

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

Report

Moanmore Lower Wind Farm Aviation Review Statement

Document Number: 001/MN0722

Author: PT\KH

Approved for Release: Rev 2.1 K Hayes **Date:** 16/09/2024

Document Filename: *Moanmore Lower Wind Farm - Aviation Review Statement*

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

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 Moanmore Lower. 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 Shannon 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 Shannon Airport.

Annex 15 - Aerodrome Surfaces

Following a review of "Terrain and obstacle requirements Area 1" as defined in ICAO Annex 15, wind turbines need to be registered if they are more than 100 meters above terrain. From the centre point (ARP – Airport Reference Point) of Shannon Airport to the boundary of the 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, the turbines would be within 45km of Shannon Airport's ARP and would be greater than 100m in height. Therefore, the turbines would be required to be included in the IAA Electronic Air Navigation Obstacle Dataset.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

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 development is over 30 km from the BRAs at Shannon Airport. At this distance there will be no impacts to the BRAs due to the proposed wind farm.

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 1000ft above all obstacles within a sector of 25 nautical miles (46km) from the VOR/DME at Shannon Airport. The maximum turbine tip-height at the proposed wind farm site could be up-to 567ft above mean sea level (AMSL). There is over 1000ft from the maximum height of the wind farm to the MSA altitude and therefore there would appear to be no impact on the published MSA altitudes for Shannon Airport.

Instrument Flight Procedures

There are 9 Instrument Flight Procedures for flights to/from Shannon 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.

A detailed instrument flight procedure analysis is outside of the scope of this report; however, from the desktop assessment conducted it is envisaged that the MSA heights will not be required to be adjusted and the Air Navigation Service Provider (ANSP) at Shannon Airport is unlikely to require a detailed assessment on the impact of the proposed turbines on flight procedures.

Communications and Navigation Systems

As the proposed wind farm is approximately 38 km from the Localizer and transmitting antennas at Shannon Airport, it is very unlikely that wind turbines at the proposed development will have any impact on these ATS communications and radio navigational aids.

Radar Surveillance Sensors

For Radar Surveillance Systems, EUROCONTROL Guidelines require a 16km 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

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

a minimum distance of 38 km from the PSR/SSR radar station at Shannon Airport and in Assessment Zone 4 of the EUROCONTROL Guidelines. As the turbines are 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 Shannon Airport for calibration of instrument landing systems. It is unlikely that the Flight Inspection Procedures will be impacted as the proposed wind farm is sufficiently far from the airport runways and the flight inspection procedures should already account for the existing obstacles (e.g. existing wind farms).

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.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

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
IAC	Irish Air Corps
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

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

Sections

1. Introduction	7
1.1 Wind Farm Site Information	7
1.2 Shannon Airport	8
2. Aviation Review	9
2.1 Annex 14 Obstacle Limitation Surfaces (OLS)	10
2.2 Annex 15 Aerodrome Surfaces	11
2.3 Building Restricted Areas (BRA)	13
2.4 Minimum Sector Altitudes	14
2.5 Instrument Flight Procedures	15
2.6 Permitted Wind Farms in vicinity of Proposed Wind Farm	16
2.7 Communication and Navigation Systems	17
2.8 Radar Surveillance Sensors	18
2.9 Flight Inspection and Calibration	22
2.10 Aeronautical Obstacle Warning Light Scheme	23
2.11 Irish Air Corps / DoD Safeguarding	24
2.12 Garda Air Support Unit (GASU) and Emergency Aeromedical Service (EAS)	26
3. Summary	31

Appendices

Appendix A – ICAO Annex 15 Area 1 Surface	32
Appendix B – Air Corps Wind Farm / Tall Structures Position Paper	33

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

1. Introduction

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

1.1 Wind Farm Site Information

The proposed wind farm development is located in County Clare approximately 39 km west of Shannon Airport. Figure 1 shows the proposed wind farm site with respect to Shannon Airport and the IAA radar stations at Shannon and Woodcock Hill.



Figure 1. Location of proposed wind farm at Moanmore Lower

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

1.2 Shannon Airport

Table 2 below shows the co-ordinates of Shannon Airport and the distance from the Airport reference Point (ARP) to the proposed wind farm site. Shannon 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
Shannon, Co Clare	International Airport	Single Asphalt Runway Airspace: Class C	52 42 07 N 008 55 29 W (Mid-point of Runway 06/24).	39.3 km

Table 1. Shannon Airport Details

The aeronautical navigation aids at the aerodrome include DVOR/DME, NDB, ILS LOC and ILS GP.

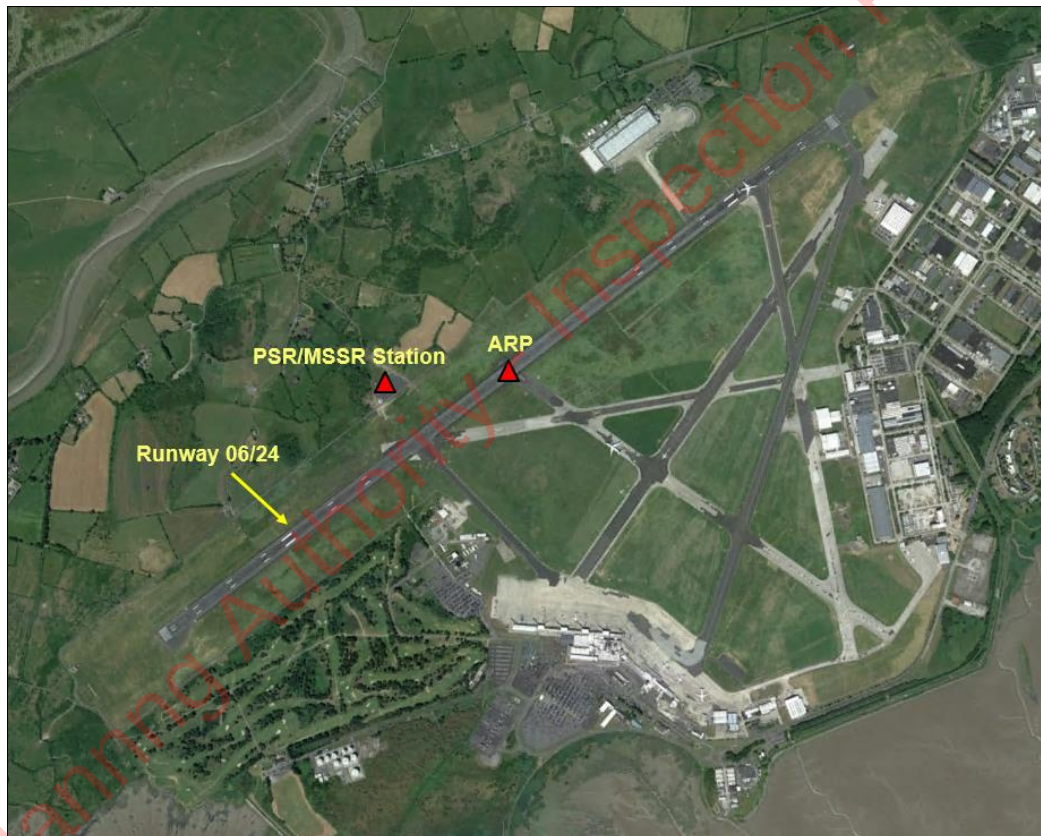


Figure 2. Shannon International Airport

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

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
- Flight Inspection and Calibration
- Aeronautical Obstacle Warning Light Scheme
- Irish Air Corps / DoD Safeguarding
- Garda Air Support Unit (GASU) and Emergency Aeromedical Service (EAS)

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.1 Annex 14 Obstacle Limitation Surfaces (OLS)

A review of the Annex 14 Obstacles Limitation Surfaces (OLS) was first carried out by first plotting the proposed turbines and the airport obstacle surfaces. The obstacle limitation surfaces for Shannon 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 Moanmore Lower wind farm. The distance from the Shannon Airport ARP, runway centre-point, to the nearest point of the proposed wind farm is 24km. The analysis of the OLS plots indicates that turbines at the proposed wind farm would not penetrate the Outer Horizontal Surface which extends to 15km from the Shannon Airport Reference Point (ARP) or runway centre-point.

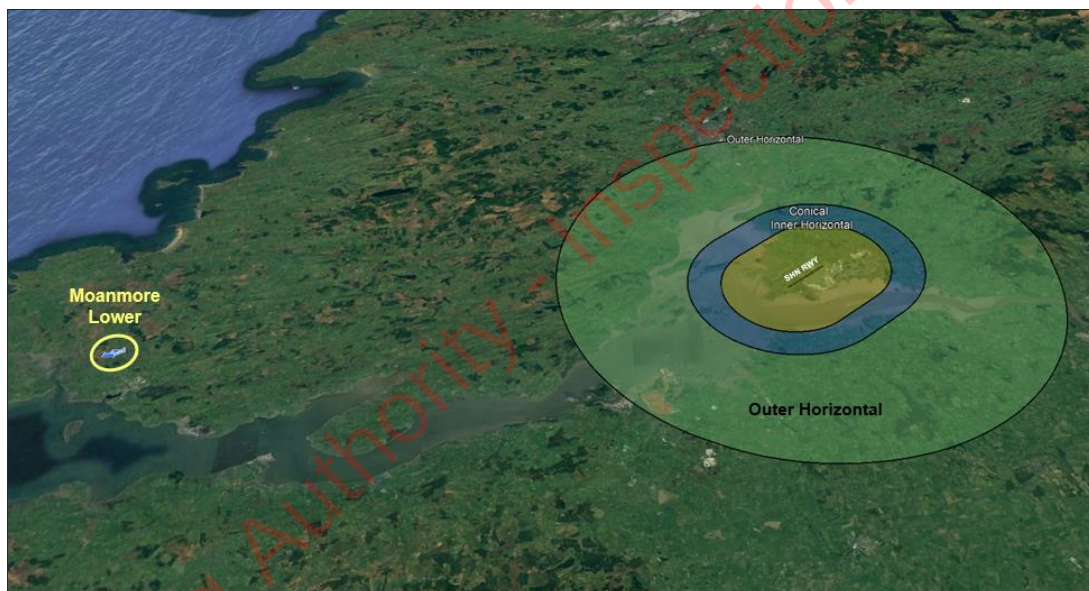


Figure 3. Moanmore Lower Wind Farm in relation to Shannon Airport OLS.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.2 Annex 15 Aerodrome Surfaces

Turbines at the proposed wind farm would penetrate the ICAO Annex 15 Aerodrome Surface as shown in Figure 4. The "Terrain and obstacle requirements Area 1" is defined in ICAO Annex 15 as an area of 45km from the Aerodrome ARP. (An illustration of ICAO Annex 15 Area 1 Surface is provided in Appendix A).

As the proposed wind farm is at a distance of 39km from Shannon ARP there is penetration of the Annex 15 surface. All obstacles, if they are more than 100 meters above terrain for a distance of 45km from Shannon ARP, need to be registered in the IAA Air Navigation Obstacle Data Set. This 45km area is known as the TMA area i.e. Total Maneuvering Area and is used for en-route circling and maneuvering and is shown in Figure 4.

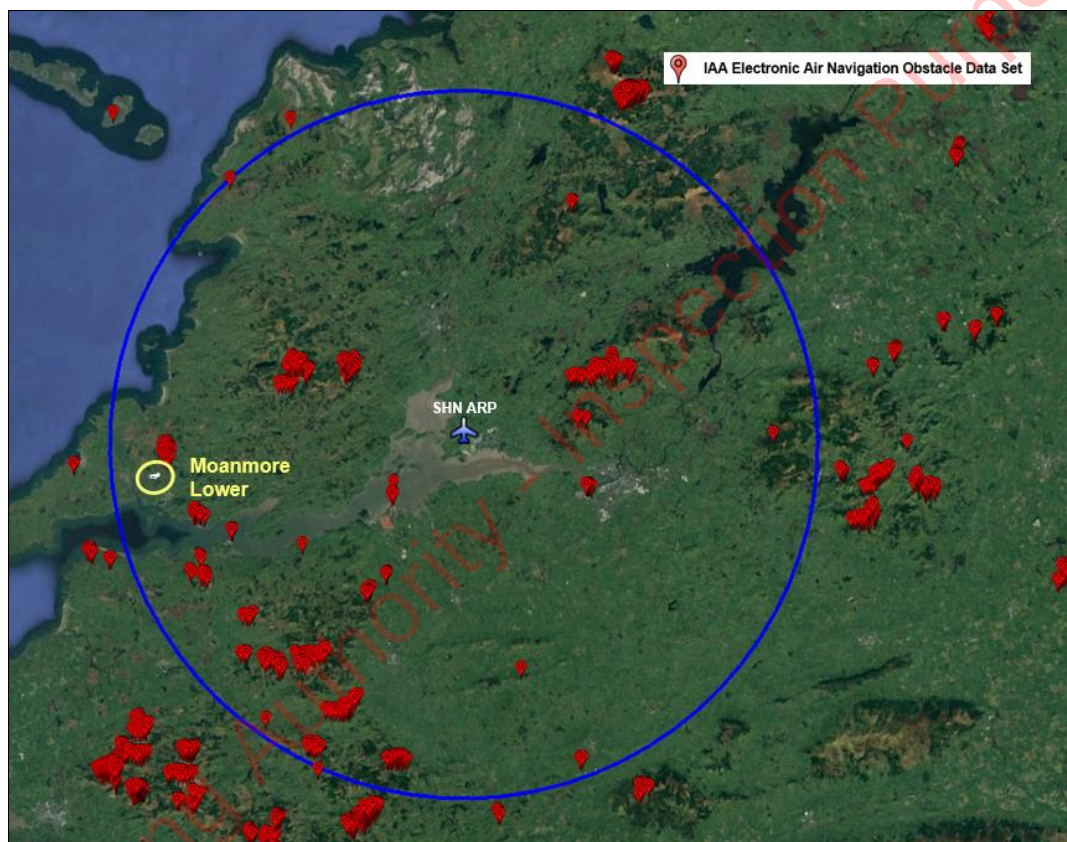


Figure 4. Annex 15 Aerodrome Surface and IAA Electronic Air Navigation Obstacle Data Set

There are other existing tall structures (obstacles) in the vicinity of the proposed wind farm, notably the operational wind farms at Tullabrack and Moneypoint and the chimney stacks at the ESB power plant at Moneypoint. These existing obstacles would shield any potential impacts from the proposed wind farm at Moanmore Lower. The IAA Electronic Air Navigation Obstacle Data Set permitted obstacles are shown relative to the proposed wind farm in Figure 5.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

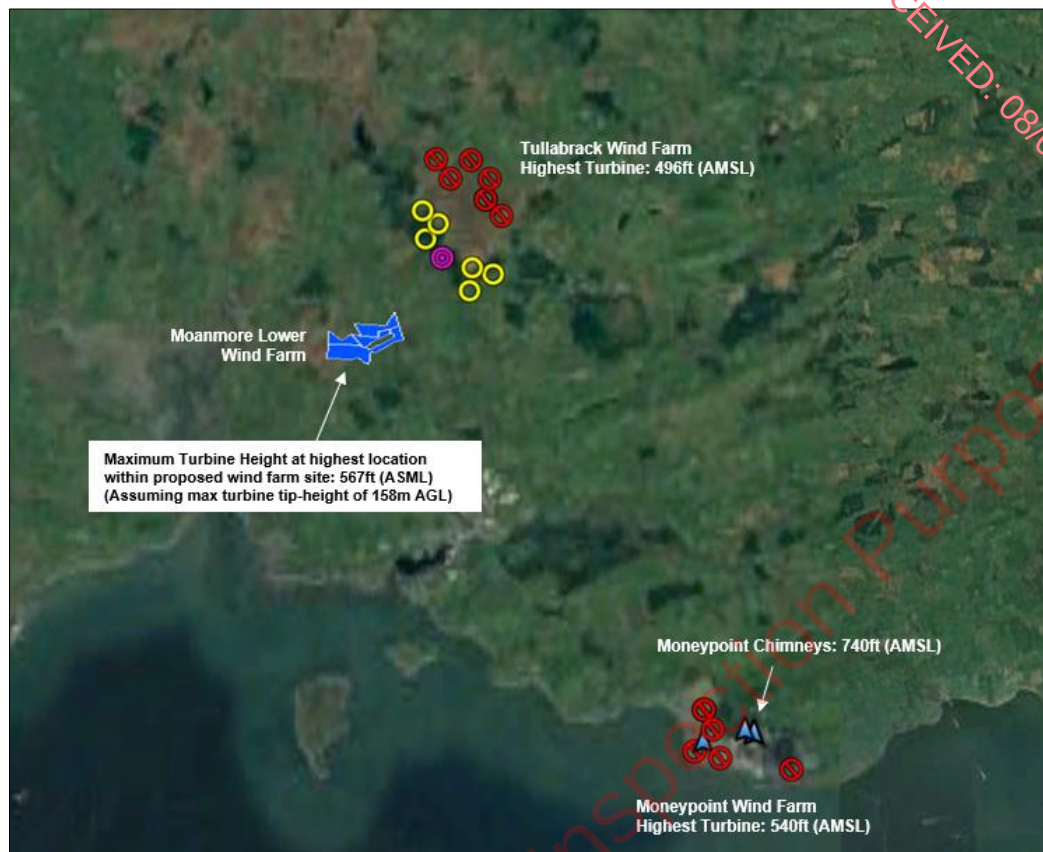


Figure 5. Permitted Obstacles in vicinity of Moanmore Lower Wind Farm

Although there are other obstacles in close proximity to 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.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

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 Shannon Airport include 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 5 below illustrates that the proposed wind farm at Moanmore Lower is over 30 km from the nearest BRA at Shannon Airport. At this distance, turbines at the proposed wind farm will have no impact on the navigation facilities associated with the Building Restricted Areas for Shannon Airport.



Figure 6. Proposed Wind Farm relative to Shannon Airport BRA - RWY 06/24

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.4 Minimum Sector Altitudes

A review of the Minimum Sector Altitudes (MSA) shows that the proposed wind farm is within 25 nautical miles from the VOR/DME at Shannon Airport. The MSA provides a minimum obstacle clearance of 1000 ft above the highest obstacle within specified sectors. The wind turbines are located within the Main Sector (MSA 3000 ft), as shown in Figure 6. According to the wind farm location, the maximum construction height for the site would be 2000 ft/609.6m AMSL (3000 ft MVA minus 1000 ft).

A 518ft (158m) turbine located at the highest point (49ft) within the proposed site boundary would result in an obstacle of 567ft AMSL. This is below the 2000ft threshold, therefore the MSA of the Main Sector will not be affected and there will be no impact on the published MSA altitude figures.

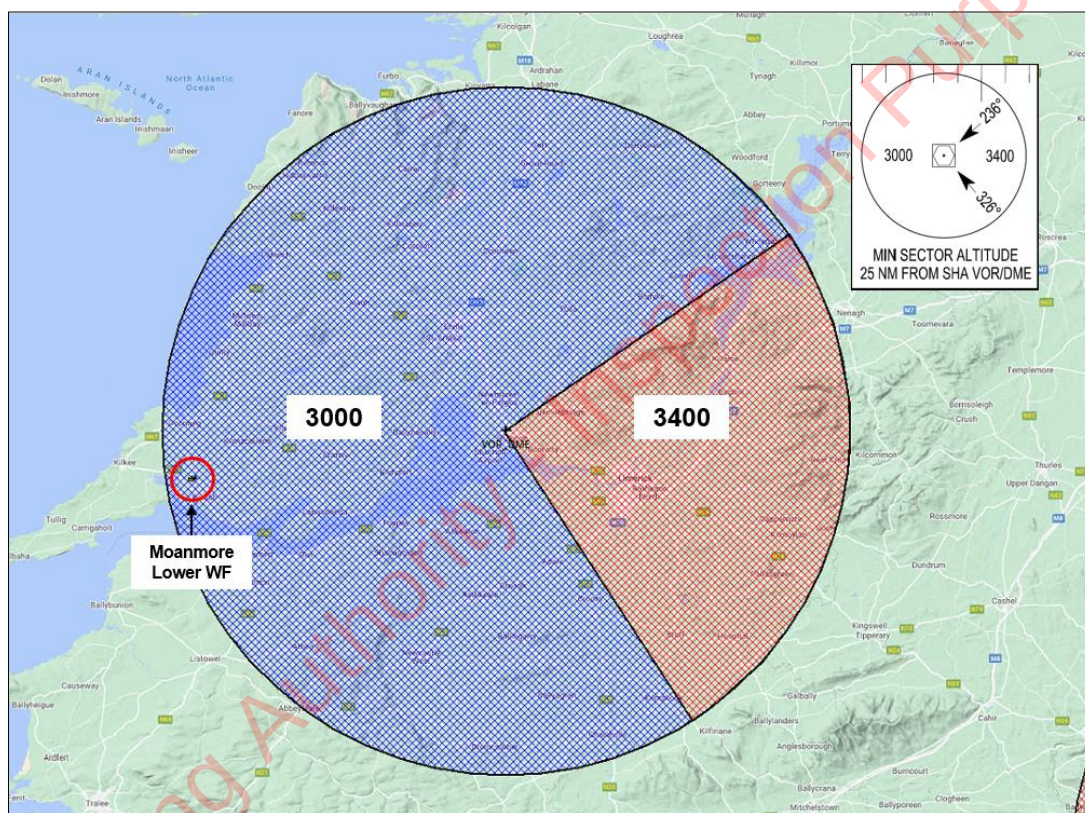


Figure 7. Shannon Airport (EINN) Minimum Sector Altitudes

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.5 Instrument Flight Procedures

There are nine published Instrument and Visual Flight Procedures for departures and arrivals into Shannon Airport.

Due to the distance of the proposed wind farm from the airport (and as there are existing obstacles (e.g. existing wind farms)) it is unlikely that there will be any impacts on the Instrument Flight Procedures for flights to/from Shannon Airports. Table 2 below lists the Instrument Flight Procedures for Shannon Airport.

AIP Chart	RWY	Procedure	Wind Farm Impacts
EINN AD 2.24-5	06	RNAV Standard Instrument Departure Chart RWY 06	No impacts.
EINN AD 2.24-6	24	RNAV Standard Instrument Departure Chart RWY 24	No impacts.
EINN AD 2.24-7	06	RNAV Standard Arrival Chart RWY 06	No impacts.
EINN AD 2.24-8	24	RNAV Standard Arrival Chart RWY 24	No impacts.
EINN AD 2.24-10	06	Instrument Approach Chart ILS or LOC RWY 06	No impacts.
EINN AD 2.24-11	06	Instrument Approach Chart VOR RWY 06	No impacts.
EINN AD 2.24-13	24	Instrument Approach Chart ILS CAT I & II or LOC 24	No impacts.
EINN AD 2.24-14	24	Instrument Approach Chart VOR RWY 24	No impacts.
EINN AD 2.24-15		Visual Approach Chart – ICAO	No impacts.

Table 2. Shannon Airport Instrument and Visual Flight Procedures

A detailed instrument flight procedure analysis is outside of the scope of this report; however, from the desktop assessment conducted it is envisaged that adjustments to the MSA figures will not be required by the Air Navigation Service Provider (ANSP) at Shannon Airport Authority and it is unlikely that they will require a detailed assessment on the possible impact of the proposed wind farm on flight procedures.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

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
Tullabrack	https://www.eplanning.ie/ClareCC/AppFileRefDetails/03908/0	Operational Wind Farm
Moneypoint	https://www.eplanning.ie/ClareCC/AppFileRefDetails/011538/0	Operational Wind Farm
Booltiagh Phase I	00/567 or PL03.120616	Operational Wind Farm
Booltiagh Phase II	07/2900	Operational Wind Farm
Letteragh	11/361	Operational Wind Farm
Glenmore	http://www.eplanning.ie/ClareCC/AppFileRefDetails/20824/0 (14/575 or PL03.245392)	Operational Wind Farm
Brookfield/ Kilmaley	15/860 or PL03.248008	Planning Submission
Cahermurphy I	http://www.eplanning.ie/ClareCC/AppFileRefDetails/19159/0	Permitted 150m turbine
Cahermurphy II	20/658 or PL03.311044	Planning Submission
Slieve Callan	http://www.eplanning.ie/ClareCC/AppFileRefDetails/109/0	Operational Wind Farm

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

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.7 Communication and Navigation Systems

The AIP document EIKN AD 2-18/19 provides the information for communication and navigation facilities for Shannon Airport. Table 4 below shows the channel frequencies for the ATS communications Facilities and the Radio Navigation and Landing Aids at 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 farm
Shannon	118 MHz –130 MHz	339 KHz – 330 MHz	14 km	No impacts

Table 4. Impacts on Communications and Navigation Systems

As the proposed wind farm is approximately 38 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.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.8 Radar Surveillance Sensors

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.”

The nearest radar surveillance sites to the proposed wind farm are the IAA Radar Stations at Shannon Airport (PSR and SSR) and at Woodcock Hill (SSR). Both IAA radar sites are shown relative to the proposed wind farm in Figure 8 below.

AiBridges <i>Total Communications Solutions</i>	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

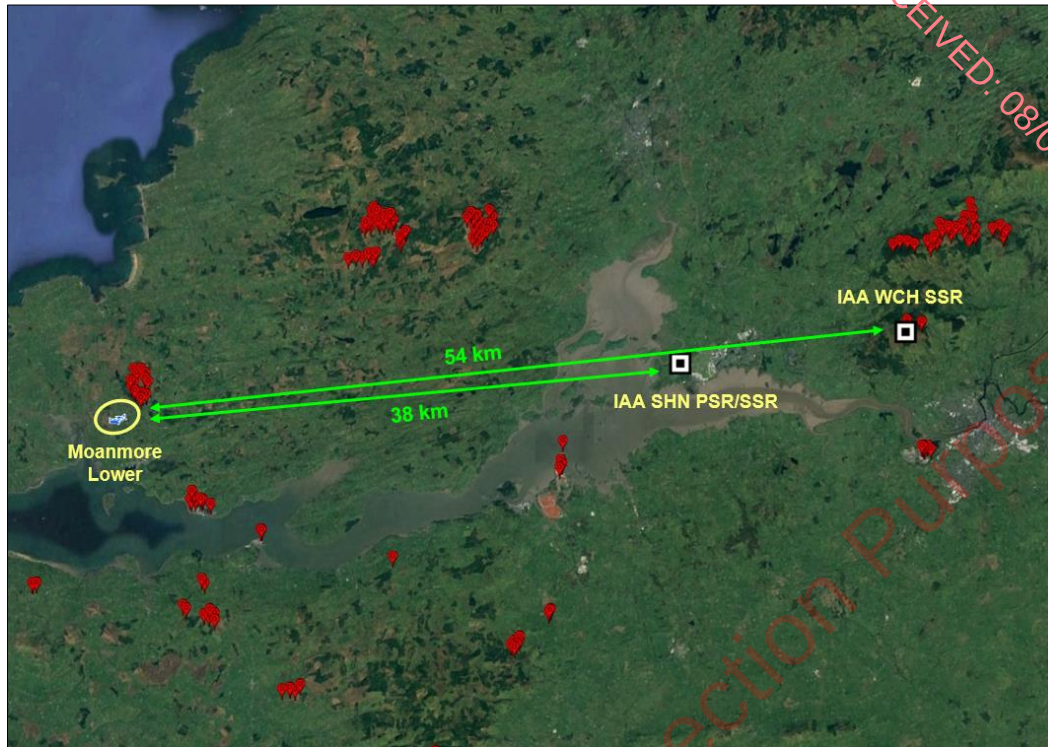


Figure 8. IAA Radar Surveillance Sites relative to proposed wind farm developments.

A review of each radar station (Shannon and Woodcock Hill) is provided in Sections 2.8.1 to 2.8.2 that follow. The findings of the review indicate that the proposed wind farm is sufficiently far from the radar stations that there would be no impacts, and a detailed radar assessment would not be required by the IAA.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.8.1 Woodcock Hill SSR Radar Assessment

The radar surveillance site at Woodcock Hill consists of a SSR system housed in the dome-shaped structure shown in Figure 9.



Figure 9. SSR at Woodcock Hill

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.

ID	Distance to SSR	Radar LOS Assessment (EuroControl Guidelines)	Radar LOS Assessment (NATS Guidelines – UK)
Moanmore Lower WF	54 km	Detailed Assessment Not Required	Detailed Assessment Not Required

Table 7. EuroControl / UK Safeguarding Guidelines – Woodcock Hill SSR

As the table above shows, 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 at Woodcock Hill.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.8.2 Shannon SSR Radar Assessment

The radar surveillance site at Shannon Airport consists of a PSR and a SSR. The PSR and the SSR antennas are co-located on the same structure at Shannon Airport (Figure 10).



Figure 10. PSR and SSR at Shannon Airport

Table 8 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.

ID	Distance to PSR/SSR	Radar LOS Assessment (EuroControl Guidelines)	Radar LOS Assessment (NATS Guidelines – UK)
Moanmore Lower WF	38 km	Detailed Assessment Not Required	Detailed Assessment Not Required

Table 8. EuroControl / UK Safeguarding Guidelines – Shannon PSR/SSR

As the tables 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 PSR/SSR at Shannon Airport.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.9 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 Shannon Airport for calibration of instrument landing systems. It is unlikely that the Flight Inspection Procedures will be impacted as the proposed wind farm is sufficiently far from the airport runways and the flight inspection procedures should already account for the existing obstacles (e.g. adjacent wind farms).

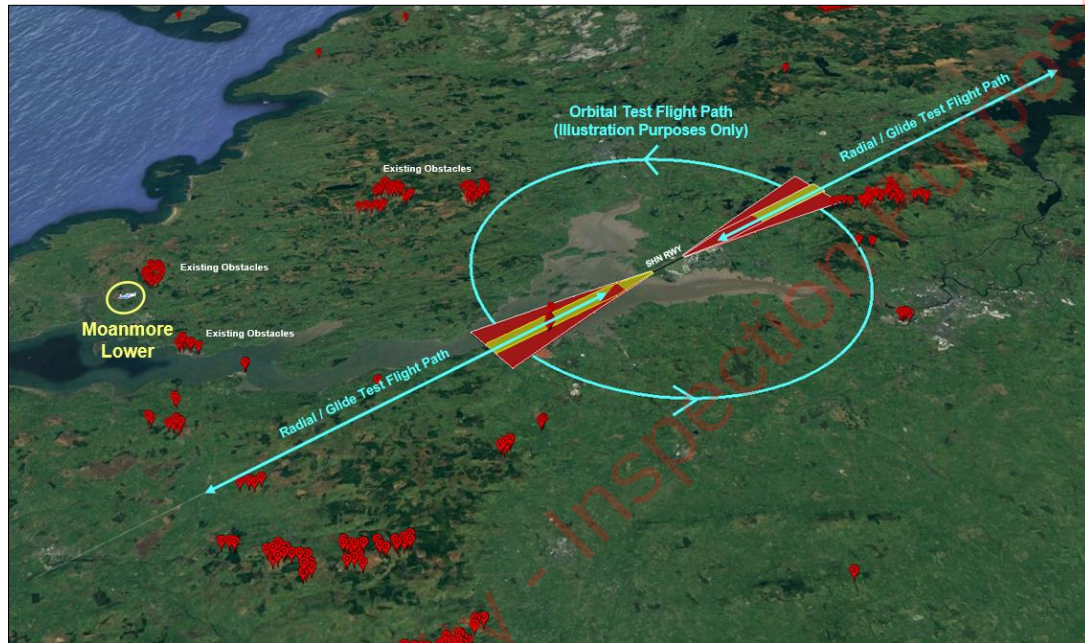


Figure 11. Flight Inspection and Calibration Test Procedures should account for Existing Obstacles (e.g. Tullabrack, Moneypoint wind farms and chimneys at ESB Moneypoint Power Station)

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.10 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.”

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.11 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 as described in Figure 12 below.

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 centerline 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 R247 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.

Figure 12. Irish Air Corps – Critical Low Level Routes

The nearest of the Air Corps restricted areas to the proposed wind farm sites is the 3 NM restricted area around the M7 Motorway, as shown in Figure 13 below. As the proposed wind farm at Moanmore Lower is located outside the restricted area, there should be no impacts on Irish Air Corps activities.

AiBridges <i>Total Communications Solutions</i>	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

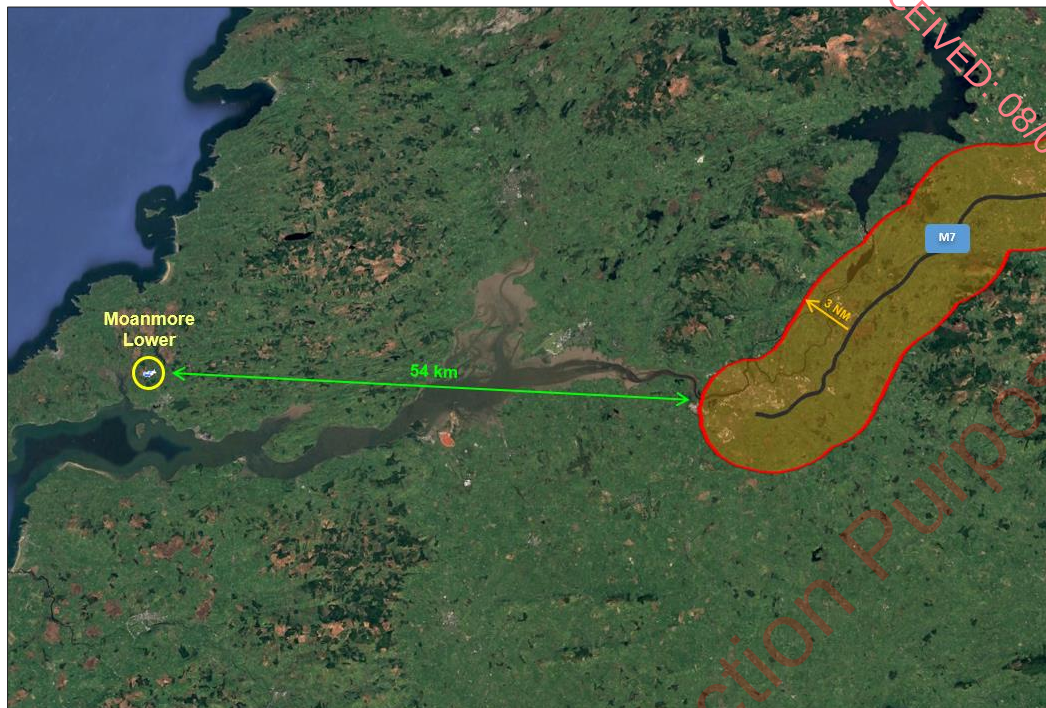


Figure 13. Proposed Wind Farm sites relative to IAC Critical Low Level Flight Routes

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.12 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 2.12.1 and 2.12.2 that follow. The review shows that GASU and EAS operations are unlikely to be impacted by the proposed development.

Aviation Impact Review	Mitigation Measure Action	Residual Impact
Garda Air Support Unit (GASU) and Emergency Aeromedical Service (EAS)	No action	None

Table 9. Aviation Impact Review - Garda Air Support Unit (GASU) and Emergency Aeromedical Service (EAS)

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.12.1 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 14. GASU - Pilatus Britten-Norman BN 2T-4S Defender 4000



Figure 15. GASU - Eurocopter EC135 T2

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

The proposed wind farm is located in an area that is sparsely populated and on agricultural / boggy terrain. For these reasons, it is highly unlikely that the proposed wind farm development would have any significant impacts on GASU operations.

In the unlikely event of GASU operations in the general 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 farms be permitted the associated turbine locations would be submitted to the IAA and aviation charts and GNSS databases would be updated accordingly.

GASU Aircraft	Impact of proposed wind farms - 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 areas. 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 – Helicopter landings in the subject area would not occur as the proposed wind farm located in agricultural / boggy terrain. 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.

Table 10. Impact of proposed wind farm on GASU Operations

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

2.12.2 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.

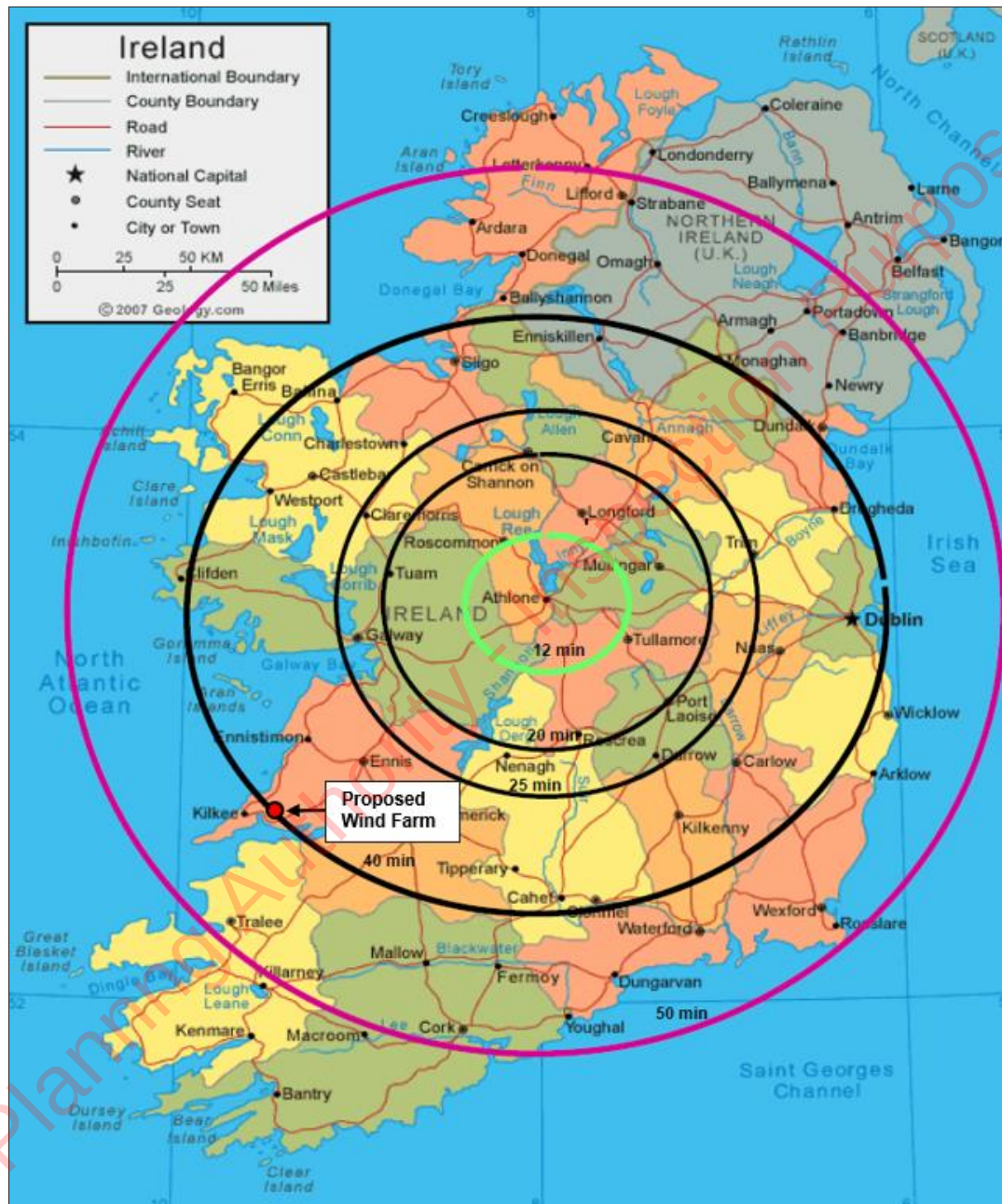


Figure 16. EAS – Flying Times from Athlone

The proposed wind farm site is located in an area that is sparsely populated. Helicopter landings are highly unlikely to occur in the subject area due to the agricultural/ boggy terrain of the proposed site.

Also, should the proposed wind farms be permitted the associated turbine locations would be submitted to the IAA and aviation charts and GNSS databases would be updated accordingly.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

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 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 farms – Opinion
Helicopter (Eurocopter EC135)	Low – Helicopter landings at the subject area are highly unlikely to occur as the proposed wind farm site is in an area that is sparsely populated and is located on agricultural / boggy terrain. 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.

Table 11. Impact of proposed wind farm on EAS Operations

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

3. Summary

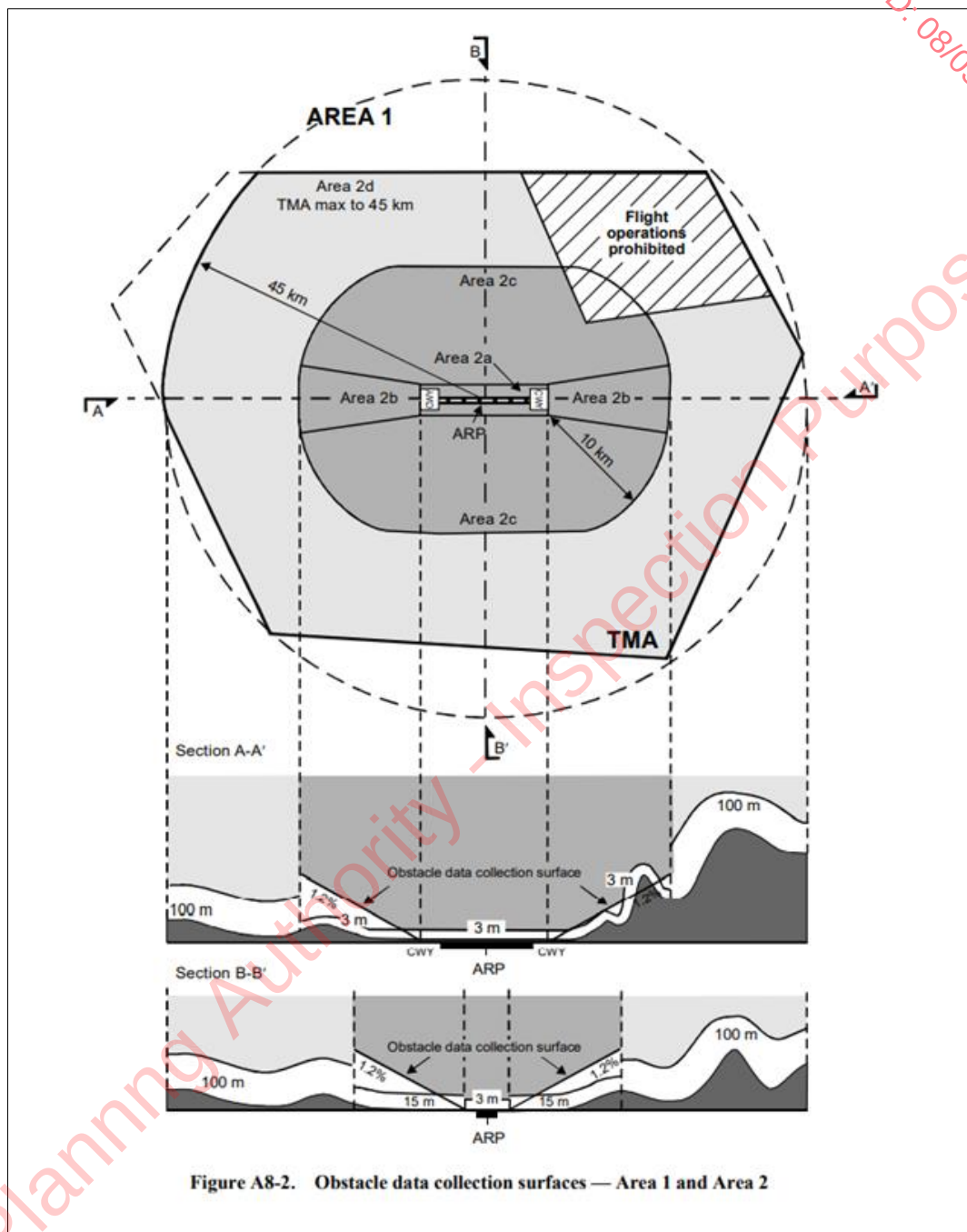
A summary of the aviation review for the proposed wind farm at Moanmore Lower is provided in Table 12 below.

Item	Impact	Summary
Annex 14 - Obstacle Limitation Surfaces (OLS)	None	Turbines at the proposed wind farm site would be located outside the OLS Surfaces for Shannon Airport.
Annex 15 - Aerodrome Surfaces	Observ.	The IAA are likely to request that turbines at the proposed wind farms be included in the IAA Aeronautical Electronic Obstacle Data Sets.
Building Restricted Areas	None	A review shows that Moanmore Lower is over 30 km from the BRAs at Shannon Airport. At this distance there would be no impacts due to the proposed wind farm.
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 VOR/DME at Shannon Airport. The maximum allowable structure in the applicable sector is 2000ft (AMSL). Turbines at the proposed wind farm would not exceed the 2000ft threshold, therefore the MSA of the applicable sector will not be affected and there will be no impact on the published MSA altitude figures.
Instrument Flight Procedures	None	A review shows that the instrument flight procedures for RWY 06 and RWY 24 standard instrument departures are unlikely to be impacted for precision aircraft.
Communication and Navigation Systems	None	As the proposed wind farm is approximately 38km from the Localizer and transmitting antenna at Shannon Airport, it is very unlikely that the proposed development will have any impact on these ATS communications and radio navigational aids.
Radar Surveillance Sensors	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	The annual Flight Inspection Procedures will not be impacted by the proposed wind farm as the proposed site is sufficiently far from the ARP at Shannon Airport that there would be no impacts. 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 to 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 indicates that they are unlikely to be impacted by the proposed wind farm development.

Table 12. Moanmore Lower Wind Farm – Aviation Review Summary

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

APPENDIX A - ICAO Annex 15 Area 1 Surface.



ICAO Annex 15 Area 1 Surface.

AiBridges Total Communications Solutions	Procedure: 001	Rev: 2.1
Moanmore Lower Wind Farm – Aviation Review Statement	Approved: KH	Date: 08/05/2025

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.

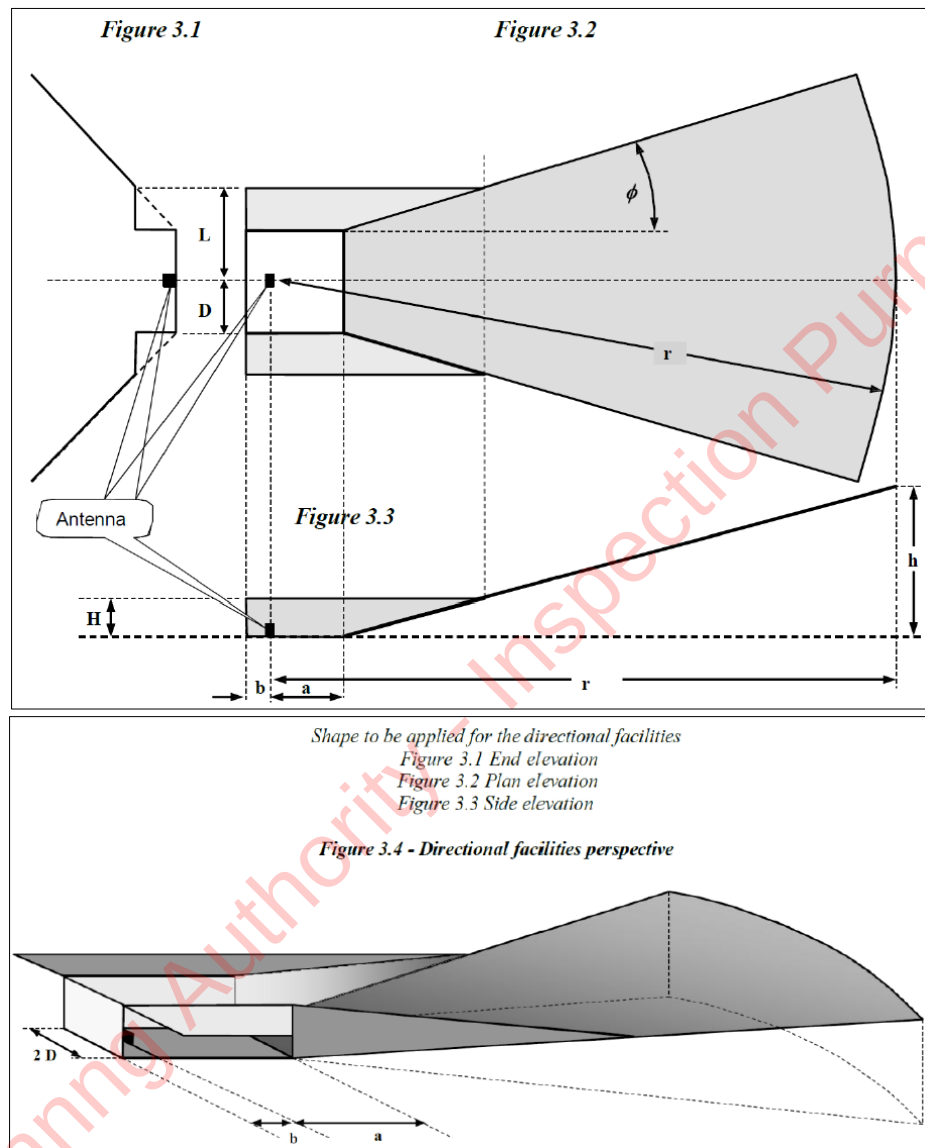


Figure B1 - Example BRA shape for directional facilities (ICAO EUR DOC 015 Figures 3.1-3.4)

Type of <i>navigation</i> facilities	<i>A</i> (m)	<i>b</i> (m)	<i>h</i> (m)	<i>r</i> (m)	<i>D</i> (m)	<i>H</i> (m)	<i>L</i> (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)