

Aviation Risk Assessment

Scottish Hydro Electric Transmission PLC

Beauly to Blackhillock to New Deer to Peterhead
400kV Project

August 2025

PLANNING SOLUTIONS FOR:

- Solar
- Defence
- Airports
- Telecoms
- Buildings
- Radar
- Railways
- Wind
- Mitigation

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ADMINISTRATION PAGE

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1	June 2025	Initial issue
2	August 2025	Administrative revisions
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1 EXECUTIVE SUMMARY

1.1 Background

- 1.1.1 Pager Power has conducted an aviation risk assessment for the proposed overhead line network between Beauly, Blackhillock, New Deer and Peterhead, (hereafter referred to as the 'Proposed Development') to determine its potential impact upon aviation activity.
- 1.1.2 The risk assessment has been assessed based on the tower heights with the highest tower at 96.57m above ground level.
- 1.1.3 The Section 37 application for the Proposed Development will be submitted to the Energy Consents Unit at which point the ECU will consult with the local planning authorities and identified statutory and non-statutory consultees. Prior to application submission, consultation has taken place with various aviation-related stakeholders identified with their feedback being used to help develop the final proposal. The assessment, conclusions and recommendations are presented in the following sections.

1.2 Licensed Airports and Radar

Inverness Airport

- 1.2.1 Sections of the Proposed Development breach the Outer Horizontal Surface (OHS) of the Obstacle Limitation Surface (OLS). Obstructions that breach this surface can in principle be accommodated however, this will require coordination with the airport.
- 1.2.2 Sections of the Proposed Development are within line-of-sight to the Primary Surveillance Radar (PSR). The towers are not predicted to cause a significant technical impact (i.e. radar clutter due to false returns) compared to wind turbines and buildings, due to not featuring a rotating blade or flat or large areas of flat uniform surfaces (causing reflection or shadowing effects).
- 1.2.3 Consultation with Inverness Airport has confirmed¹ that there is no safeguarding impact from this Proposed Development.

1.3 NATS NERL Radar

- 1.3.1 Sections of the Proposed Development are within line-of-sight to the Allanshill Primary Surveillance Radar (PSR). The towers are not predicted to cause a significant technical impact (i.e. radar clutter due to false returns) compared to wind turbines and buildings, due to not featuring a rotating blade or flat and opaque surfaces (causing reflection or shadowing effects).
- 1.3.2 NATS NERL have confirmed² via consultation that the Proposed Development does not conflict their safeguarding criteria and have no objections.

¹Source: Highlands and Islands Airports Limited, November 2024

²Source: NATS (En Route) Public Limited Company ("NERL"), July 2024

1.4 Ministry of Defence (MoD)

Low Flying Zones and Danger Area

- 1.4.1 The Proposed Development is located within an area of 'low priority for military low flying concerns'. No significant impacts upon military low flying operations are predicted, and the MoD have confirmed³ their only requirement is to be provided sufficient information for the whole length of the Proposed Development for aviation charting and safety management purposes.

Aviation Lighting

- 1.4.2 Consultation has been undertaken with the MoD at each stage of the project. The MoD have confirmed² as part of the pre-application consultation that based on the shared proposals their only requirement is to be provided sufficient information for the whole length of the Proposed Development for aviation charting and safety management purposes.

RAF Lossiemouth

- 1.4.3 Sections of the Proposed Development breaches the OHS of the OLS. Obstructions that breach this surface can in principle be accommodated; however, this will require coordination with the MoD.
- 1.4.4 Sections of the Proposed Development are within line-of-sight to the PSR. The towers are not predicted to cause a significant technical impact (i.e. radar clutter due to false returns) compared to wind turbines and buildings, due to not featuring a rotating blade or flat and opaque surfaces (causing reflection or shadowing effects).
- 1.4.5 Sections of the Proposed Development are within the safeguarded area pertaining to the Precision Approach Radar. The towers are not predicted to cause a significant technical impact but is located within the safeguarded area.
- 1.4.6 Consultation has been undertaken with the MoD at each stage of the project. The MoD have confirmed² as part of the pre-application consultation that based on the shared proposals their only requirement is to be provided sufficient information for the whole length of the Proposed Development for aviation charting and safety management purposes.

Radar

- 1.4.7 Sections of the Proposed Development are within line-of-sight to the to the Secondary Surveillance Radar (SSR) and Air Surveillance and Control Service (ASCACS) Radar at Remote Radar Head Buchan. The towers are not predicted to cause a significant technical impact (i.e. radar clutter due to false returns) compared to wind turbines and buildings, due to not featuring a rotating blade (causing reflection or shadowing effects).
- 1.4.8 Consultation has been undertaken with the MoD at each stage of the project. The MoD have confirmed³ as part of the pre-application consultation that based on the shared proposals their only requirement is to be provided sufficient information for the whole length of the Proposed Development for aviation charting and safety management purposes.

³ Source: Defence Infrastructure Organisation, October 2024

1.5 Met Radar

- 1.5.1 Sections of the Proposed Development are within line-of-sight to the Hill of Dudwick Met Radar. The towers are not predicted to cause a significant technical impact (i.e. radar clutter due to false returns) compared to wind turbines and buildings, due to not featuring a rotating blade or flat or large areas of flat uniform surfaces (causing reflection or shadowing effects).
- 1.5.2 The Met Office have confirmed⁴ via consultation that there will be no adverse impact upon the closest meteorological radar at Hill of Dudwick and have no objections.

1.6 Civil Airfields

- 1.6.1 In general, the Proposed Development will be less easily visible to pilots flying visually. The subsections below summarise the medium impact upon civil unlicensed airfields.
- 1.6.2 For civil unlicensed airfields, as presented in Table 2 on page 16, no significant impact is predicted considering the distance between the airfields and closest tower.

Easterton Airfield

- 1.6.3 The Proposed Development is located 150m laterally from the extended runway centreline and 7km from the runway threshold. At this point, aircraft are predicted to be vertically clear of the Proposed Development. The Proposed Development also lies within the recommended distance for consultation. Consultation is ongoing with Highland Gliding Club, who operate from Easterton Airfield, to understand the impact of the Proposed Development and possible mitigation solutions.

Eskadale Airfield

- 1.6.4 The Proposed Development is located 171m laterally from the extended runway centreline and 24km from the runway threshold. At this point, aircraft are predicted to be vertically clear of the Proposed Development. The Proposed Development also lies within the recommended distance for consultation.
- 1.6.5 It has not been possible to contact the identified airfield as no information appears to be available regarding its operations. It has however been included within this report in the event the airfield is still active.

Longside Airfield

- 1.6.6 The Proposed Development is located 900m laterally from the extended runway centreline and 19.1km from the runway threshold for Longside Airfield. At this point, aircraft are predicted to be vertically clear of the Proposed Development. The Proposed Development also lies within the recommended distance for consultation. Consultation with Buchan Aero Club, who operate at Longside Airfield, has been undertaken to confirm their position but no response has been received to date.

⁴ Source: Met Office, July 2024

Summary of Consultation

1.6.7 Table 1 below provides a summary of the consultee responses.

Consultee	Type of Consultation	Response
Highlands and Islands Airports Limited	Pre-application Consultation (November 2024)	The Aerodrome Safeguarding and Operations Support Officer has reviewed the aviation risk assessment and assessed the towers against the Instrument Flight Procedures for Inverness Airport. They have confirmed that based on the information provided there is no safeguarding impact from the Proposed Development
Defence Infrastructure Organisation	Pre-application Consultation (October 2024)	The Assistant Safeguarding Manager has reviewed the information provide as part of the consultation and advised that the MOD does have concerns with regard to the Proposed Development, however these concerns only relate to the need for sufficient information to be provided for the whole length of the Overhead Power Line for Aviation Charting and Safety Management purposes The MOD Subject Matter Experts have also confirmed there will be no requirement for aviation warning lighting for the Proposed Development
NATS (En Route) Public Limited Company ("NERL")	Pre-application Consultation (July 2024)	The Proposed Development has been examined from a

Consultee	Type of Consultation	Response
		technical safeguarding aspect and does not conflict with our safeguarding criteria. Accordingly, NATS (En Route) Public Limited Company ("NERL") has no safeguarding objection to the proposal.
Met Office	Pre-application Consultation (July 2024)	There would not be any adverse impact on the closest meteorological radar at Hill of Dudwick. Therefore, the Met Office has no objections to the application and does not need to be consulted further.
Highland Gliding Club – Easterton Airfield	Pre-application Consultation Meeting (December 2024)	Highland Gliding Club has advised the Proposed Development would impact the feasibility of one of their gliding routes out with the airfield that is utilised for trainees. Discussions are ongoing regarding options to try mitigate against this impact.

Table 1 Summary of Consultation Feedback

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2 ABOUT PAGER POWER

- 2.1.1 Pager Power is a dedicated consultancy company based in Suffolk, UK. The company has undertaken projects in 62 countries within Europe, Africa, America, Asia and Australasia.
- 2.1.2 The company comprises a team of experts to provide technical expertise and guidance on a range of planning issues for large and small developments.
- 2.1.3 Pager Power was established in 1997. Initially the company focus was on modelling the impact of wind turbines on radar systems. Over the years, the company has expanded into numerous fields including:
 - Renewable energy projects.
 - Building developments.
 - Aviation and telecommunication systems.
- 2.1.4 Pager Power prides itself on providing comprehensive, understandable and accurate assessments of complex issues in line with national and international standards. This is underpinned by its custom software, longstanding relationships with stakeholders and active role in conferences and research efforts around the world.

3 INTRODUCTION

3.1 Overview

- 3.1.1 Pager Power has conducted an aviation risk assessment for the proposed overhead line network between Beaulieu, Blackhilllock, New Deer and Peterhead, (hereafter referred to as the 'Proposed Development') to determine its potential impact upon aviation activity.
- 3.1.2 The risk assessment has been assessed based on the tower heights with the highest tower at 96.57m above ground level (AGL).
- 3.1.3 The report includes:
- Identification of relevant aviation infrastructure including:
 - Aerodromes (licensed, unlicensed and military);
 - Radar;
 - Radio navigation aids.
 - Overview of relevant safeguarding assessment distances;
 - Radio line of sight assessment for the relevant infrastructure, including:
 - Radar installations;
 - Radio navigation aids.
 - Overall risk and key issues.
- 3.1.4 The aim is to identify and assess the aviation risks associated with construction and operation of the Proposed Development.

4 PROPOSED DEVELOPMENT INFORMATION

4.1 Proposed Development Details

- 4.1.1 The coordinates (Eastings and Northings as per British National Grid) and heights above ground level of towers assessed are presented in Appendix A. The proposed overhead line network, indicated in white, is shown on aerial imagery in Figure 1 below.



Figure 1 Proposed overhead line network

5 AVIATION RISK ASSESSMENT

5.1 Risk Assessment Results

5.1.1 Table 2 on the following pages present the aviation risk assessment chart and identified risks.

Stakeholder	Aviation Risk	Distance	Risk Level
Licensed Airports and Radar	Inverness Airport	9km	Low
	Inverness Primary Surveillance Radar (PSR)	18km	High
NATS En-Route Limited (NERL)	Perwinnes PSR	57km	Low
	Allanhill PSR	22km	High
	Allanshill Secondary Surveillance Radar (SSR)	12km	Low
	Kinloss Beacons	14km and 15km	Low
	Inverness Beacons	8km	High
Ministry of Defence (MoD)	Low flying system	-	Low
	RRH Buchan	66km	Low
	RRH Buchan Air Surveillance and Control System (ASACS)	7km	High
	Lossiemouth Precision Approach Radar (PAR)	14km	Low
	Buchan SSR	7km	Medium
	Kinloss SSR	14km	Low

Stakeholder	Aviation Risk	Distance	Risk Level
	Kinloss PAR	32km	High
	Royal Air Force (RAF) Kinloss	14km	Medium
	RAF Lossiemouth	14km	Medium
	Lossiemouth PSR	17km	High
Met Office	Hill of Dudwick Met Radar	19km	High
Unlicensed Civil Airfields	Inverness Heliport	8km	Low
	Viewfield (unlicensed)	7km	Low
	Roths (unlicensed)	8km	Low
	Easterton (unlicensed)	3km	Medium
	Eskadale (unlicensed)	2km	Medium
	Hatton Airfield	10km	Low
	Fetterangus Airfield	9km	Low
	Peterhead Heliport	3km	Low

Stakeholder	Aviation Risk	Distance	Risk Level
	Longside Airfield	3km	Medium

Table 2 Identified aviation risks

6 AVIATION RISK ASSESSMENT DISCUSSION

6.1 Overview

- 6.1.1 The following section presents the results and discussion of the medium and high risks as identified by the risk assessment.
- 6.1.2 The most significant constraint with respect to physical safeguarding at licensed and military aerodromes is the Obstacle Limitation Surfaces (OLS). The OLS consists of a set of imaginary planes defined in three dimensions for physical safeguarding purposes (i.e., ensuring that physical structures do not present a safety hazard at an airfield) and are defined around licensed and military aerodromes. The dimensions and geometry of the surfaces are constructed based on detailed rules defined in the UK Civil Aviation Authority's (CAA) Civil Aviation Publication (CAP) 168 for licensed aerodromes, and in the UK Military Aviation Authority (MAA): Regulatory Article (RA) 3512: Permanent Fixed Wing Aerodrome - Obstacle Environment for military aerodromes. The size of the surfaces is dependent on the number of runways, their dimensions and the procedures carried out at the aerodrome.
- 6.1.3 The approach taken for the radar installations is as follows:
- Radar line of sight assessment for the most significant radar and tower;
 - Consideration of the distance from the radar;
 - Sensitivity of the location in which the Proposed Development is situated.
- 6.1.4 Further information regarding the methodology or the additional line-of-sight charts can be provided upon request.

6.2 Licensed Airports and Radar

Obstacle Limitation Surfaces Assessment

- 6.2.1 Towers as part of the Proposed Development and within 15km of Inverness Airport have been assessed against the Obstacle Limitation Surfaces (OLS) for Inverness Airport. Figure 2 on the following page shows the Proposed Development (red crosses) plotted against the OLS.

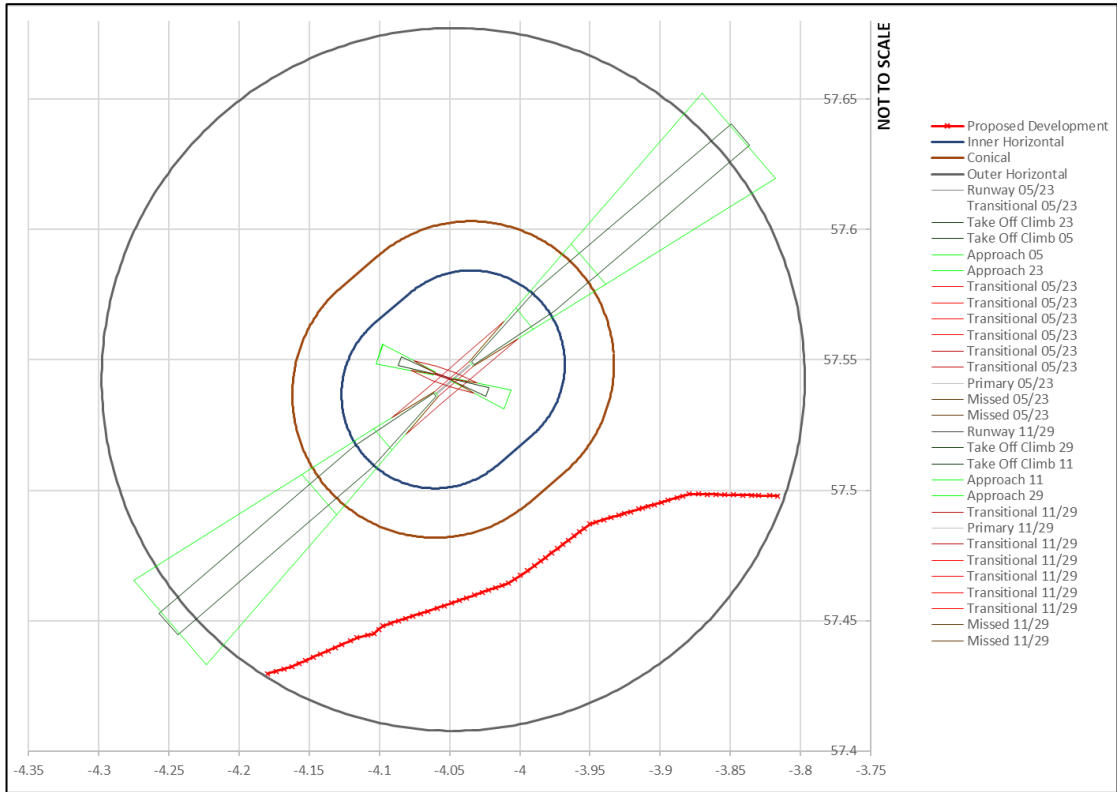


Figure 2 OLS plot for Inverness Airport

- 6.2.2 The assessment results are presented in Appendix B. The Proposed Development infringes the Outer Horizontal Surface, between a minimum of 58.51m and a maximum of 223.23m.
- 6.2.3 Consultation with Inverness Airport as part of the pre application consultation has confirmed⁵ that they do not safeguard against the Outer Horizontal Surface, and therefore there is no safeguarding impact from this Proposed Development.

Radar Line-of-Sight Assessment

- 6.2.4 The radar line-of-sight analysis has been completed for the Proposed Development to determine the extent of the visibility to the Primary Surveillance Radar (PSR) at Inverness Airport.
- 6.2.5 Figure 3 on the following page presents the line-of-sight chart from the Inverness Airport PSR to the most visible tower. The box labelled 'certainty' provides the distance (in metres) by which the Proposed Development is within line-of-sight to the assessed radar.

⁵ Source: Highlands and Islands Airports Limited, November 2024

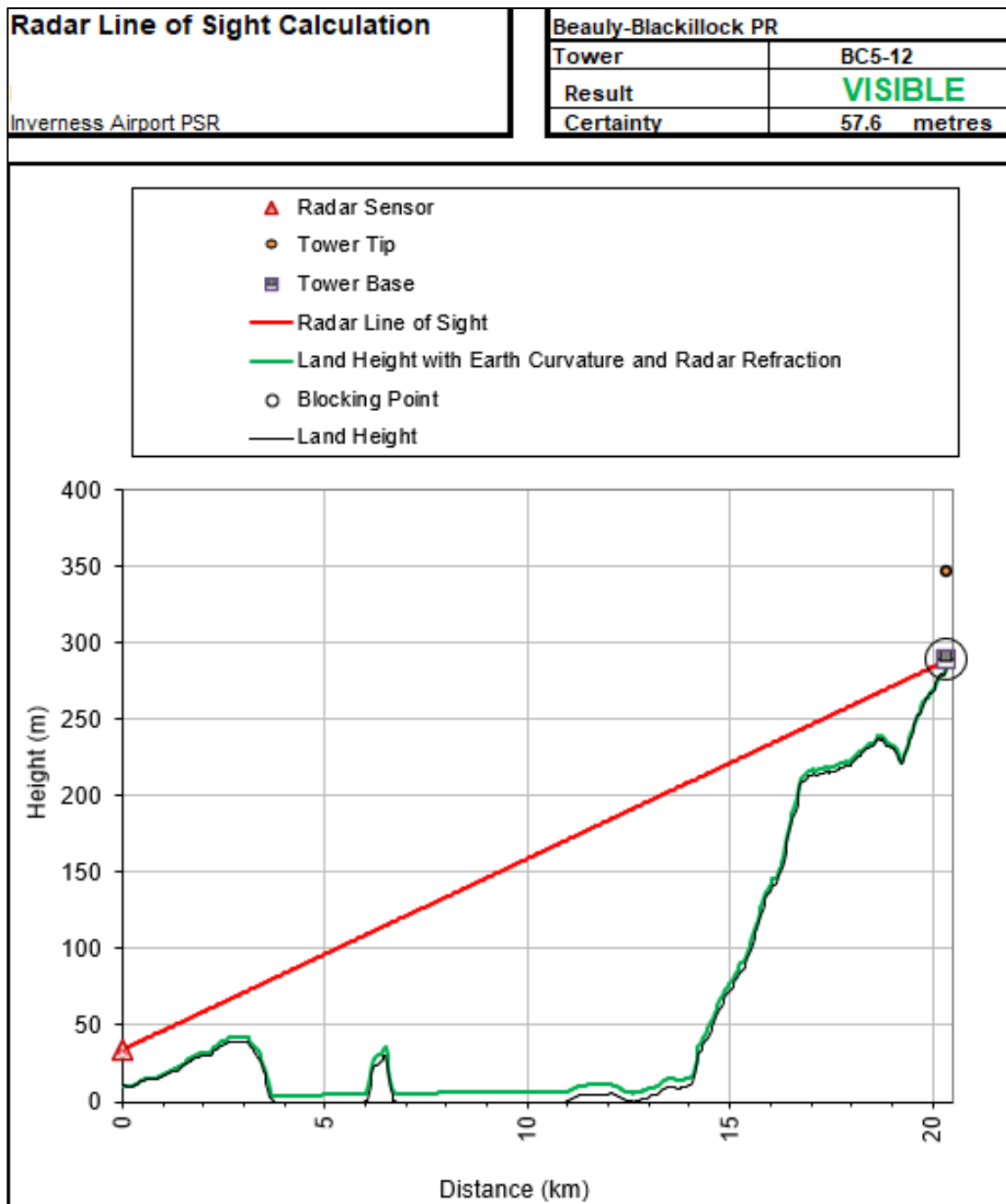


Figure 3 Line-of-sight chart for Inverness PSR

- 6.2.6 Static obstructions such as the proposed towers for this Proposed Development are unlikely to cause an impact upon radar compared to wind turbines and buildings. The rotating blades of wind turbines move at speeds similar to some aircraft that most Doppler radar are designed to detect, which will not be a feature of the proposed towers. Buildings can impact a radar in two ways:

- Reflections – reflections from a structure can potentially result in genuine aircraft returns being plotted in the wrong place as a result of the structure reflecting signals in a specular (mirror-like) way; and
- Shadowing – large obstructions within a radar's area of coverage can have a 'shadowing' effect, reducing the signal strength immediately behind them.

6.2.7 The proposed towers will not feature a rotating blade or large areas of flat uniform surfaces and therefore are not predicted to cause reflection or shadowing effects.

6.2.8 Consultation with Inverness Airport has confirmed that there is no safeguarding impact from this Proposed Development.

High-Level Instrument Flight Analysis

6.2.9 Aircraft flying Instrument Flight Rules (IFR) have been assessed at a high-level by considering the Maximum Elevation Figure (MEF), Surveillance Minimum Altitude Chart (SMAC) and published Instrument Flight Procedures (IFPs) and their location relative to the Proposed Development. This has been undertaken to determine whether an impact upon the published procedures is expected or whether a more detailed analysis is required.

Maximum Elevation Figure (MEF)

6.2.10 The MEF shows the maximum altitude of the highest terrain or structure in a particular quadrangle of a standard aeronautical chart. The highest elevated tower pertaining to the Proposed Development has a maximum⁶ altitude of 1,283 feet and located within the quadrangle where the MEF is 1,900 feet. The Proposed Development is 617 feet below the MEF, and therefore the MEF will not be impacted by the Proposed Development.

Surveillance Minimum Altitude Figure (SMAC)

6.2.11 Surveillance Minimum Altitude Charts (SMAC) are published to show the lowest altitude a pilot will be instructed to fly whilst receiving instruction from an Air Traffic Control service.

6.2.12 Figure 4 on the following page shows the ATC SMAC⁷ for Inverness Airport. The figure has been annotated with a red line to indicate the location of the Proposed Development.

⁶ Tower CB9-14 (126-7) is elevated at 390.34 metres amsl. The elevation is rounded up to be conservative.

⁷ Source: NATS AIP (last accessed August 2024)

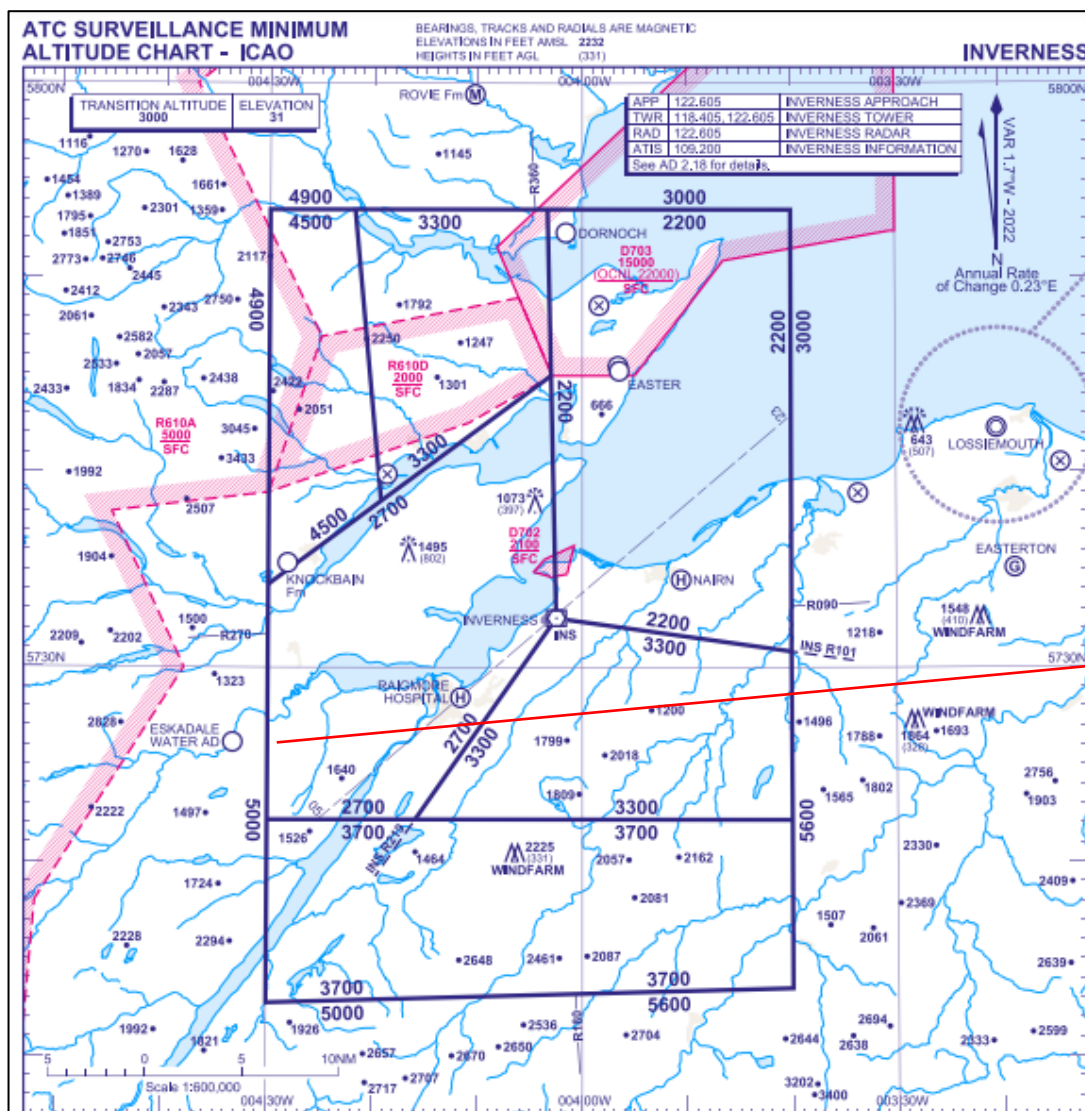


Figure 4 ATC SMAC - Inverness Airport

6.2.13 The Proposed Development will be in sectors where the minimum altitude for each sector varies. Table 3 below and on the following page summarises the maximum altitude for the Proposed Development, the sectors of the SMAC and the vertical clearance between the Proposed Development and aircraft subject to a radar control service.

SMAC Elevation (ft amsl)	Maximum Elevation of Proposed Development (ft amsl)	Vertical clearance (ft)
2,700	1,283	1,417
3,300	1,283	2,017

SMAC Elevation (ft amsl)	Maximum Elevation of Proposed Development (ft amsl)	Vertical clearance (ft)
5,600	1,283	4,317

Table 3 Vertical clearances relative to SMAC

- 6.2.14 The vertical clearances are significantly greater than the specified clearance of 984 feet⁸ in the CAA procedure (CAP 777) for designing SMACs. The SMAC is not likely to be affected by the Proposed Development.

Obstacle Clearance Margins

- 6.2.15 As a general rule Instrument Flight Procedures (IFP) are designed so that there are vertical and horizontal safety margins between the specified trajectory and surrounding terrain and obstacles. These margins vary depending on the phase of flight and whether UK, European or International rules are being considered. Nevertheless, the vertical margins are always 1,000 feet or less (except in particularly mountainous regions). This means that if the vertical clearance between an IFP route and the top of the Proposed Development exceeds 1,000 feet then it will not have a significant safety impact on aircraft flying the route.
- 6.2.16 The maximum altitude of the Proposed Development is 1,283 feet. This means that an IFP route or limit which is at more than 2,823 feet will be unaffected by the Proposed Development.

Consideration of IFP for Runway Threshold 05

- 6.2.17 The IFP procedure 'INSTRUMENT APPROACH CHART ILS/DME/VOR RWY 05 (CAT A,B) – ICAO' is shown in Figure 5 on the following page. The closest tower (BC5-20) relative to the procedure is annotated by the red dot and has an elevation⁹ of 404 feet amsl.
- 6.2.18 The closest tower has a lateral clearance of 998m. At this point of the procedure, an aircraft will be at a vertical height 2,100 feet amsl. The vertical clearance between the closest tower and aircraft will be 1,696 feet. The vertical clearance between this IFP and the closest tower of the Proposed Development exceeds 1,000 and therefore the IFP will be unaffected by the Proposed Development.

⁸ 300 metres

⁹ 123 metres

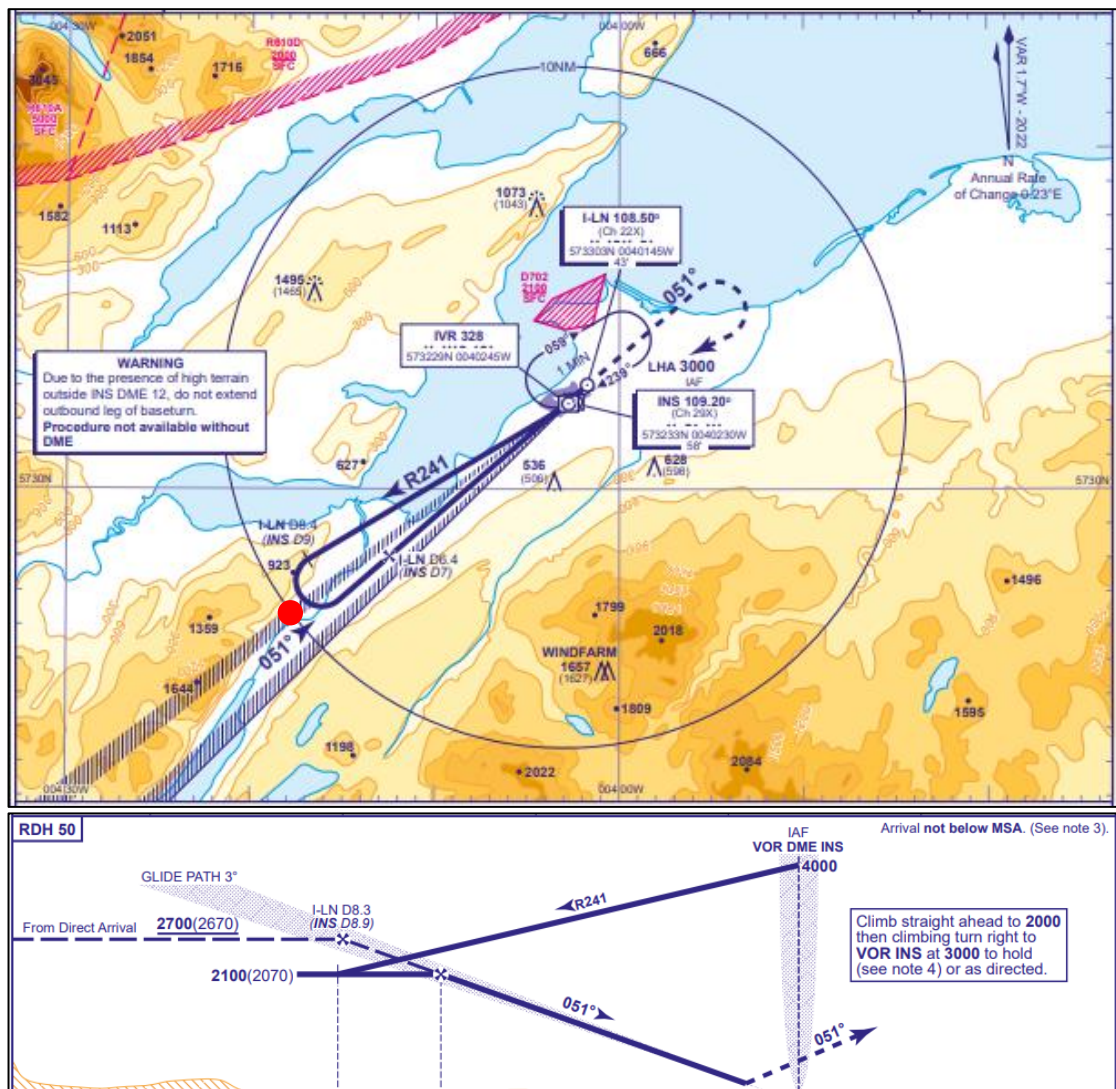


Figure 5 IFP relative to Proposed Development

Conclusions

- 6.2.19 Initial assessment indicates that the SMAC at Inverness Airport is unlikely to be affected by the Proposed Development. Other high-level assessments have shown that the clearance distances between the assessed procedures and the proposed obstacles exceeded the relevant IFP clearance minima.
- 6.2.20 Consultation with Inverness Airport has confirmed¹⁰ that there is no safeguarding impact from this Proposed Development.

¹⁰ Source: Highlands and Islands Airports Limited, November 2024

6.3 NATS NERL

Radar Line-of-Sight Assessment

- 6.3.1 The radar line-of-sight analysis has been completed for the Proposed Development to determine the extent of the visibility to the Allanshill Primary Surveillance Radar (PSR).
- 6.3.2 Figure 6 on the following page presents the line-of-sight chart from the radar to the most visible tower respectively. The box labelled 'certainty' provides the distance (in metres) by which the Proposed Development is within line-of-sight to the assessed radar.

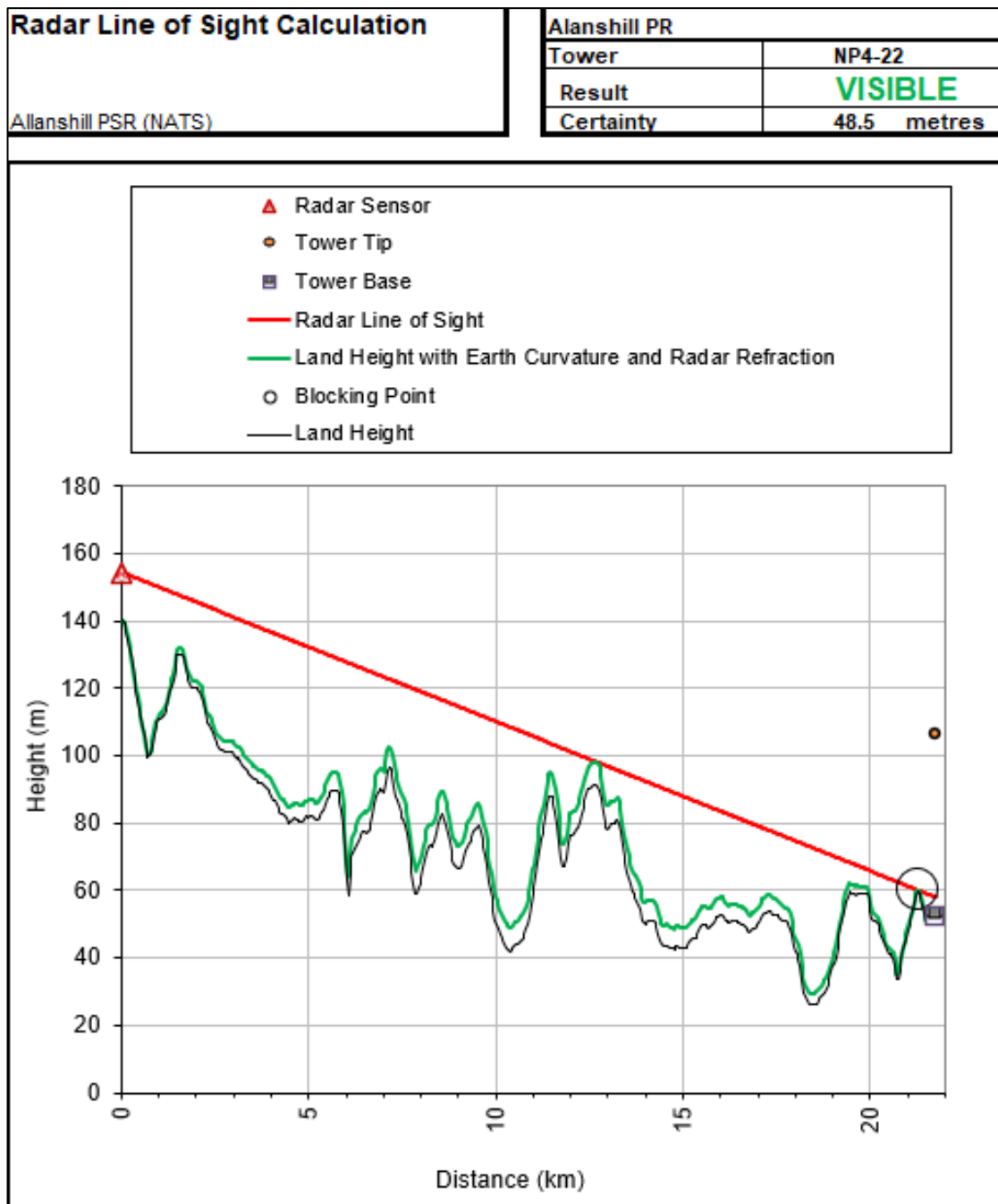


Figure 6 Line-of-sight chart for Allanshill PSR

- 6.3.3 The proposed towers will not feature a rotating blade or large areas of flat uniform surfaces, and therefore are not predicted to cause reflection or shadowing effects. No significant impact upon the PSR is predicted. Consultation with NATS has confirmed that the Proposed Development does not conflict their safeguarding criteria and have no objections.

6.4 Ministry of Defence (MOD)

Military Low Flying

6.4.1 Military low flying can take place throughout the UK. The MOD has published a map indicating areas within the UK where military low flying activities are the most likely to cause an objection. The map is colour coded as follows:

- Green – Area with no military low flying concerns;
- Blue – Low priority military low flying areas less likely to raise concerns;
- Amber – Regular military low flying area where mitigation may be necessary to resolve concerns;
- Red – High priority military low flying area likely to raise considerable and significant concerns.

6.4.2 The location of the proposed overhead line network (white outline) relative to the military low flying zones is shown in Figure 7 below. The figure shows that the proposed overhead line network is located within the 'blue' zone, which is an area with low priority for military low flying concerns.

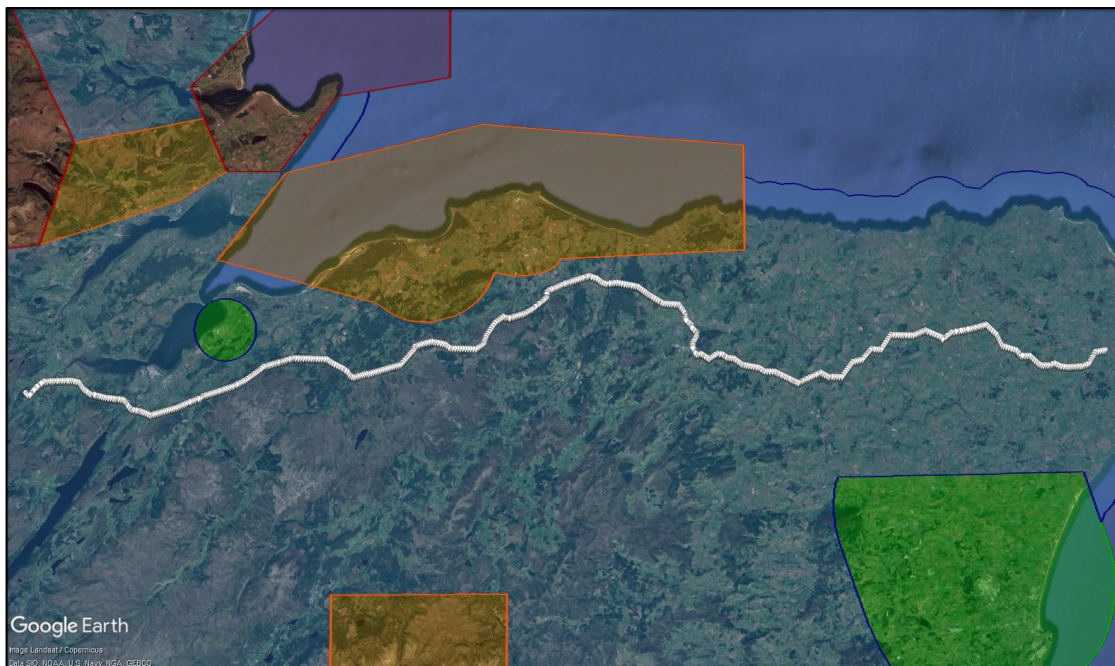


Figure 7 Military low flying zones relative to Proposed Development

6.4.3 The MoD have confirmed¹¹ that there is no requirement for lighting the structures. Details regarding the Proposed Development, such as the height and location of the towers, is required for aviation charting and safety management purposes.

¹¹ Source: Defence Infrastructure Organisation, October 2024

Obstacle Limitation Surfaces Assessment

- 6.4.4 Towers as part of the Proposed Development and within 15km of RAF Lossiemouth have been assessed against the OLS for RAF Lossiemouth. Figure 8 below shows the Proposed Development (red crosses) plotted against the OLS.

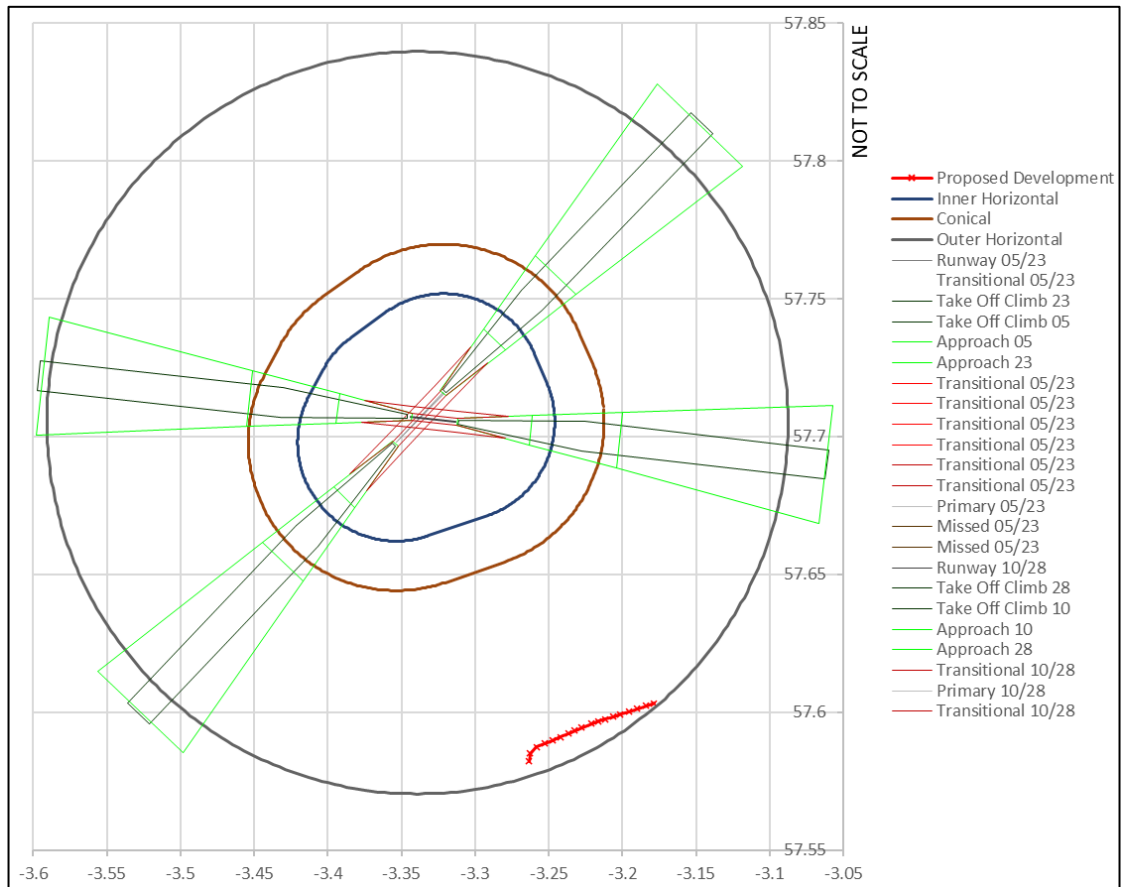


Figure 8 OLS plot for RAF Lossiemouth

- 6.4.5 The assessment results are presented in Appendix B. The Proposed Development infringes the Outer Horizontal Surface, between a minimum of 7.50m and a maximum of 131.83m
- 6.4.6 Developments that breach the Outer Horizontal Surface can in principle be accommodated; however, this will require coordination with the MoD. The existing terrain (i.e. ground elevation) surrounding RAF Lossiemouth is shown to already be breaching the Outer Horizontal Surface by a minimum of 16.43m (at the location of tower CB11-8). Therefore, acceptance of further infringement is likely to depend on whether current operations are already affected by the terrain infringement.
- 6.4.7 Continued consultation with the Ministry of Defence is recommended as the project progresses into detailed design.

Radar Line-of-Sight Assessment

- 6.4.8 The radar line-of-sight analysis has been completed for the Proposed Development to determine the extent of the visibility to the PSR at RAF Lossiemouth.

Figure 9 below presents the line-of-sight chart from the RAF Lossiemouth PSR to the most visible tower. The box labelled 'certainty' provides the distance (in metres) by which the Proposed Development is within line-of-sight to the assessed radar.

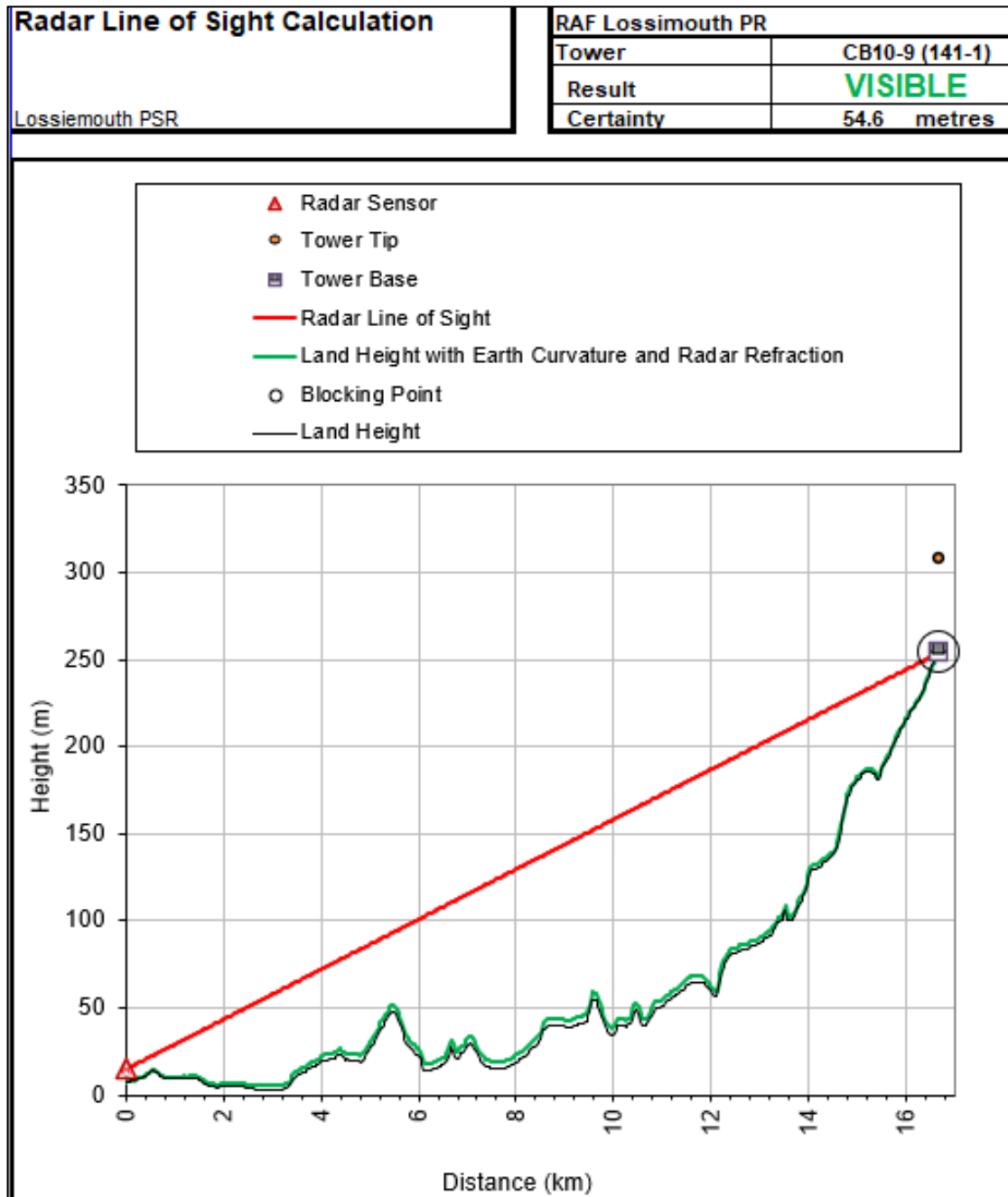


Figure 9 Line-of-sight chart for RAF Lossiemouth PSR

- 6.4.9 The proposed towers will not feature a rotating blade or large areas of flat uniform surfaces and therefore are not predicted to cause reflection or shadowing effects.
- 6.4.10 Consultation with the MoD has confirmed no significant impact is predicted.

Precision Approach Radar Assessment

- 6.4.11 Precision Approach Radars (PAR) operate using two beams, one scanning horizontally and the other vertically. The returns from these beams are used to guide an aircraft in for landing. This process is essentially the combination of two two-dimensional radar, allowing it to effectively operate as one three-dimensional radar. Unwanted returns (from obstructions) can impair the operation of a PAR.
- 6.4.12 PARs are only required to monitor aircraft as they come into land, and so they are safeguarded within a defined zone extending from the end of each runway. These zones are defined by an angle either side of the runway's extended centreline and a range, resulting in a cone-shaped safeguarding zone. This zone is defined by an angle of 20 degrees either side of the runway's extended centreline out to a range of 20 nautical miles (NM).
- 6.4.13 Figure 10 below illustrates (not to scale) the construction of a PAR exclusion zone. The blue outlined area shows the PAR safeguarded zone originating from the centreline of the runway perpendicular to the location of the PAR beside the runway.

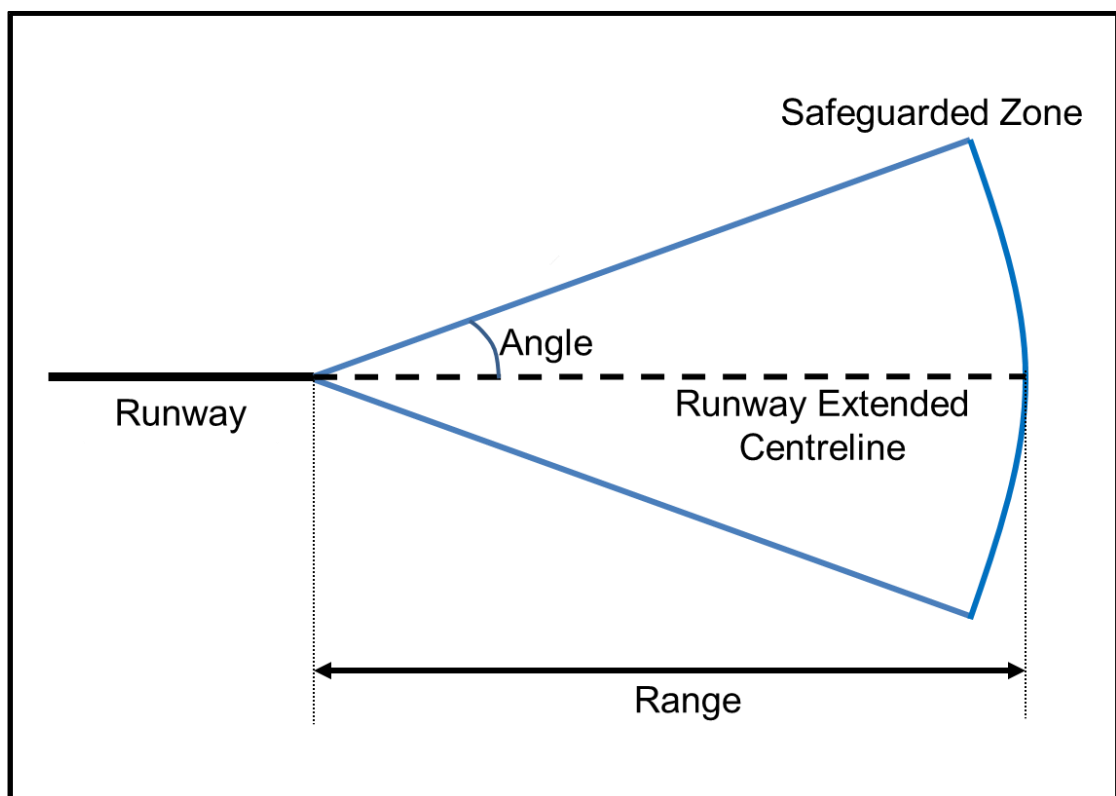


Figure 10 PAR safeguarded area

- 6.4.14 The PAR safeguarded area (indicated by the red region) for threshold 05 at RAF Lossiemouth is shown in Figure 11 on the following page.

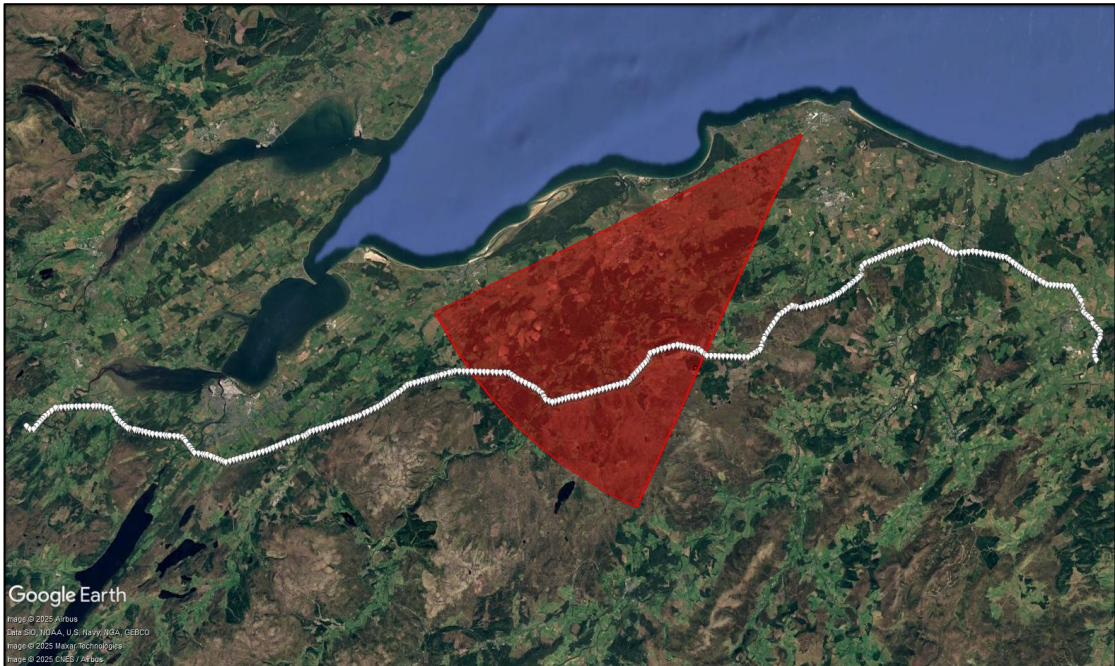


Figure 11 PAR safeguarded area for RAF Lossiemouth threshold 05

- 6.4.15 A technical impact upon the PAR is not predicted, due to the towers not featuring a rotating blade or large areas of flat uniform surfaces. Sections of the Proposed Development are within the safeguarded area for the PAR and therefore may be objected to.
- 6.4.16 Consultation with the MoD has confirmed no significant impact is predicted upon the PAR.

6.5 Met Office Meteorological Radar

Radar Line-of-Sight Assessment

- 6.5.1 The radar line-of-sight analysis has been completed for the Proposed Development to determine the extent of the visibility to the Hill of Dudwick Met Radar.
- 6.5.2 Figure 12 on the following page presents the line-of-sight chart from the radar to the most visible tower respectively. The box labelled 'certainty' provides the distance (in metres) by which the Proposed Development is within line-of-sight to the assessed radar.

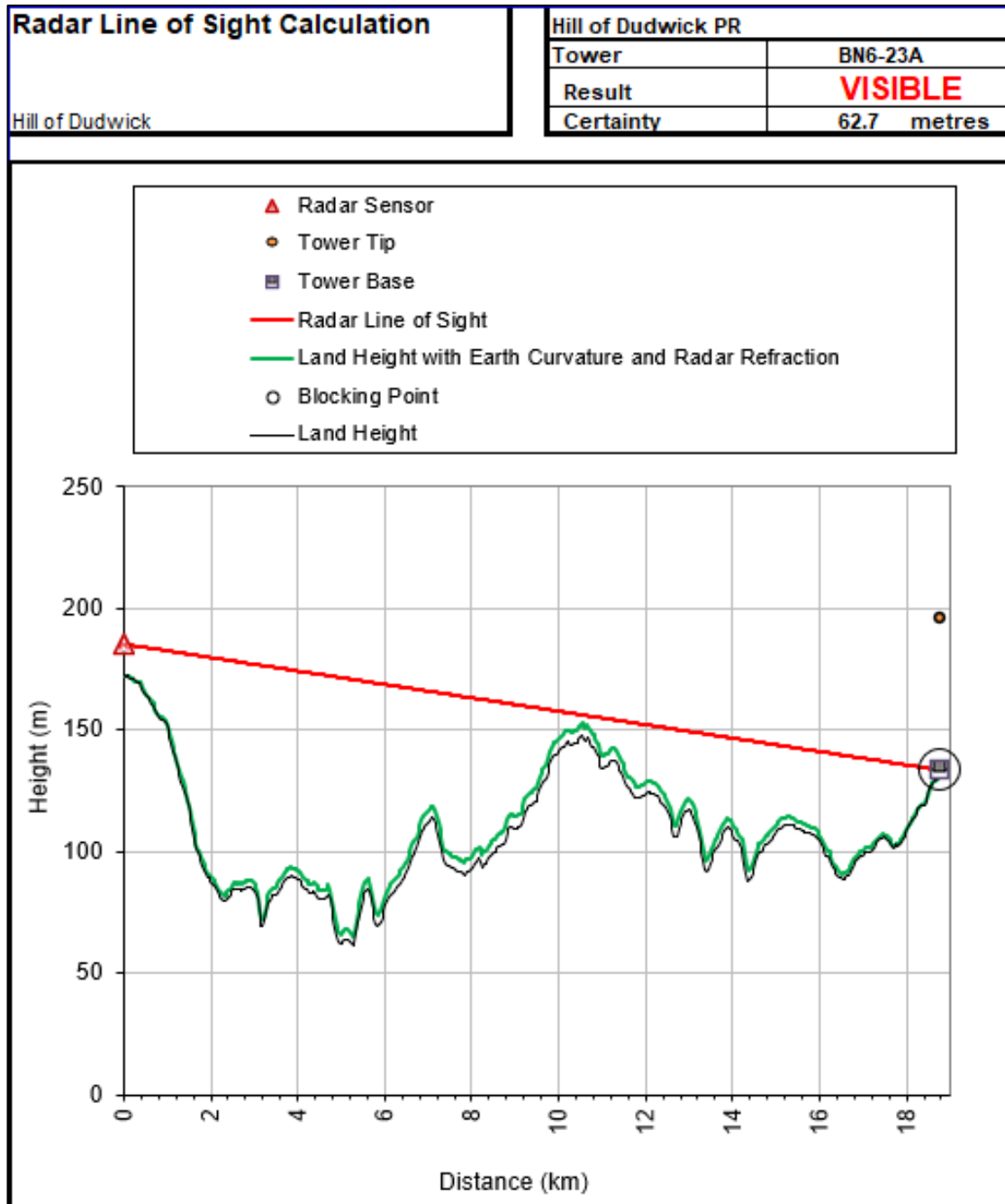


Figure 12 Line-of-sight chart for Hill of Dudwick Met Radar

- 6.5.3 Consultation with the Met Office has been undertaken who have confirmed no adverse impact upon the meteorological radar at Hill of Dudwick and have no objections.

6.6 Civil Airfields

- 6.6.1 Unlicensed civil airfields, such as Easterton Airfield and Easkadale Airfield as identified in the risk assessment, do not have officially safeguarded OLS like licensed aerodromes. Unlicensed aerodromes should take steps to protect their locations from the effects of possible adverse developments.
- 6.6.2 The most sensitive location for an obstruction is typically along the extended runway centreline. Figures 13 to 15 on the following page show the Proposed Development relative to the extended runway centrelines for Easterton Airfield, Easkadale Airfield and Longside Airfield respectively. The extended runway centreline is shown as the red line within the figures.



Figure 13 Proposed Development relative to Easterton Airfield extended runway centreline



Figure 14 Proposed Development relative to Eskadale Airfield extended runway centreline



Figure 15 Proposed Development relative to Longside Airfield extended runway centreline

- 6.6.3 The lateral clearance between the closest tower and the extended centreline, and the distance to the runway threshold at this point is presented in Table 4 below. Aircraft are predicted to be vertically clear of the tallest proposed tower, considering the distance to the runway threshold.

Airfield	Minimum Clearance Between Closest Tower and Extended Runway Centreline	Distance to Runway Threshold
Easterton Airfield	150m	7km
Eskadale Airfield	240m	24km
Longside Airfield	900m	19.1km

Table 4 Minimum clearance between towers and extended runway centrelines for unlicensed civil airfields

- 6.6.4 The Proposed Development also lies within the recommended distance for consultation¹² and consultation with the airfields is recommended to confirm their position on the Proposed Development.

¹² Based upon the guidance laid down in CAA Publication CAP 764 Policy and Guidelines on Wind Turbines, Version 6 dated February 2016; Civil Aviation Authority (2019), CAP 168 Licensing of Aerodromes, Edition 11; Civil Aviation Authority (2018), CAP 777 Licensing of Aerodromes, Version 5; ICAO (2006), Procedures for Air Navigation Services, Aircraft Operations, Volume II Construction of VISUAL AND Instrument Flight Procedures, Fifth Edition and NATS AIP

7 OVERALL CONCLUSIONS AND RECOMMENDATIONS

7.1 Licensed Airports and Radar

Inverness Airport

- 7.1.1 Sections of the Proposed Development breach the Outer Horizontal Surface (OHS) of the Obstacle Limitation Surface (OLS). Obstructions that breach this surface can in principle be accommodated however, this will require coordination with the airport.
- 7.1.2 Sections of the Proposed Development are within line-of-sight to the Primary Surveillance Radar (PSR). The towers are not predicted to cause a significant technical impact (i.e. radar clutter due to false returns) compared to wind turbines and buildings, due to not featuring a rotating blade or flat or large areas of flat uniform surfaces (causing reflection or shadowing effects).
- 7.1.3 Consultation with Inverness Airport has confirmed that there is no safeguarding impact from this Proposed Development.

7.2 NATS NERL Radar

- 7.2.1 Sections of the Proposed Development are within line-of-sight to the Allanshill Primary Surveillance Radar (PSR). The towers are not predicted to cause a significant technical impact (i.e. radar clutter due to false returns) compared to wind turbines and buildings, due to not featuring a rotating blade or flat and opaque surfaces (causing reflection or shadowing effects).
- 7.2.2 NATS NERL have confirmed via consultation that the Proposed Development does not conflict their safeguarding criteria and have no objections.

7.3 Ministry of Defence (MoD)

Low Flying Zones and Danger Area

- 7.3.1 The Proposed Development is located within an area of 'low priority for military low flying concerns'. No significant impacts upon military low flying operations are predicted, and the MoD have confirmed their only requirement is to be provided sufficient information for the whole length of the Proposed Development for aviation charting and safety management purposes.

Aviation Lighting

- 7.3.2 Consultation has been undertaken with the MoD at each stage of the project. The MoD have confirmed that based on the shared proposals (such as the Scoping Report) their only requirement is to be provided sufficient information for the whole length of the Proposed Development for aviation charting and safety management purposes.

RAF Lossiemouth

- 7.3.3 Sections of the Proposed Development breaches the OHS of the OLS. Obstructions that breach this surface can in principle be accommodated; however, this will require coordination with the MoD.

- 7.3.4 Sections of the Proposed Development are within line-of-sight to the PSR. The towers are not predicted to cause a significant technical impact (i.e. radar clutter due to false returns) compared to wind turbines and buildings, due to not featuring a rotating blade or flat and opaque surfaces (causing reflection or shadowing effects).
- 7.3.5 Sections of the Proposed Development are within the safeguarded area pertaining to the Precision Approach Radar. The towers are not predicted to cause a significant technical impact but is located within the safeguarded area.
- 7.3.6 Consultation has been undertaken with the MoD at each stage of the project. The MoD have confirmed that based on the shared proposals their only requirement is to be provided sufficient information for the whole length of the Proposed Development for aviation charting and safety management purposes.

Radar

- 7.3.7 Sections of the Proposed Development are within line-of-sight to the to the Secondary Surveillance Radar (SSR) and Air Surveillance and Control Service (ASCACS) Radar at Remote Radar Head Buchan. The towers are not predicted to cause a significant technical impact (i.e. radar clutter due to false returns) compared to wind turbines and buildings, due to not featuring a rotating blade (causing reflection or shadowing effects).
- 7.3.8 Consultation has been undertaken with the MoD at each stage of the project. The MoD have confirmed that based on the shared proposals (such as the Scoping Report) their only requirement is to be provided sufficient information for the whole length of the Proposed Development for aviation charting and safety management purposes

7.4 Met Radar

- 7.4.1 Sections of the Proposed Development are within line-of-sight to the Hill of Dudwick Met Radar. The towers are not predicted to cause a significant technical impact (i.e. radar clutter due to false returns) compared to wind turbines and buildings, due to not featuring a rotating blade or flat or large areas of flat uniform surfaces (causing reflection or shadowing effects).
- 7.4.2 The Met Office have confirmed via consultation that there will be no adverse impact upon the closest meteorological radar at Hill of Dudwick and have no objections.

7.5 Civil Airfields

- 7.5.1 In general, the Proposed Development will be less easily visible to pilots flying visually. The subsections below summarise the medium impact upon civil unlicensed airfields.
- 7.5.2 For civil unlicensed airfields, as presented in Table 2 on page 16, no significant impact is predicted considering the distance between the airfields and closest tower.

Easterton Airfield

- 7.5.3 The Proposed Development is located 150m laterally from the extended runway centreline and 7km from the runway threshold. At this point, aircraft are predicted to be vertically clear of the Proposed Development. The Proposed Development also lies within the recommended distance for consultation. Consultation is ongoing with Highland Gliding Club, who operate from Easterton Airfield, to understand the impact of the Proposed Development and possible mitigation solutions.

Eskadale Airfield

- 7.5.4 The Proposed Development is located 171m laterally from the extended runway centreline and 24km from the runway threshold. At this point, aircraft are predicted to be vertically clear of the Proposed Development. The Proposed Development also lies within the recommended distance for consultation.
- 7.5.5 It has not been possible to contact the identified airfield as no information appears to be available regarding its operations. It has however been included within this report in the event the airfield is still active.

Longside Airfield

- 7.5.6 The Proposed Development is located 900m laterally from the extended runway centreline and 19.1km from the runway threshold for Longside Airfield. At this point, aircraft are predicted to be vertically clear of the Proposed Development. The Proposed Development also lies within the recommended distance for consultation. Consultation with Buchan Aero Club, who operate at Longside Airfield, has been undertaken¹³ to confirm their position but no response has been received to date.

¹³ Source: Scottish Hydro Electric Transmission plc, March 2023

APPENDIX A – TOWER COORDINATES

The coordinates (Easting and Northings as per British National Grid) and heights above ground level of towers assessed (an extract of key towers from the overall schedule) for the OLS and line-of-sight assessments are presented in the table below.

Reference	Easting	Northing	Height (m agl)
BC1-1	248377	842674	68.67
BC2-5A	251238	844304	57.57
BC4-4B	255012	844369	54.02
BC5-6A	257845	842319	69.57
BC5-17	261277	841600	66.57
CB1-6A	263998	839894	60.57
CB2-3	267260	839277	54.57
CB2-14	270867	840314	54.57
CB3-1	274226	841695	66.02
CB3-12	277841	842777	54.57
CB4-3A	281272	844389	57.57
CB4-15	284434	846112	55.52
CB5-4	287470	846935	54.02
CB5-15A	291610	846721	57.57
CB6-2	295026	845028	63.57
CB6-12	297781	844354	54.57
CB7-11 (70-9)	301521	845228	57.57
CB7-22 (80-6)	304549	847152	57.57

Reference	Easting	Northing	Height (m agl)
CB8-8A	307686	848906	54.22
CB8-19 (94-2)	311074	847839	57.57
CB9-4A	314910	848181	54.57
CB9-15 (127)	316947	851420	54.02
CB10-4 (129-3)	320104	852359	57.57
CB10-15 (142-3)	323391	854011	63.57
CB11-7 (147)	325840	856335	49.52
CB12-5 (149-4)	329448	857561	52.52
CB12-16B	332886	856825	57.57
CB14-11B	336861	856439	58.52
CB14-21 (178-8)	339754	854738	60.57
CB15-6 (207-5)	343044	853574	54.57
CB16-3	345114	850767	71.67
CB16-16	345703	846792	57.57
CB16-17	345831	846455	57.02
BN1-13A	349071	846223	54.22
BN2-4A	352263	844914	69.57
BN2-14	355595	843772	57.57
BN3-2	359094	842618	63.57
BN4-6	361971	842299	54.57
BN4-17	365315	842582	63.57
BN4-28	368559	844327	60.57

Reference	Easting	Northing	Height (m agl)
BN5-9	371550	846471	54.22
BN6-1	374400	848442	57.02
BN6-12	378345	848567	54.57
BN6-22B	381910	847893	60.02
NP1-11	385055	848906	57.57
NP1-22A	388598	849375	63.57
NP2-8A	391203	846336	63.57
NP3-5B	394633	844986	54.22
NP4-1A	397489	843549	54.02
NP4-12	401031	843269	51.57
NP4-23A	403907	844684	57.57
NP4-29	405716	845567	59.67

Tower coordinates and heights

APPENDIX B – OBSTACLE LIMITATION SURFACES ASSESSMENT RESULTS

Inverness Airport

The table below and on the following pages present the towers assessed, the most restrictive surface and the minimum infringement.

Tower	Most Restrictive Surface	Infringement (m)
CB2-9	Outer Horizontal Surface	121.14
CB2-10	Outer Horizontal Surface	121.64
CB2-11	Outer Horizontal Surface	129.44
CB2-12	Outer Horizontal Surface	128.76
CB2-13	Outer Horizontal Surface	127.08
CB2-14	Outer Horizontal Surface	125.99
CB2-15	Outer Horizontal Surface	128.19
CB2-16	Outer Horizontal Surface	125.27
CB2-17	Outer Horizontal Surface	117.54
CB2-18	Outer Horizontal Surface	104.36
CB2-19	Outer Horizontal Surface	99.31
CB2-20	Outer Horizontal Surface	98.21
CB2-21	Outer Horizontal Surface	90.07
CB2-22	Outer Horizontal Surface	84.80
CB2-23	Outer Horizontal Surface	92.57
CB2-24	Outer Horizontal Surface	116.23
CB3-1	Outer Horizontal Surface	130.87

Tower	Most Restrictive Surface	Infringement (m)
CB3-2	Outer Horizontal Surface	165.06
CB3-3	Outer Horizontal Surface	177.96
CB3-4	Outer Horizontal Surface	168.36
CB3-5	Outer Horizontal Surface	159.48
CB3-6	Outer Horizontal Surface	161.10
CB3-7	Outer Horizontal Surface	173.44
CB3-8	Outer Horizontal Surface	179.72
CB3-9	Outer Horizontal Surface	188.70
CB3-10	Outer Horizontal Surface	194.90
CB3-11	Outer Horizontal Surface	190.37
CB3-12	Outer Horizontal Surface	197.62
CB3-13	Outer Horizontal Surface	212.26
CB3-14	Outer Horizontal Surface	223.23
CB3-15	Outer Horizontal Surface	209.84
CB3-16	Outer Horizontal Surface	207.79
CB3-17	Outer Horizontal Surface	202.58
CB3-18	Outer Horizontal Surface	210.33
CB3-19	Outer Horizontal Surface	204.12
CB3-20	Outer Horizontal Surface	193.63
CB3-21	Outer Horizontal Surface	181.65
CB4-1	Outer Horizontal Surface	169.64
CB4-2	Outer Horizontal Surface	170.47

Tower	Most Restrictive Surface	Infringement (m)
CB4-3	Outer Horizontal Surface	150.61
CB4-4	Outer Horizontal Surface	160.02
CB4-5	Outer Horizontal Surface	154.87
CB4-6	Outer Horizontal Surface	145.87
CB4-7	Outer Horizontal Surface	142.29
CB4-8	Outer Horizontal Surface	137.52
CB4-9	Outer Horizontal Surface	131.78
CB4-10	Outer Horizontal Surface	134.98
CB4-11	Outer Horizontal Surface	142.27
CB4-12	Outer Horizontal Surface	130.59
CB4-13	Outer Horizontal Surface	127.72
CB4-14	Outer Horizontal Surface	121.55
CB4-15	Outer Horizontal Surface	116.79
CB4-16	Outer Horizontal Surface	112.40
CB4-17	Outer Horizontal Surface	116.48
CB4-18	Outer Horizontal Surface	128.41
CB4-19	Outer Horizontal Surface	140.32
CB4-20	Outer Horizontal Surface	140.08
CB4-21	Outer Horizontal Surface	107.95
CB4-22	Outer Horizontal Surface	99.43
CB5-1	Outer Horizontal Surface	103.06
CB5-2	Outer Horizontal Surface	83.80

Tower	Most Restrictive Surface	Infringement (m)
CB5-3	Outer Horizontal Surface	72.42
CB5-4	Outer Horizontal Surface	65.67
CB5-5	Outer Horizontal Surface	60.96
CB5-6	Outer Horizontal Surface	61.31
CB5-7	Outer Horizontal Surface	68.54
CB5-8	Outer Horizontal Surface	64.19
CB5-9	Outer Horizontal Surface	66.63
CB5-10	Outer Horizontal Surface	62.14
CB5-11	Outer Horizontal Surface	64.39
CB5-12	Outer Horizontal Surface	65.29
CB5-13	Outer Horizontal Surface	67.32
CB5-14	Outer Horizontal Surface	58.51

OLS results for Inverness Airport

RAF Lossiemouth

The table below and on the following pages present the towers assessed, the most restrictive surface and the minimum infringement.

Tower	Most Restrictive Surface	Infringement (m)
CB11-2 (144-1)	Outer Horizontal Surface	97.72
CB11-3 (146)	Outer Horizontal Surface	125.88
CB11-4 (146-1)	Outer Horizontal Surface	131.83
CB11-5 (146-2)	Outer Horizontal Surface	121.50
CB11-6 (146-3)	Outer Horizontal Surface	97.32
CB11-7 (147)	Outer Horizontal Surface	77.97

Tower	Most Restrictive Surface	Infringement (m)
CB11-8 (147-1)	Outer Horizontal Surface	83.00
CB11-9 (147-2)	Outer Horizontal Surface	89.99
CB11-10 (147-3)	Outer Horizontal Surface	83.93
CB11-11 (148)	Outer Horizontal Surface	49.92
CB11-12 (148-1)	Outer Horizontal Surface	44.06
CB11-13 (148-2)	Outer Horizontal Surface	44.95
CB12-1 (149)	Outer Horizontal Surface	32.86
CB12-2 (149-1)	Outer Horizontal Surface	34.42
CB12-3 (149-2)	Outer Horizontal Surface	27.21
CB12-4 (149-3)	Outer Horizontal Surface	13.32
CB12-5 (149-4)	Outer Horizontal Surface	7.50
CB12-6 (149-5)	Outer Horizontal Surface	9.83

OLS results for RAF Lossiemouth



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