths and DMEs that provide guidance for aircraft landings. The minimum safeguarded areas for these facilities are defined by the International Civil Aviation Organisation (ICAO) in the document ICAO EUR DOC 015, Section 7. The BRA parameters as specified by the ICAO are provided in Appendix B of this report.

Figure 6 below illustrates that the proposed wind farm at Lissinagroagh is over 20 km from the Sligo Airport BRA (safeguarded area for Runway 28). At this distance turbines at the proposed wind farm will have no impact on the navigation facilities associated with the Building Restricted Areas for Sligo Airport.

Figure 6. Proposed Wind Farm relative to Sligo Airport BRA (RWY 28)

2.4 Minimum Sector Altitudes

The proposed wind farm is located in the northwestern MSA Sector of Sligo Airport, as shown in Figure 7. According to the wind farm location, the maximum construction height for the site would be 2700ft/579m AMSL (3700 ft MSA minus 1000 ft).

The maximum tip height of the highest of the proposed turbines (T05) would be 1768 ft AMSL. This is below the 2700 ft threshold, therefore the relevant MSA will not be affected and there will be no impact on the published MSA altitude figures for Sligo Airport.

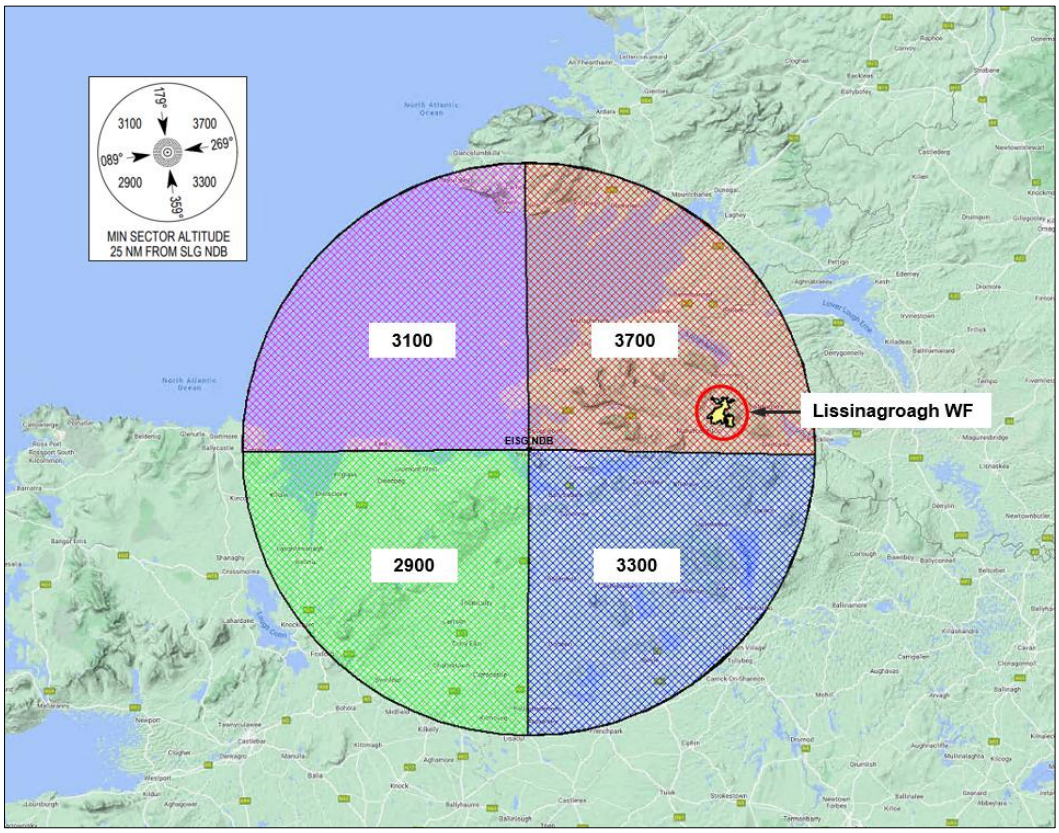

Figure 7. Sligo Airport (EISG) Minimum Sector Altitudes

2.5 Instrument Flight Procedures and Building Restricted Areas

There are 7 published Instrument and Visual Flight Procedures for arrivals to and departures from Sligo Airport. Due to the distance of the proposed wind farm from the Airport (and as there are existing obstacles (e.g. telecom masts and existing wind farms)) it is unlikely that there will be any impacts on the Instrument Flight Procedures for flights to/from Sligo Airport. Table 2 below lists the Instrument Flight Procedures for Sligo Airport.

Aerodrome	Aerodrome Procedure	Chart ID	Wind Farm Impacts
Sligo	Instrument Approach Chart RNP Y RWY 10 CAT A, B – ICAO	EISG AD 2.24-7	No Impacts.
Sligo	Instrument Approach Chart RNP Z RWY 10 CAT A, B – ICAO	EISG AD 2.24-8	No Impacts.
Sligo	Instrument Approach Chart NDB Y RWY 10 - CAT A, B ICAO	EISG AD 2.24-9	No Impacts.
Sligo	Instrument Approach Chart NDB Z RWY 10 - CAT A, B ICAO	EISG AD 2.24-10	No Impacts.
Sligo	Instrument Approach Chart RNP RWY 28 CAT A, B – ICAO	EISG AD 2.24-11	No Impacts.
Sligo	Instrument Approach Chart NDB RWY 28 - CAT A, B ICAO	EISG AD 2.24-12	No Impacts.
Sligo	Visual Approach Chart – ICAO	EISG AD 2.24-16	No Impacts.

Table 2. Instrument and Visual Flight Procedures – Sligo Airport

2.6 Permitted Wind Farms in vicinity of Proposed Wind Farm

The Planning References for the permitted wind farms in the vicinity of the proposed wind farm are shown below in Table 3. None of these wind farms required a Full Assessment of Instrument Flight Procedures.

Wind Farm	Planning Reference	Description
Faughery	Available online at www.eplanning.ie	Operational Wind Farm
Carrickeeny	Available online at www.eplanning.ie	Operational Wind Farm
Tullynamoyle	Available online at www.eplanning.ie	Operational Wind Farm
Duneill	Available online at www.eplanning.ie	Operational Wind Farm
Garavgh Glebe	Available online at www.eplanning.ie	Operational Wind Farm
Carrownyclowan,	Available online at www.eplanning.ie	Operational Wind Farm
Carrane	Available online at www.eplanning.ie	Operational Wind Farm
Black Banks	Available online at www.eplanning.ie	Operational Wind Farm
Moneenatieve	Available online at www.eplanning.ie	Operational Wind Farm
Arigna	Available online at www.eplanning.ie	Operational Wind Farm
Altagowan	Available online at www.eplanning.ie	Operational Wind Farm
Tullynahaw	Available online at www.eplanning.ie	Operational Wind Farm
Derrysallagh	Available online at www.eplanning.ie	Operational Wind Farm

Table 3. Permitted Wind Farms in vicinity of Proposed Wind Farm

2.7 Communication Navigation and Surveillance Systems

In this section the possible impact of the proposed wind farm on the Communication, Navigation and Radar Surveillance Systems for the aerodrome at Sligo Airport is assessed.

2.7.1 Communications and Navigation Systems

The AIP document EISG AD 2-18/19 provides the information for communication and navigation facilities for Sligo Airport. The table below shows the channel frequencies for the ATS communications Facilities and the Radio Navigation and Landing Aids for the airport.

Aerodrome	ATS communications Facilities Channel Frequency	Radio Navigation and Landing Aids Channel Frequency	Approximate Distance to Localizer and Transmitting antennas	Impacts of wind fam
Sligo	112.1 MHz	384 kHz – 109 MHz	29 km	No impacts

Table 4. Impacts on Communications and Navigation Systems

As the proposed wind farm is approximately 29 km from the Localizers and transmitting antennas, it is very unlikely that turbines at the proposed wind farm will have any impact on these ATS communications and radio navigational aids. Typically, interference to VHF communications systems will only occur when obstacles are in close proximity to the VHF transmitter e.g. less than 500m.

2.7.2 Radar Surveillance Systems

The tables below show the Irish Aviation Authority Assessment Zone arrangement for the two types of aviation radar surveillance systems; Primary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR).

Zone	Description	Assessment Requirements
Zone 1	0 - 500m	Safeguarding
Zone 2	500m - 15km and in radar line of sight	Detailed Assessment
Zone 3	Further than 15km and in radar line of sight	Simple Assessment
Zone 4	Not in radar line of sight	No Assessment

Table 5. PSR Zone Arrangements

Zone	Description	Assessment Requirements
Zone 1	0 - 500m	Safeguarding
Zone 2	500m - 16km but within maximum instrumented range and in radar line of sight	Detailed Assessment
Zone 4	Further than 16km or not in radar line of sight	No Assessment

Table 6. SSR Zone Arrangements

The EUROCONTROL Guidelines require a 16km safe distance for a “Zone 4 - No Assessment” condition and detailed assessments are required for any proposed wind within 16km of a secondary surveillance radar.

It should be noted that in the UK, NATS (Air Traffic Control) safeguards SSR to a distance of 10 km. The guidelines used by NATS (*CAP 764: Chapter 2: Impact of wind turbines on aviation*) state that:

> *"Wind turbine effects on SSR are traditionally less than those on PSRs but can be caused due to the physical blanking and diffracting effects of the turbine towers, depending on the size of the turbines and the wind farm. These effects are typically only a consideration when the turbines are located very close to the SSR i.e. less than 10 km."*

2.7.2.1 Irish Aviation Authority (IAA) Radar Surveillance Sensors

To determine which Assessment Zones are applicable to the proposed wind farm a desktop assessment was carried out. The nearest radar surveillance site to the proposed wind farm development is the IAA radar station at Dooncarton, Co Mayo.

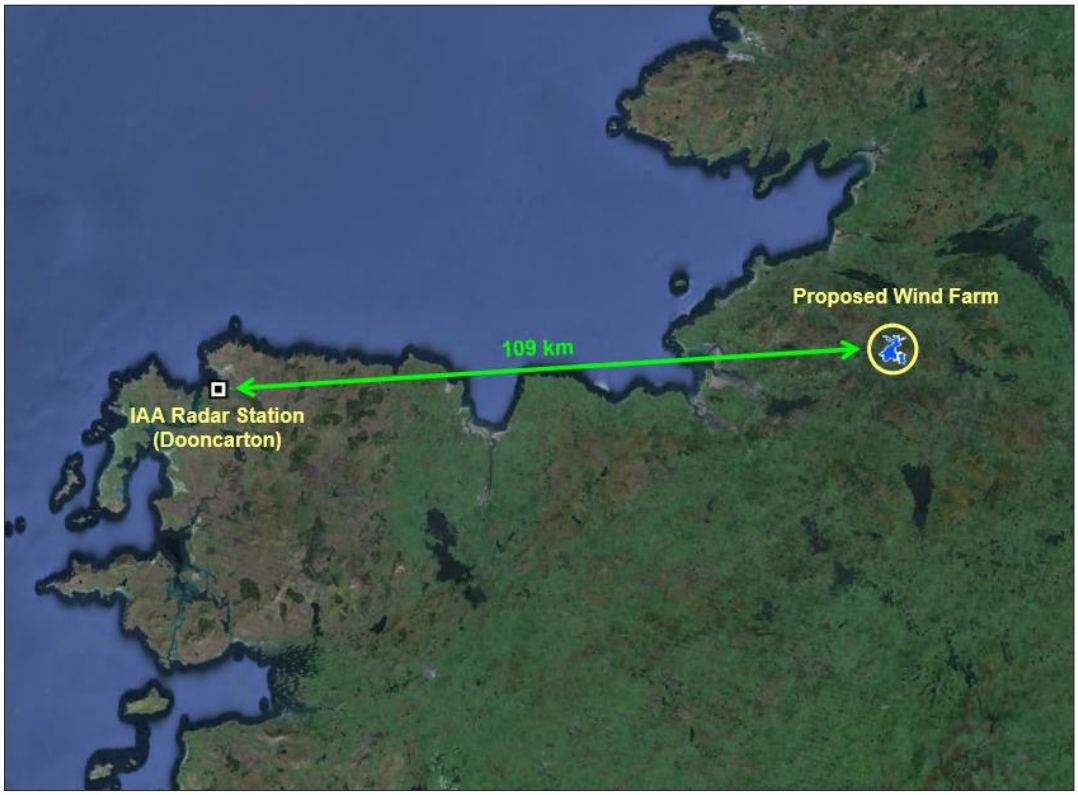

Figure 8. Nearest IAA Radar Surveillance Site relative to Lissinagroagh Wind Farm.

2.7.2.1.1 Dooncarton Radar Assessment

The radar surveillance site at Dooncarton consists of a SSR system located in the six-story circular reinforced concrete communications tower shown in Figure 9. The SSR antennas are housed in the dome-shaped structure at the top of the tower.

Figure 9. Dooncarton Radar Station

Table 7 below shows the (EuroControl & NATS) assessment zone applicable to the nearest point where a turbine could potentially be located. The applicable assessment zone has been based on distance from the Radar Station and whether a radar line-of-sight condition exists.

Wind Farm ID	Distance to PSR/SSR Radar Station	Radar LOS Assessment (EuroControl Guidelines)	Radar LOS Assessment (NATS Guidelines – UK)
Lissinagroagh	109 km	Detailed Assessment Not Required	Detailed Assessment Not Required

Table 7. EuroControl / UK Safeguarding Guidelines – Dooncarton Radar Station

As the table above show, the proposed wind farm is within Assessment Zone 4 as specified by the EUROCONTROL guidelines, which would indicate that a detailed technical assessment would not be required for the impact on the SSR radar station at Dooncarton.

2.8 Flight Inspection and Calibration

Flight checks are conducted annually to ensure that flight procedures and associated navigational aids are safe and accurate. These flight checks are carried out by an IAA approved Flight Inspection Service Provider. The checks are carried out during annual inspections consisting of radial and orbital test flights around the airport for calibration of instrument landing systems. Figure 14 shows the flight track that the Flight Inspection Service Provider undertook for the most recent checks for Sligo Airport conducted in January 2024. The flight route indicates that the Flight Procedure does not fly over the proposed wind farm site.

Flight Inspection and Calibration flights must be flown at a height of at least 1,000 ft above the ground or above the highest obstacle to be encountered. The altitude of the test aircraft as it flew by Lissinagroagh was 3950 ft. As, the maximum height of highest of the proposed turbines (T05) is 1768 ft AMSL (i.e. over 2000 ft clearance), it is highly unlikely that there would be any impact to the Flight Inspection and Calibration test procedure for Sligo Airport.

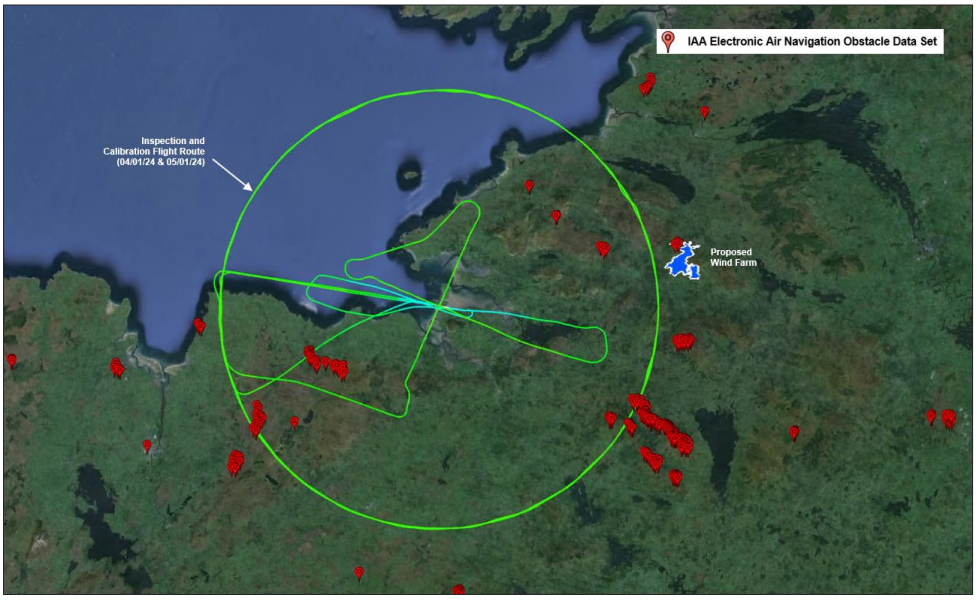

Figure 10. Flight Inspection and Calibration Test Flight Route (04/01/24 and 05/01/24)

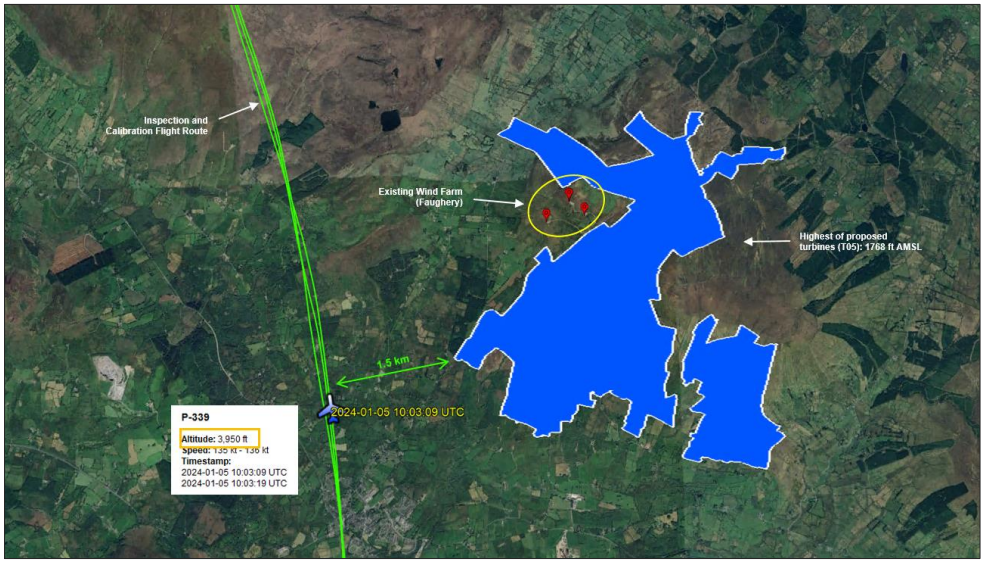

Figure 11. Flight Inspection and Calibration Test Flight – No impact from proposed development

2.9 Aeronautical Obstacle Warning Light Scheme

In the event of a grant of planning consent the IAA-ANSP would require the lighting of the proposed wind turbines in the interest of aviation safe-guarding as the proposed development may be considered as an en-route obstacle. The developers of the proposed turbines would intend to implement an aeronautical obstacle warning light.

It is recommended that lighting requirements should be in accordance with Chapter Q – Visual Aids for denoting Obstacles; CS ADR.DSN.Q.851 and GM.ADR.DSN.Q.851 (Pages 729/730) of the EASA Easy Access Rules for Aerodromes (Reg (EU) No. 139/2014) where it states that

> *"Applicability: When considered as an obstacle a wind turbine should be marked and/or lighted."*

2.10 Irish Air Corps / DoD Safeguarding

The Irish Air Corps Position Paper "*Air Corps Wind Farm/ Tall Structures Position Paper*" published on 08th August 2014 (Appendix B), states that the Air Corps are likely to oppose any wind farm / tall structure in the following restricted areas:

- Lands underlying military airspace for flying activity. (Areas contained in Danger Areas EI-D1, EI-D5, EI-D6, EI-D13, EI-D14, Restricted Areas EI-R15, EI-R16 within 20 NM of Baldonnel, MOAs 3 and 4 within 20 NM of Baldonnel.
- Low Flying Training Areas within MOA 4 in the areas of; Blessington, Edenderry/Allenwood/Rathangan, Kilmeague/Newbridge.
- Low Flying Training Area West – LFTA WEST.
- A distance of 5 NM or less from military installations.
- Critical low level flying routes in support of Air Corps operation requirements.

The nearest of the Air Corps restricted areas to the proposed wind farm is the 5NM restricted area around the military installation at Finner Camp, Co Donegal, as shown in Figure 12 below. As the proposed wind farm is located outside the restricted area, there should be no impacts on Irish Air Corps activities.

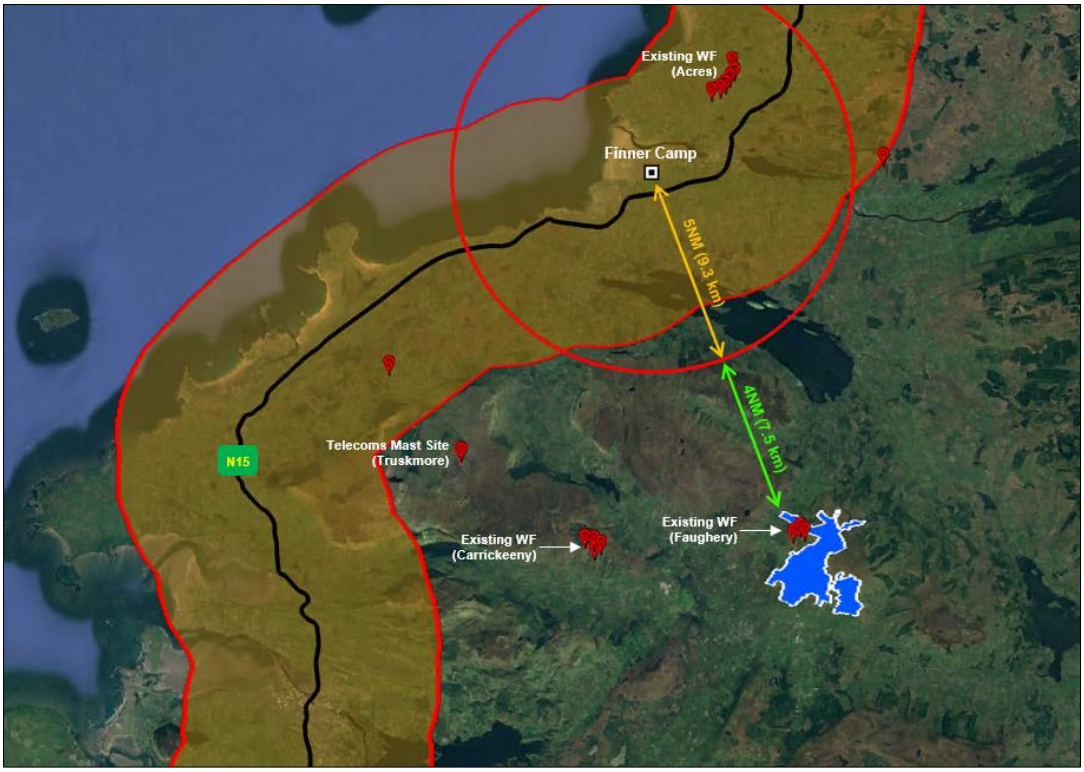

Figure 12. Proposed Wind Farm relative to IAC Restricted Area around Finner Camp, Co Donegal

2.11 Garda Air Support Unit (GASU) and Emergency Aeromedical Service (EAS)

The standard concerns that are being raised in recent consultations with the Air Corps also highlight the potential for obstacles that could impact the operations of the Garda Air Support Unit (GASU) and the Emergency Aeromedical Service (EAS). The excerpt below is taken from a response received from the IAC in relation to a third-party wind farm project:

> "*Having consulted with the subject matter experts in the Irish Air Corps, the Department of Defence wishes to make the following observations:*
>
> - *The Department of Defence cannot support, based on military advises, the erection of wind farms or other tall structures within 3 NM of roads identified as critical low level routes in support of operational requirements. The erection of obstacles within low-level helicopter routes could affect the Irish Air Corps ability to access regional areas and to fulfil its role.*
> - *If this proposed development was to go to the planning stage, the Department of Defence would be obligated to raise the following concerns and advise the planning authorities that the proposed windfarm*
>
> *a) lies wholly within 3 nautical miles of the [Motorway/National Road] which is identified as a critical low level route used by state aircraft on operational taskings. A windfarm or any other tall structures within a low-level route will be an obstacle to state aircraft not operating within the civil rules of the air;*
>
> *b) The [Motorway/National Road] low level route requires protection from obstacles for low level state aircraft on operational tasking's such as:*
>
> *(i) The Garda Air Support Unit (GASU)*
> *(ii) The Emergency Aeromedical Service (EAS)"*

An assessment of the possible impacts of the proposed wind farm on the Garda Air Support Unit and the Emergency Aeromedical Service operations is provided in Sections 2.11.1 and 2.11.2 that follow.

2.11.1 The Garda Air Support Unit (GASU)

The Garda Air Support Unit is based at Casement Aerodrome, Baldonnel and is typically deployed to incidents in the following cases:

- Immediate threat to life
- Incidents of a criminal, terrorist or other nationally important nature
- Immediate threat of serious public disorder
- Tasks leading to the prevention or detection of crime
- Evidence gathering
- Intelligence gathering
- Photographic tasks
- Traffic Management/Monitoring

The unit consists of one fixed-wing aircraft (a Pilatus Britten-Norman BN 2T-4S Defender 4000) and two helicopters (Eurocopter EC 135 T2).

Figure 13. GASU - Pilatus Britten-Norman BN 2T-4S Defender 4000

Figure 14. GASU - Eurocopter EC135 T2

It is unlikely that a fixed-wing aircraft would be used in a low-level flight capacity over the Lissinagroagh region. In the unlikely event that that a fixed-wing aircraft is flying in the Lissinagroagh area, it should be noted that all modern aircraft are equipped with a range of Global Navigation Satellite Systems (GNSS), e.g. GPS, GLNASS, Galileo, etc. These GNSS systems provide pilots with accurate navigation information including data to avoid obstacles during VFR operations. Should the proposed wind farm at Lissinagroagh be permitted the turbine locations would be submitted to the IAA and aviation charts and GNSS databases would be updated accordingly.

GASU helicopters would also be fitted with GNSS systems which would clearly identify any potential objects in the operational area (e.g. wind turbines). Also, in good weather conditions, a wind farm at Lissinagroagh could potentially be used as a visual landmark to aid Visual Flight Rules (VFR) navigation which would actually make it easier for pilots to identify their flight position.

If a helicopter is required to land in Lissinagroagh area, the pilot would seek a Helicopter Landing Site (HLS) that is clear of wires, loose objects and is relatively clear of obstacles. The chosen HLS should also have good road access. A good example of a HLS would be a local football field. As the proposed wind farm site consists of largely of mountainous / forested lands it would be highly unlikely that the site location would ever be considered as a HLS due to its terrain and road access. The football field at Manorhamilton (as marked in Figure 15) would be a much more suitable HLS for any such emergency landings in subject area.

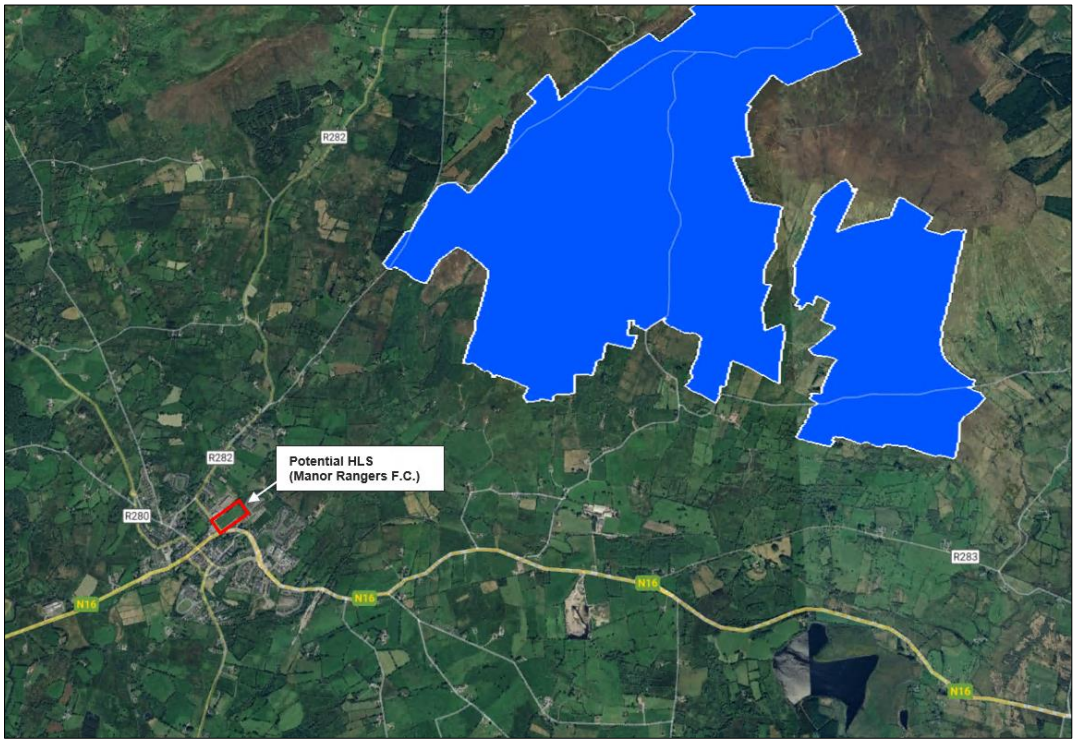

Figure 15. Potential Helicopter Landing Site – Manor Rangers F.C.

GASU Aircraft	Impact of proposed wind farm - Opinion
Fixed-wing Airplane (Pilatus Britten-Norman BN 2T-4S Defender 4000)	Low – Fixed-wing aircraft are unlikely to be deployed in low level activity in the subject area. In addition, the aircraft would be equipped with modern communications systems and navigational equipment. Should the wind farm be permitted, the turbines would be fitted with aeronautical lighting and would be clearly marked in aviation charts.
Helicopter (Eurocopter EC135 T2)	Low – The helicopter would be equipped with modern communications systems and navigational equipment. Should the wind farm be permitted, the turbines would be fitted with aeronautical lighting and would be clearly marked in aviation charts. Should an emergency landing be required in the subject area, the football pitch at Manorhamilton could potentially be used as a HLS.

Table 8. Impact of proposed wind farm on GASU Operations

2.11.2 The Emergency Aeromedical Service (EAS)

This Emergency Aeromedical Service is based in and operates from the Custume Barracks in Athlone. The aircraft utilised by the EAS is an Irish Air Corps Euro-copter 135 and is used for time-critical medical emergencies. Figure 16 below shows the flying times from the EAS base at Athlone.

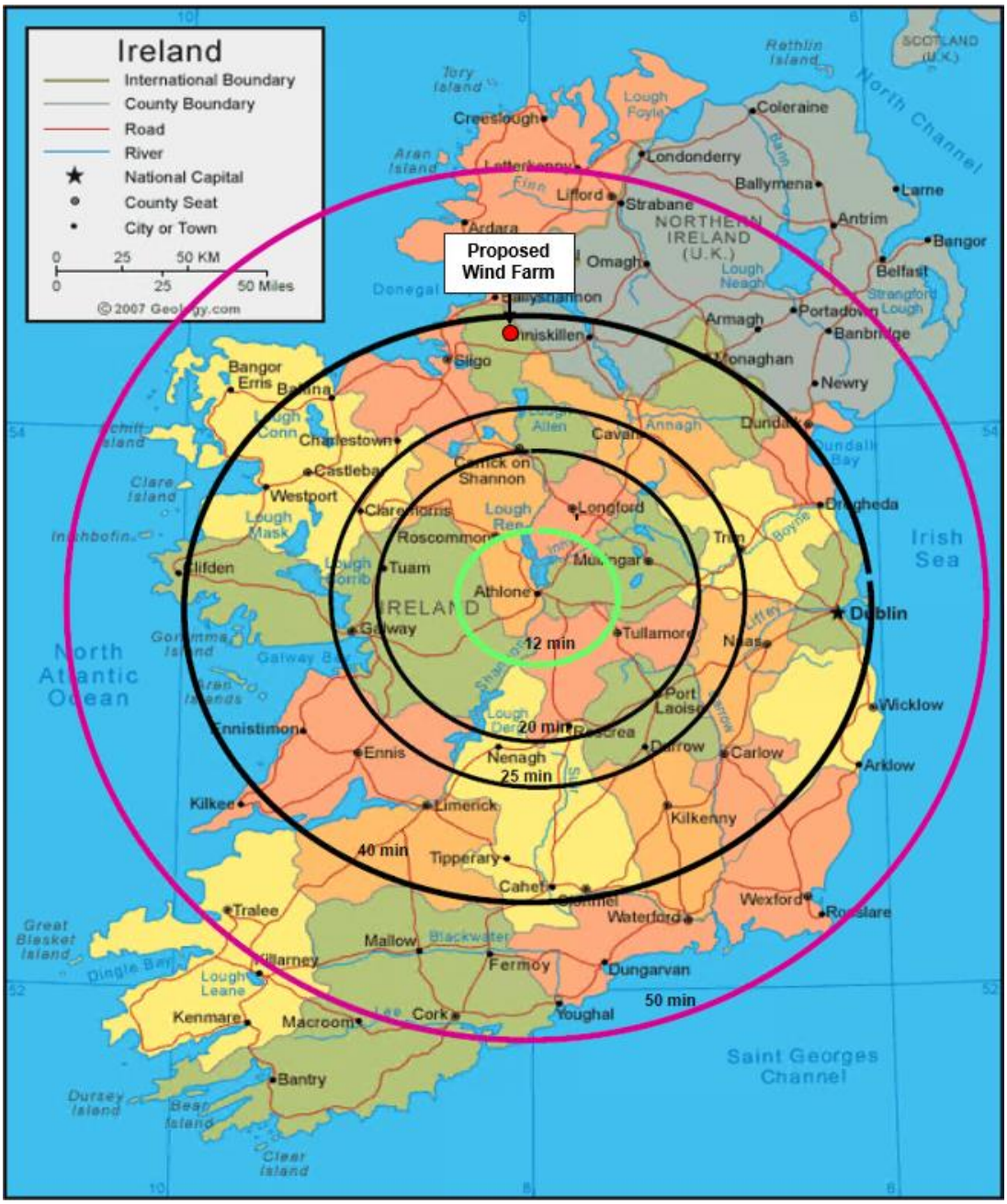

Figure 16. EAS – Flying Times from Athlone

The proposed wind farm is located approximately 2 km northeast of Manorhamilton and any emergency helicopter landings in the subject area, are likely to occur at Manor Rangers football field.

Also, should the proposed wind farm at Lissinagroagh be permitted the turbine location would be submitted to the IAA and aviation charts and GNSS databases would be updated accordingly. EAS helicopters would also be fitted with GNSS systems which would clearly identify any potential objects in the operational area (e.g. wind turbines).

In addition, the footprint of the proposed wind farm development is small and any flight diversions for EAS operations north of Lissinagroagh would have negligible time impacts. For these reasons, turbines at the proposed wind farm should have no impact on EAS flights from Athlone.

EAS Aircraft	Impact of proposed wind farm – Opinion
Helicopter (Eurocopter EC135)	Low – The helicopter would be equipped with modern communications systems and navigational equipment. Should the wind farm be permitted, the turbines would be fitted with aeronautical lighting and would be clearly marked in aviation charts. Should an EAS landing be required in the subject area, the football pitch at Manorhamilton is likely to be used as a HLS.

Table 9. Impact of proposed wind farm on EAS Operations

3. Summary

A summary of the aviation review for the proposed wind farm at Lissinagroagh is provided in Table 10 below.

Item	Impact	Summary
Annex 14 - Obstacle Limitation Surfaces (OLS)	None	**Outer Horizontal Surface:** Turbines at the proposed wind farm site would be located outside the Outer Horizontal Surface.
	None	**Take-off and Approach Surfaces:** Turbines at the proposed wind farm would be outside the take-off and approach surfaces.
Building Restricted Areas	None	A review shows that Lissinagroagh is over 20 km from the BRA for Sligo Airport. At this distance there would be no impacts due to the proposed wind farm.
Annex 15 - Aerodrome Surfaces	Observ.	Turbines at the proposed wind farm would penetrate the ICAO Annex 15 Aerodrome Surface for Sligo Airport. All obstacles, if more than 100 meters above terrain for a distance of 45 km from center point of the airport, need to be registered in the IAA Air Navigation Obstacle Data Set. The IAA may request that the turbines be included in the IAA Aeronautical Electronic Obstacle Data Sets. It should be noted that other existing tall structures nearer to airport (e.g. Carrickeeny Wind Farm, Dunneil Wind Farm, 2RN Telecoms Mast at Truskmore) are also located within the ICAO Annex 15 Aerodrome Surface and are already listed in the IAA Aeronautical Electronic Obstacle Data Sets.
Minimum Sector Altitudes (MSA)	None	A review of the Minimum Sector Altitudes (MSA) shows that the proposed wind farm is within 25 nautical miles from the NDB at Sligo Airport Turbines at the proposed wind farm would not exceed the threshold for Sligo MSA, therefore there will be no impact on the published MSA altitude figures.
Instrument Flight Procedures	None	A review shows that the standard instrument flight procedures for and Sligo Airport are unlikely to be impacted for precision aircraft.
Communication and Navigation Systems	None	As the proposed wind farm is approximately 29 km from the Localizer and transmitting antenna at Sligo Airport, it is very unlikely that the proposed development will have any impact on these ATS communications and radio navigational aids.
Radar Surveillance Systems Safeguarding	None	The proposed wind turbines would be located in Assessment Zone 4 (EuroControl guidelines) for SSR and PSR instruments and a detailed Impact Assessment will not be required
Flight Inspection and Calibration	None	A review shows that the annual Flight Inspection Procedures for Sligo Airport will not be impacted as the flight path and flight altitude is sufficiently far from the proposed development. In addition, the Flight Inspection Procedures should already account for existing obstacles.
Aeronautical Obstacle Warning Light Scheme	Observ.	It is possible that the IAA may request that the wind farm, if permitted, would be fitted with Aeronautical Obstacle Warning Lights in accordance with industry standards. Subject to further consultation with the IAA.
Irish Air Corps / DoD Safeguarding	None	The proposed wind farm is located outside the Irish Air Corps Restricted Areas.
Garda Air Support Unit and Emergency Aeromedical Service	None	An assessment of GASU and EAS operations indicate that they are unlikely to be impacted by the proposed wind farm development.

Table 10. Lissinagroagh Wind Farm – Aviation Review Summary

APPENDIX A - ICAO Annex 15 Area 1 and Area 2 Surfaces.

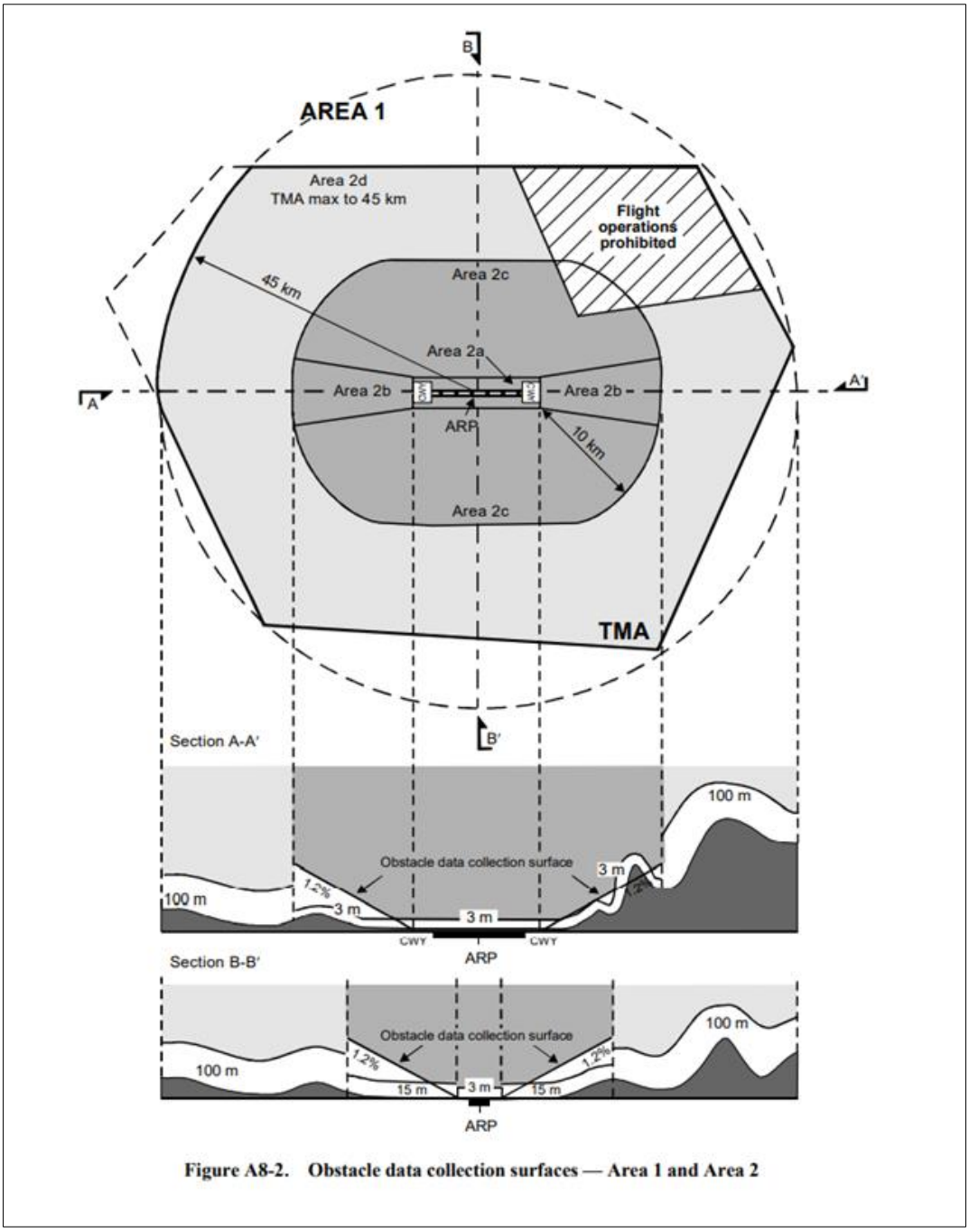

Figure A8-2. Obstacle data collection surfaces — Area 1 and Area 2

Figure A1 - ICAO Annex 15 Area 1 and Area 2 Surfaces.

APPENDIX B - ICAO Building Restricted Areas.

Figure B1 below shows an example BRA shape for directional facilities. Table B1 provides harmonized guidance figures for the directional navigational facilities in accordance with Figure B1.

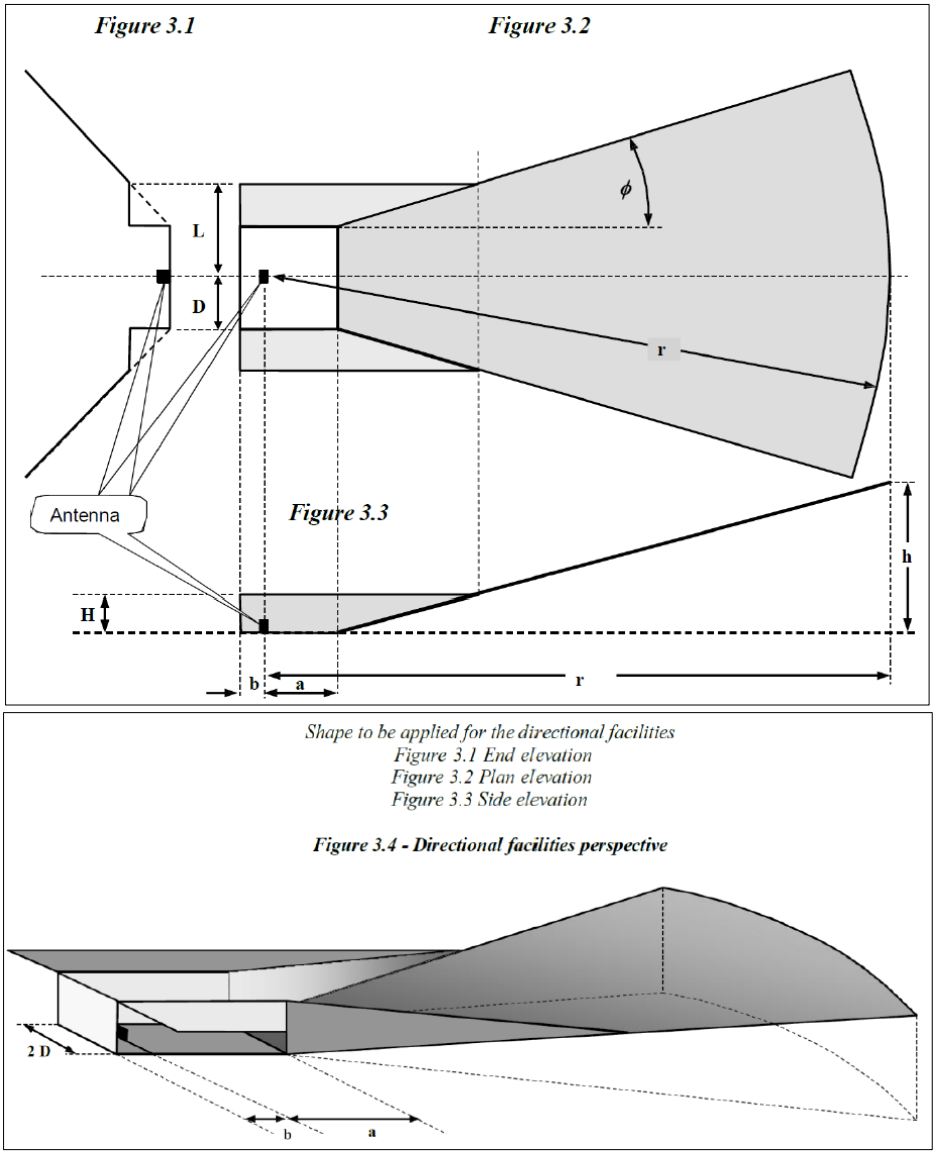

Figure B1 - Example BRA shape for directional facilities (ICAO EUR DOC 015 Figures 3.1-3.4)

*Type of **navigation** facilities*	***A*** *(m)*	***b*** *(m)*	***h****(m)*	***r*** *(m)*	***D*** *(m)*	***H*** *(m)*	***L*** *(m)*	***ϕ*** *(°)*
ILS LLZ (medium aperture single frequency)	Distance to threshold	500	70	a+6000	500	10	2300	30
ILS LLZ (medium aperture dual frequency)	Distance to threshold	500	70	a+6000	500	20	1500	20
ILS GP M–Type (dual frequency)	800	50	70	6000	250	5	325	10
MLS AZ	Distance to threshold	20	70	a+6000	600	20	1500	40
MLS EL	300	20	70	6000	200	20	1500	40
DME (directional antennas)	Distance to threshold	20	70	a+6000	600	20	1500	40

Table B1 - Harmonized guidance figures for the directional navigational facilities (ICAO EUR DOC 015 Table 2)