

Technical Appendix 1.5 Aviation and Radar

1. Introduction

- 1.1.1 This Appendix provides an indication of the potential effects of the proposed Dalfad Wind Farm (hereafter referred to as the “Proposed Development”) on aviation during the construction and operational phases. Decommissioning effects are scoped out given these are similar to construction impacts. It includes the full assessment methodology along with the key reference documents covering legislation, policy and guidance.
- 1.1.2 This Appendix has been written by Sagentia Aviation Ltd (Osprey), with the assessment undertaken with specific reference to the relevant aviation legislation and guidance and draws upon:
- **Technical Annex 1.5.1:** Very High Frequency (VHF) Carrier to Interference and Intervisibility (C/I) Assessment (Sagentia, 2026) detailing Communication and Navigation systems of Glasgow Prestwick Airport (GPA).
- 1.1.3 This Appendix is supported by the following figures:
- **Figure TA1.5.1:** Aviation Study Area;
 - **Figure TA1.5.2:** Proposed Development Location; and
 - **Figure TA1.5.3:** Proposed Aviation Lighting Scheme.
- 1.1.4 The data used in this technical appendix is the most up to date publicly available information which can be obtained from the data sources referenced. Data has also been provided through consultation.

2. Baseline Conditions

2.1 Study Area

- 2.1.1 The assessment aims to exhaustively identify all potential issues and the associated stakeholders affected by the Proposed Development. This involves considering all military and civil aerodromes in the wider area out to 60 km, all radar installations out to the limit of their range, all navigational aids and air-ground-air communications stations to the limit of their safeguarding and low flying activities in the airspace above and around the site (**Figure TA1.5.1**). The Study Area has been defined based on established guidance; the CAA Civil Aviation Publication (CAP 764) Policy and Guidelines on Wind Turbines (CAA, 2026), consultation zones and criteria. Whilst not definitive, CAP 764 provides criteria for assessing whether any turbine development might influence aviation related operations. Consideration of the potential for the Proposed Development turbines to impact on aviation receptors has been undertaken in accordance with the standard consultation distances stated in CAP 764 including the following:
- Airspace coincident with published IFPs to consider an aerodrome's requirement to protect its IFPs is also considered.

2.2 Scope

- 2.2.1 This Appendix considers the construction (in line with the Construction Programme in **Chapter 2**), operation and maintenance of the Proposed Development. Impacted



- receptors would adjust / recover to the Proposed Development in the period from Application through to end of the operational phase.
- 2.2.2 The aviation scope exhaustively identifies all potential issues and the associated stakeholders affected by the Proposed Development. This involves considering all military and civil aerodromes in the wider area out to 60 km, all radar installations out to the limit of their range, all navigational aids and air-ground-air communications stations to the limit of their safeguarding and low flying activities in the airspace above and around the Proposed Development, including:
- Airspace coincident with published IFPs to consider an aerodrome's requirement to protect its IFPs;
 - Aerodrome radar to 75 km; and
 - NATS en-route radar to 200 km.
- 2.2.3 There are two PSR sites (NATS Lowther Hill and GPA) located, and considered, within the Proposed Development aviation study area (and radar installations out to the limit of their range) following Scoping response. MOD Air Defence Radar (ADR) Remote Radar Heads (RRH) Buchan and Brizlee Wood, Aberdeen International Airport, Highlands and Islands Ltd, Glasgow International Airport and Edinburgh Airport PSRs have been scoped out following Scoping response. There are no SSR systems located within 10 km of the Proposed Development (the CAA suggested radius where impact is expected); therefore, SSR is scoped out from further analysis.
- 2.2.4 Information on aviation and radar within the aviation and radar study area was collected through a detailed desktop review of existing studies and datasets. The following additional data sources were used in the desk study:
- CAA Visual Flight Rules (VFR) Charts (CAA / NATS, 2026); and
 - **Technical Annex 1.5.1:** Very High Frequency (VHF) Carrier to Interference and Intervisibility (C/I) Assessment (Osprey, 2025) detailing Communication and Navigation systems of GPA.

2.3 Current Baseline

- 2.3.1 Airspace is classified as A to G in accordance with International Civil Aviation Organisation (ICAO) standards¹. Airspace Classes A to E are variants of Controlled Airspace (CAS) in which aircraft require an ATC clearance. Class G Airspace is designated as uncontrolled airspace in which aircraft can operate autonomously without any clearance required. Immediately above and surrounding the Proposed Development airspace is used by both military and civil registered aircraft. The Proposed Development sits in Class G Airspace immediately outside the GPA Control Zone (CTR), underneath the Scottish Terminal Control Area (TMA), both Class D and underneath Class C CAS (**Figure TA1.5.2**).
- Class G Airspace established from the surface up to 5,500ft above mean sea level (amsl) immediately surrounding the Proposed Development. Aircraft operating within this airspace do not require receipt of an ATS from GPA and military tactical low flying training can take place in the Proposed Development Area, underneath Class C and D CAS (**Figure TA1.5.2**).

¹ There is no airspace designated as Class B or Class F in UK airspace.



- Class D CAS established from 5,500 ft amsl up to Flight Level (FL) 195 forming the Scottish TMA. Aircraft operating within this airspace must be in receipt of an ATS from NATS Prestwick Area Control Centre (ACC) or delegated to GPA or Glasgow Airport.
- Class C CAS established from FL 195 up to FL 245. All aircraft operating in this airspace must be in receipt of an ATS from NATS or Military controllers located at a NATS ACC, or Military Air Defence Controllers.
- Class C CAS established above FL 245. Again, all aircraft operating in this airspace must be in receipt of an ATS from NATS or Military controllers located at a NATS ACC, or Military Air Defence Controllers.

2.3.2 There are no Secondary Surveillance Radar (SSR) systems located within the CAA suggested radius where impact is expected (10 km). GPA ATC provide radar services in and around its CTR; additionally, NATS has a licence obligation to provide radar data to other remote aviation stakeholders (such as the Ministry of Defence (MOD)) to a high quality and performance standard for the benefit of UK aviation. Any potential impact that the Proposed Development might have on NATS En-Route Limited (NERL) radar systems, which cover the area of the Proposed Development must be considered both in terms of effect on the civilian en-route services and in the context of its remote users such as the MOD and airports.

2.4 Future Baseline in Absence of Proposed Development

2.4.1 The likely evolution without implementation of the Proposed Development as far as airspace changes, including traffic density, can be qualitatively assessed. If the Proposed Development does not come forward, no significant change to the present airspace construct, particularly the GPA CTR, or usage, in terms of aircraft movement density, above and around the Proposed Development area is expected.

3. Consultation

3.1.1 Consultation undertaken prior to and during the EIA Scoping stage has been described in Appendix C of the Pre-Application Consultation Report (PAC Report) submitted as part of the application for Section 36 consent. The PAC Report summarises relevant consultee responses to the Scoping Report and confirms how those responses were addressed as part of the EIA process.

3.1.2 No further direct consultation has been undertaken.

3.2 Receptors Requiring Assessment

3.2.1 **Table TA1.5-1** provides a summary of which receptors and impacts have been scoped in or out of the assessment.

Table TA1.5-1: Summary of Assessment Scope

Receptor	Scoped In?		Comments
	Construction	Operation	
GPA	Yes	Yes	Scoping Response (26 February 2026). The Initial Safeguarding Assessment indicates that while this proposed development lies outwith Glasgow Prestwick Airport's Controlled Airspace (CAS), it is in an area where the airport's ATC regularly provides an Air Traffic Service (ATS):



Receptor	Scoped In?		Comments
	Construction	Operation	
			i. Direct radar line of sight between the Primary Surveillance Radar(s) at GPA and the turbines. ii. Baseline Probability of Detection (PD) Flight Trial & Terma Radar Modelling Assessment. iii. Potential disruption to multiple Instrument Flight Procedures and minimum safe altitudes due to the site's location and proximity to GPAs controlled airspace, in particular the Instrument Flight Procedures for Runway 30. iv. Potential loss of VHF Ground to Air communications in the vicinity of the windfarm because of the large turbines and proximity to other developments in the area. v. Increasing cumulative impact due to the proliferation of turbines in the area to the south-east of the Airport.
NATS	No	Yes	Scoping Response (27 February 2026). Accordingly, NATS (En Route) plc objects to the proposal. The reasons for NATS's objection are a predicted impact on Lowther Hill PSR, the Proposed Development is likely to cause false primary plots to be generated and a reduction in the PSR's probability of detection; outlined in the TOPA SG40975 report.
MOD	Yes	Yes	Scoping Response (13 March 2026). The MOD has concerns with the proposal due to the potential impact to low flying aircraft operating in the development area.
Glasgow International Airport	No	No	Scoping Response (13 March 2026). The proposed development lies outwith Glasgow Airport's radar consultation zone and is below the height that requires IFP assessment.
Edinburgh Airport	No	No	Scoping Response (18 February 2026). The proposed development lies outwith the Aerodrome Safeguarding Zone for Edinburgh Airport.

4. Likely Effects and Potential for Mitigation

4.1.1 The effects described in this section would commence once the first turbine is erected and will gradually increase as the remaining 13 turbines are constructed and will continue through the 40-year lifespan of the Proposed Development.

4.2 Primary Surveillance Radar (PSR)

4.2.1 Radar detectable turbines can be a significant cause of radar false plots, or unwanted returns (clutter), as the rotating blades can trigger the Doppler threshold (e.g. minimum shift in signal frequency) of the Radar Data Processor (RDP) and therefore might be interpreted as aircraft targets. Additionally, the rotation of the turbine blades provides an indication to the radar system that the target acquired is



- moving and thus defeating Doppler processing techniques. This issue can be further compounded by a large number of turbines located together (such as a wind farm) which leads to a cumulative effect over a greater volume of airspace with higher densities of radar clutter produced.
- 4.2.2 Without specific turbine mitigation processing capabilities, radar cannot distinguish between returns from wind turbines (false returns, or clutter) and those from aircraft. Air traffic controllers are required to assume that actual aircraft targets could be lost over the location of a wind farm; furthermore, identification of aircraft under control could be lost or interrupted. It is mainly for the above reasons that aviation radar system operators object to wind farm developments that are within radar line of sight (LoS) to radar systems.
- 4.2.3 Local circumstances may raise issues that are unique to a specific case. For this reason, the local aerodrome operator, Air Navigation Service Providers (ANSP) and Air Traffic Service (ATS) providers are qualified to interpret what this impact might be; however, they must demonstrate a thorough assessment of how it will affect the safety, efficiency and flexibility of their specific operations.
- 4.2.4 The current GPA mitigating PSR, the Terma SCANTER System, has no further capacity to apply mitigation to more wind turbines without significant investment to upgrade the system, but if such investment were to be acquired by GPA, then an increase in data handling capacity, within the PSR system processor would be considered as a possible technical solution subject to commercial agreement with the Applicant.
- 4.2.5 Similarly, with the NATS Lowther Hill PSR, technical cumulative impacts related to multiple turbine developments within the Study Area (section 2.1) can be mitigated with a technical solution subject to commercial agreement with the Applicant.
- 4.2.6 A flight trial will be commissioned, to evaluate performance parameters of the PSR, subject to commercial agreement with the Applicant to validate the PSR mitigations and ensure compliance to regulation in the latest edition of CAP 670 Air Traffic Services Safety Requirements.

4.3 Instrument Flight Procedures (IFP)

- 4.3.1 An Instrument Flight Procedure is a published procedure used by aircraft flying in accordance with Instrument Flight Rules (IFR) which is designed to achieve and maintain an acceptable level of safety for operations during, but not exclusively in, inclement weather.
- 4.3.2 Large turbine developments, dependent on location and proximity to published airport IFP safeguarded areas might impact the safe operation of these published procedures.
- 4.3.3 The Applicant will continue to engage with GPA to provide an agreed route to mitigation. This can be achieved through the commission of an IFP Mitigation Report. GPA has requested, in its Scoping Response (26th February 2026), that an IFP Mitigation Report be provided to GPA², completed by a CAA Approved Procedure Design Organisation (APDO). IFP impacts can then be mitigated subject to agreement with the Applicant.
- 4.3.4 The CAA states within CAP 764 that *“the CAA is responsible for being satisfied that a certificated or licensed aerodrome complies with the relevant requirements and is*

² An IFP Mitigation Report cannot be prepared by the Applicant; the Applicant will request that GPA's APDO undertakes the report.



safe for use by civil aircraft, having regard in particular to the physical characteristics of the aerodrome and its surroundings.....". An APDO is an organisation that has been formally approved by the CAA to design IFPs for use in UK airspace. The APDO must ensure that procedures meet ICAO and UK regulatory requirements, provide adequate obstacle clearance therefore ensuring safe, accurate, and operationally practical procedures.

4.4 Carrier to Interference (C/I)

4.4.1 The Carrier to Interference (C/I) ratio quantifies how much stronger the carrier, main system equipment signal (VHF radio communication between the airport and aeroplane) is compared to the interference signal (from a turbine in this scenario). The C/I ratio directly affects the quality and reliability of aeronautical radio communication and navigation systems.

- The CAA states within CAP 670 that *"turbine interference prediction is a complex process which requires a detailed technical knowledge of radio propagation theory and the application of a defined prediction methodology. Prediction of turbine interference impacts above a threshold value will not automatically result in the rejection of a given development proposal. Technical impact (interference levels) and operational impacts are assessed separately. The type of operational usage and the geographic location and volume of affected airspace (Volume of Interest) will affect the level of operational impact and hence sensitivity to a particular development proposal"*.

4.4.2 Large turbine developments, dependent on location and proximity to Communication, Navigation and Surveillance (CNS) systems safeguarded areas may impact the safe operation of these systems. Potential impact on CNS is described in **Technical Annex 1.5.1 (VHF Assessment)**. The Applicant will continue to engage with GPA to provide an agreed route to mitigation through either or both operational or technical means.

4.4.3 The results of the C/I analysis in **Technical Annex 1.5.1 (VHF Assessment)** are considered to be conservative in the establishment of results and are provided in order to establish the worst-case possibility of impact to aviation stakeholders. C/I results are theoretical in nature however; analysis is based on CAA guidance (CAP 670) for establishing the potential impact to aviation communications systems from operational turbines and it is considered this will not have an implication for the conclusions of the assessment.

4.5 Aviation Lighting

4.5.1 In conforming with the requirements (under Article 222) of the Air Navigation Order (ANO) 2016 (CAP 393), as amended 2022, for the fitment of aviation obstruction lighting for the Proposed Development could have a significant effect on the nighttime visual environment, having the potential to affect local residents and visitors to the area alike at night (see **EIAR Chapter 4**). However, to minimise the potential for significant nighttime visual effects while still maintaining aviation safety, a reduced aviation lighting scheme is proposed for the Proposed Development (see **Figure TA1.5.3**). Engagement will take place with, *inter alia*, the MOD, NATS, GPA, Maritime and Coastguard Agency (MCA) Search and Rescue (SAR), Helicopter Emergency Medical Service (HEMS) operators, National Police Air Services (NPAS) and local General Aviation Sports & Recreation (GA S&R) operators. The scheme will be subject to CAA approval.



5. Cumulative Effects of the Proposed Development

5.1 Embedded and Standard Mitigation

5.1.1 Several measures (primary and tertiary) have been adopted as part of the Proposed Development to reduce the potential for impacts on aviation and radar. These are outlined in **Table TA1.5-2** below. As there is a commitment to implementing these measures, they are considered inherently part of the design of the Proposed Development and have therefore been considered in the assessment presented below.

Table TA1.5-2: Measures Adopted as part of the Proposed Development

Measures Adopted as part of the Proposed Development	Justification	How the Measures will be Secured
Embedded Mitigation Measures: Measures included as part of the Proposed Development Design		
Development of, and adherence to, a Construction Environmental Management Plan (CEMP) which will be prepared in accordance with the layout principles.	The CEMP, including a final plan of the Proposed Development will be prepared to inform all receptors, as appropriate, but before construction commences.	Through the Scottish Government Energy Consents Unit (ECU).
Standard Measures: Measures Required to meet Legislative requirements, or Adopted Standard Industry Practice		
Lighting as required and/or determined necessary for aviation safety as agreed with GPA unless otherwise agreed with the Ministry of Defence (MOD) Defence Infrastructure Organisation (DIO) Safeguarding for the operational life of the Proposed Development.	In line with standard industry practice and in compliance with Article 222 of the ANO (CAP 393). Appropriate marking, lighting and aids to navigation will be employed during the construction, operational and decommissioning phases as appropriate to ensure the safety of all aviation stakeholders. Appropriate lighting will ensure the onshore structures are visible for aeronautical Search And Rescue (SAR) and emergency response procedures.	Aviation safety is secured through a requirement of the ECU.
Defence Geographic Centre (DGC) Notification - information regarding construction should be passed to the DGC at least 10 weeks in advance of the obstacle type(s) erection detailing position, height (tip of arc) and type of aviation lighting. Once reported, all will be included in the DGC Obstruction database and all that meet aviation chart inclusion	In line with RenewableUK guidance.	In line with standard industry practice.



Measures Adopted as part of the Proposed Development	Justification	How the Measures will be Secured
criteria will be published for broader awareness.		
Defence Infrastructure Organisation Safeguarding (DIOS) Notification - notify DIOS of the following at least 14 days prior to the commencement of construction: • The date of the commencement of construction. • The date any turbines are brought into use. • The maximum height of any construction equipment to be used. • The maximum heights of any turbine and meteorological mast to be constructed. • The latitude and longitude of each turbine and meteorological mast to be constructed. • The DIOS must be notified of any changes to the information supplied and of the completion of construction.	In line with standard industry practice.	Aviation safety is secured through a requirement of the ECU.
NATS Aeronautical Information Service (AIS) Notification - Appropriate information about the site construction and any associated lighting (where applicable), for example the height and temporary location of construction cranes, should be provided to the NATS AIS (for promulgation in applicable aviation publications including the UK Integrated Aeronautical Information Package (IAIP)).	In line with standard industry practice and in compliance with Article 222 of the ANO (CAP 393).	In line with standard industry practice.

5.1.2 Where significant effects have been identified, further mitigation measures have been identified to reduce the significance of effect to acceptable levels following the initial assessment. These are measures that could further prevent, reduce and, where possible, offset any adverse effects on the environment. These measures are set out, where relevant, below.

5.2 Cumulative Assessment

5.2.1 GPA raised concerns, in the Scoping Response (26th February 2026), regarding cumulative impact “*due to existing and proposed windfarms in the vicinity of the proposed Dalfad Wind Farm*”.



PSR

- 5.2.2 There are a number of existing, consented and proposed wind farms, including the Proposed Development, located in areas understood to be detectable to GPA Terma and NATS PSRs. Without mitigation, the Proposed Development would have cumulative effects on the GPA and NATS PSR with these other projects, in terms of the area affected by radar clutter and the distances between areas of clutter on the radars. Discussions are ongoing with NATS and GPA regarding potential mitigation measures as described in **Section 3** and **Section 4**.
- 5.2.3 NATS has defined mitigation solutions which will be subject to commercial agreement between the Applicant and NATS and will be implemented by radar optimisation of the affected Proposed Development Area of the Lowther Hill PSR which will remove all wind turbine radar returns.
- 5.2.4 GPA has a defined mitigation solution which will be subject to commercial agreement between the Applicant and GPA and will be implemented by radar and processor optimisation for the affected Proposed Development Area of the GPA PSR.
- 5.2.5 Following implementation of mitigation (both technical and operational), it can be expected that the stand-alone and cumulative effects of the Proposed Development on the GPA and NATS PSR will be removed.

IFP

- 5.2.6 There are a number of existing, consented and proposed wind farms, including the Proposed Development, located in areas that might interfere with GPA IFPs. The Proposed Development might have cumulative effects on the GPA IFPs, in its area and with these other projects. Discussions are ongoing with GPA regarding potential mitigation measures, if required, as described in **Section 3** and **Section 4**.
- 5.2.7 Consultation regarding the potential breach of the IFPs with GPA is continuing with a view to reaching agreement on mitigation to maintain safe separation for aircraft flying IFR procedures in the sectors of the IFPs impacted by the Proposed Development. Agreement will be sought should the minimum of 300 m separation between the highest obstacle (turbine) and the IFP minima be breached.
- 5.2.8 Following implementation of mitigation, it can be expected that the stand-alone and cumulative effects of the Proposed Development on the GPA IFPs will be removed.

VHF C/I

- 5.2.9 There are a number of existing, consented and proposed wind farms, including the Proposed Development, located in areas that might interfere with GPA VHF aeronautical communication and navigation systems. The Proposed Development might have cumulative effects on the GPA VHF systems, none reported, in its volume and with these other projects, in terms of the volume affected and the distances between areas of interference. Discussions are ongoing with GPA regarding potential mitigation measures, if required, as described in **Section 3** and **Section 4**.
- 5.2.10 Following implementation of mitigation, if required, it can be expected that the stand-alone and cumulative effects of the Proposed Development on the GPA VHF C/I will be reduced to an operationally acceptable level.



Aviation Lighting

- 5.2.11 The proliferation of turbines within Low Flying Area 16 (LFA 16) is a general concern for the MOD (Scoping Response, 26th February 2026) regarding military Low Flying operations in this region.
- 5.2.12 Following implementation of the proposed reduced lighting scheme for the Proposed Development (see **Figure TA1.5.3**) (subject to CAA approval); it can be expected that the stand-alone and cumulative effects of the Proposed Development on low flying operations will be removed.

5.3 Additional Mitigation

- 5.3.1 **Table TA1.5-3** sets out additional mitigation measures (also known as secondary mitigation, comprising measures beyond embedded/standard mitigation) to which the Applicant has committed. These measures are designed to reduce identified adverse effects.



Table TA1.5-3: Additional (Secondary) Mitigation

Reference	Mitigation/ Enhancement Measure	Description
PSR An ATS provider such as NATS and GPA might accept that although a technical impact may be present, it can be managed and accepted by implementing operational mitigation in airspace that is not regularly used for the separation of aircraft. However, in the airspace in which the Proposed Development is located, operational acceptance of the effect created is unlikely to be acceptable to all ATS providers without mitigation, portions of airspace may be more important to some ATC establishments than others, due to the role and responsibility of ATC provision allocated to them. Further engagement and agreement is required with the respective PSR receptor on the mitigation solution to be utilised.	Pre-Construction, Construction and Operation In the case of NATS radar systems impacted (Lowther Hill PSR) previous acceptable mitigation of wind turbine impact to these systems has been achieved through agreement by NATS of radar optimisation and in some cases, infill. The Lowther Hill Indra PSR incorporates the latest technologies for en-route air route surveillance which might provide an enhanced capability to mitigate wind turbine effect. However, optimisation of the radar system to mitigate the potential impact of the Proposed Development will be required and be agreed by NATS. In the case of GPA Terma PSR previous acceptable mitigation of wind turbine impact to these systems has been achieved through agreement by GPA of updates to processor, data access / storage. The GPA Terma PSR incorporates the latest technologies for terminal surveillance which provides an enhanced capability to mitigate wind turbine effect. However, optimisation of the radar system to mitigate the potential impact of the Proposed Development will be required and be agreed by GPA.	NATS has defined mitigation solutions which will be subject to commercial agreement between the Applicant and NATS and will be implemented by radar optimisation of the affected Proposed Development Area of the Lowther Hill PSR which will remove all wind turbine radar returns. GPA has a defined mitigation solution which will be subject to commercial agreement between the Applicant and GPA and will be implemented by radar and processor optimisation for the affected Proposed Development Area of the GPA PSR. Assuming that an acceptable, and confirmed, PD is achieved post optimisation, the mitigation will have to be kept in place by the Airport for the lifetime of the windfarm. Secured through the Scottish Government ECU as aviation safety is secured through a requirement of the ECU.
IFP Consultation with regard to the potential breach of the IFPs with GPA is continuing with a view to reaching agreement on mitigation to maintain safe separation for aircraft flying IFR procedures in the sectors of the IFPs impacted by the Proposed Development.	Pre-Construction The aerodrome licence holder or representative acting on the licence holder's behalf is responsible for the initial design, routine maintenance and periodic review of their aerodrome's IFPs. Agreement will be sought should the minimum of 300 m separation between the highest obstacle (turbine) and the IFP minima be breached.	The aerodrome licence holder shall, if appropriate, independently re-issue the procedures related to an aerodrome as soon as possible if the changing obstacle environment or aerodrome operational requirement dictates an amendment to procedures, either laterally or vertically. During annual maintenance review an appointed and CAA Approved Procedure Designer will review the IFPs published for the given aerodrome and assess their compliancy to ICAO criteria – as well as ensuring that the applicable obstacle clearance is achieved for all procedures considering the latest aerodrome and obstacle survey data available at the given date. As an output from the review, the Procedure



Reference	Mitigation/ Enhancement Measure	Description
		Designer will provide a list of recommended changes to the Proposed Development, to be actioned on the IFPs to ensure they remain compliant to criteria as well as provide the required clearance margin over terrain and obstacles surrounding the airport. If a change to the procedures is required, consideration will be given to any new dominant vertical obstacle(s) that require a change to the level previously provided in a particular segment/area of the IFP charts related to the aerodrome. This new level will provide a minimum of 300 m obstacle clearance for IFR flights. Secured through the Scottish Government ECU as aviation safety is secured through a requirement of the ECU.
C/II An insignificant theoretical, mathematical effect to VHF communications in the near volume of the Proposed Development. This is a technical item and at this point therefore theoretical in nature. If any operational total loss of VHF communication outside the volume of the Proposed Development was ascribed to the presence of the turbines, operational mitigation would be in the form of a notice of potential 'poor' communications in the area (or on specific radial and altitude). Aerodromes have volumes of airspace at low levels in their vicinity that suffer degraded communication due to various reasons including the surrounding topography, built environment and atmospheric conditions. Hypothetical, unproven and unmodelled technical mitigation could take the form of a combination of the following: increased transmitter power at the aerodrome, taller transmitter towers or repeater transmitters within the Proposed Development Area.	Pre-Construction, Construction and Operation CAA guidance on this subject is contained within CAP 670: <i>Air Traffic Services Safety Requirements</i>, which sets out a two-step process.	CAA Defined Process: I. The first step is to determine through theoretical mathematical modelling, the conceptual effect of the Proposed Development. The worst-case mathematical modelling assumes that the WTG would be always facing the VHF radio antenna to create a safety-conservative, worst-case scenario (despite this not being physically probable). II. The second step is for GPA to then assess the potential for operational impact (including cumulative effect), based on the theoretical results of the first step, mathematical modelling, and hence sensitivity to the Proposed Development. Secured through the Scottish Government ECU as aviation safety is secured through a requirement of the ECU.



Reference	Mitigation/ Enhancement Measure	Description
Aviation Lighting Consultation with regard to the potential for an effect on the nighttime visual environment is continuing with aviation operators in the area of the Proposed Development with a view to reaching agreement on a CAA reduced aviation lighting scheme.	Pre-Construction, Construction and Operation CAA approved reduced aviation lighting scheme.	A reduced aviation lighting scheme is proposed for the Proposed Development (see Figure TA1.5.3); engagement will take place with, inter alia, the MOD, NATS, GPA, Maritime and Coastguard Agency (MCA) Search and Rescue (SAR), Helicopter Emergency Medical Service (HEMS) operators, National Police Air Services (NPAS) and local General Aviation Sports & Recreation (GA S&R) operators.



6. Conclusion and Recommendations

6.1 Aviation Issues

PSR

- 6.1.1 Implementation of the contractually agreed mitigation (kept in place by NATS and GPA for the lifetime of the windfarm) and flight trial will address any potential effects so that there will be no risk to aviation safety.

IFP

- 6.1.2 Implementation of the IFP Mitigation Report recommendations, agreed by GPA and approved by the CAA will address any potential effects so that there will be no risk to aviation safety.

6.1.3 C/I

- 6.1.4 Implementation of the agreed operational and physical mitigation by GPA will address any potential effects so that there will be no risk to aviation safety.

Aviation Lighting

- 6.1.5 Implementation of the CAA approved reduced aviation lighting scheme will address any potential effects so that there will be no risk to aviation safety.

6.2 Recommended Planning Condition

- 6.2.1 It is recommended that the required mitigation for GPA PSR and IFPs be secured through planning (**Table TA1.5-3**), in a condition as follows:

**“Aviation Primary Surveillance Radar (PSR) and Instrument Flight Procedures (IFP)
– GPA**

- (1) No turbine tower of any turbine may be erected unless and until:
 - (a) The Company has agreed the IFP Mitigation Solution with the Airport operator which has been submitted to and agreed in writing by the Scottish Ministers; and
 - (b) the Scottish Ministers have confirmed in writing that they are satisfied that the Company has put in place a binding undertaking to pay the Airport Operator such sums as are demonstrably and reasonably incurred by the Airport operator for implementing the measures in the IFP Solution.
- (2) The turbines shall be constructed fully in accordance with the approved IFP Mitigation Solution including, for the avoidance of doubt, in accordance with the maximum permitted turbine blade tip-heights in the IFP Mitigation Solution, unless any change to the IFP Mitigation Solution is approved in writing by the Airport Operator and the Scottish Ministers.
- (3) No wind turbine blade shall be fitted to any Relevant Turbine until the Scottish Ministers are satisfied that the Company has agreed a Windfarm Mitigation Scheme with the Airport Operator in order to mitigate the impact of the development on:
 - (a) the Airport Operator's Windfarm Radar Mitigation System (WFRMS); and
 - (b) the Airport Operator's other installed communications, navigation, surveillance (CNS) systems and/or the efficiency of air traffic services provided by the Airport Operator.



- (4) The Development shall be constructed, commissioned and operated fully in accordance with the approved Windfarm Mitigation Scheme.

Reason: *In the interests of aviation safety and to ensure the Airport Operator is reimbursed for the actual costs it incurs in approving the turbine parameters and updating the instrument flight procedures (if required) as a result of the Development.*

6.3 References

UK Govt, *National Planning Framework 4 (NPF4)* (UK Govt, 2024)

Scottish Govt, *Onshore Wind Policy Statement* (Scot Govt, 2022)

Scottish Govt, *Planning Circular 2/03 Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas)* (Scot Govt, 2003)

East Ayrshire, 2024. *Local Development Plan (LDP2)*.

ICAO, Document 8168 Ops/611 *Procedures for Air Navigation Services Aircraft Operations* (ICAO, 2018)

ICAO Annex 14 *Aerodromes Design and Operations contains Standards and Recommended Procedures (SARPs)* (ICAO, 2022)

EUROCONTROL-GUID-130: *How to Assess the Potential Impact of Wind Turbines Surveillance Sensors* (EUROCONTROL 2014)

CAA CAP 032, *UK Aeronautical Information Publication* (CAA, 2026)

CAA CAP 168, *Licensing of Aerodromes* (CAA, 2025a)

CAA CAP 393, *The Air Navigation Order (ANO)* (CAA, 2026)

CAA CAP 670, *Air Traffic Services Safety Requirements* (CAA, 2019)

CAA CAP 738, *Safeguarding of Aerodromes* (CAA, 2020)

CAA CAP 764, *Policy and Guidelines on Wind Turbines* (CAA, 2026)

CAA CAP 774, *The UK Flight Information Services* (CAA, 2021)

CAA CAP 785B, *Implementation and Safeguarding of Instrument Flight Procedures (IFP) in the UK* (CAA, 2022b)

CAA CAP 999, *Helicopter Search and Rescue (SAR) in the UK National Approval Guidance* (CAA, 2023b)

The Military MOD Aeronautical Information Publication (AIP), (MOD, 2026)

