

Report



GA Pet Food Wind Turbine

Addendum to GA Pet Food Wind Turbine, Warton Aerodrome CNS
Safeguarding Assessment Report, 72054 001 dated 28th Nov
2024

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19 March 2025

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Revision History

Revision	Issue Date	Prepared by	Authorized by	Reason/Description
Issue 1.0	19 th March 2025	Linda Worley	Foz Binning	Initial Issue

Executive summary

In November 2024, GA Pet Food Partners Ltd commissioned Osprey Consulting Services Ltd (now trading as Sagentia Aviation) to conduct technical safeguarding assessments to determine potential aviation impacts against the Communications Navigation and Surveillance (CNS) systems at BAE Warton Aerodrome that could be impacted by a single proposed Wind Turbine Generator (WTG).

The safeguarding assessment including conclusions and recommendations was published in GA Pet Food Wind Turbine, Warton Aerodrome CNS Safeguarding Assessment Report, 72054 001 dated 28th Nov 2024.

Following publication of the Report, GA Pet Food Partners Ltd is now considering micrositing (minor change to the turbine location) and reducing the planned WTG tip height. To address these changes, the Client has requested Sagentia Aviation provides an update (this Document) where the Report is reviewed, parameter changes are assessed, and any deltas against the original results are qualitatively appraised.

Scope

The following three appraisals have been conducted against the original findings published in the Report:

- Radar Line of Sight (LOS) Assessment - Qualitative Appraisal
- CNS Coverage (Intervisibility) Assessment - Qualitative Appraisal
- CAA Civil Aviation Publication (CAP) 670 Compliant Carrier Interference (C/I) Assessment - Qualitative Appraisal

Methodology

Qualitative appraisals have been conducted by the author of the Report, whereby the micrositing and reduction in tip height of the WTG were considered against the results published in the Report.

Radar Line of Sight (LOS) Assessment - Qualitative Appraisal Conclusions

There is no interlaying terrain that would change the results of the LOS Assessment even with micrositing and a WTG tip height reduction of 19.46m, therefore it is concluded that the microsited and reduced height of the WTG of the Development will still be visible to in-scope CNS systems, and without suitable mitigations might cause an impact. As such we consider that the results from the Report remain extant.

CNS Coverage (Intervisibility) Assessment - Qualitative Appraisal Conclusions

Micrositing of the WTG will cause a minimal reduction to the impacted sector widths. The reduction in tip height will cause a small change to the starting position and small reduction in the length of the shadow regions. Therefore, it is concluded that the microsited and reduced WTG height will cause a very small reduction to the shadow impacts published in the Report. In reality, the deltas against the results published in the Report would not be noticeable. As such we consider that the results from the Report remain extant.

CAA Civil Aviation Publication (CAP) 670 Compliant Carrier Interference (C/I) Assessment - Qualitative Appraisal Conclusions

The micrositing of the WTG will cause a minimal change to location of the nucleus of C/I presented, but this would hardly be quantifiable. The reduction in tip height of the WTG would cause a small reduction in the C/I ratio calculated. Therefore, it is concluded that the microsited and reduced WTG height will cause a very small reduction to the C/I impacts published in the Report. In reality, the deltas against the results published in the Report would not be noticeable. As such we consider that the results from the Report remain extant.

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1 Introduction

1.1 Introduction

Warton Aerodrome (“the Aerodrome”) is responsible for the technical safeguarding of their Communications Navigation and Surveillance (CNS) systems in accordance with the Civil Aviation Authority (CAA) requirements.

In November 2024, GA Pet Food Partners Ltd (“the Client”) commissioned Osprey Consulting Services Ltd (Osprey) (now trading as Sagentia Aviation) to conduct technical safeguarding assessments to determine potential aviation impacts against the CNS systems at the Aerodrome, that could be impacted by the Client’s proposed Wind Turbine Generator (WTG) (“the Development”). Osprey’s safeguarding assessment, conclusions and recommendations are published in GA Pet Food Wind Turbine, Warton Aerodrome CNS Safeguarding Assessment Report, 72054 001 dated 28th Nov 2024 (“the Report”).

Following publication of the Report, the Client is now considering micrositing (minor change to the turbine location) and reducing the planned WTG tip height. To address these changes, the Client has requested Sagentia Aviation provides an update (“the Addendum”) where the Report is reviewed, parameter changes are assessed, and any deltas against the original results are qualitatively appraised.

1.2 Purpose

This document is an Addendum to the Report and provides a qualitative commentary to potential changes to the results published in the Report from a change in WTG location of approximately 30 meters (m), and also from a reduction in the WTG tip height.

This document should be read in conjunction with the Report.

1.3 Scope

1.3.1 The Development

For the purposes of this Addendum and the conclusions provided within, the Development is defined as the proposed WTG located approximately 5.2 Nautical Miles (NM) from the Aerodrome’s Aerodrome Reference Point (ARP). Figure 1 depicts the localisation of the WTG to the Aerodrome.



Figure 1 - Localisation

The revised Development consists of a single WTG with a maximum tip height of 180.3m Above Ground Level (AGL). Specific WTG parameters and geolocations used in this Addendum are detailed in Table 1 below.

WTG	Coordinates (4NGR ¹)		Tip Height (m AGL)	Blade Length (m)	Blade Chord (m)	Tower Height (m AGL)	Tower Width (m)	Label
	East/ West	North/ South						
1	53°40'04.8"N	2°48'55.3"W	180.3	67.79	3.93	125.9	4.79	PFPT1

Table 1 - Development Parameters

1.3.2 Requirements

The Client has commissioned a qualitative appraisal of the following technical assessments published in the Report. Each appraisal is detailed in respective sections of this document, with summary conclusions also provided:

- **Section 2** - Radar Line of Sight (LOS) Assessment - Qualitative Appraisal
- **Section 3** - CNS Coverage (Intervisibility) Assessment - Qualitative Appraisal
- **Section 4** - CAA Civil Aviation Publication (CAP) 670 Compliant Carrier Interference (C/I) Assessment - Qualitative Appraisal

1.3.3 In-Scope CNS

For the purposes of this Addendum and the scope of work contained within, the Aerodrome CNS being considered, and the respective technical assessments conducted, remain as defined in the Report and as reproduced in Table 2 below. Table 3 replicates the CNS parameters used for the assessments as specified in the Report.

¹ National Grid Reference.

Warton CNS	Radar LOS Assessment	CNS Coverage Assessment	C/I Assessment
Primary Surveillance Radar (PSR)	✓	✓	
Very High Frequency (VHF) Communications (Comms) Transmitter (TX)/ Receiver (RX) Site		✓	✓
Non-Directional Beacon (NDB)		✓	

Table 2 - CNS Assessment Scope

Warton CNS	Coordinates	Antenna Electrical Centre Height (m AGL)	Peak Power (kW) ²	Frequency (MHz) ³	Antenna Gain (dBi) ⁴	DOC ⁵ (NM)
PSR	54°44'20.04"N 2°53'37.22"W	23	24	1300	36	40
VHF Comms TX/RX Site	53°44'44.30"N 002°53'20.11"W	26.2	0.005	127.2	2.1	40
NDB	53°45'5.93"N 2°51'8.36"W	15	N/A	N/A	N/A	15

Table 3 - CNS Parameters

1.4 Abbreviations

The following abbreviations are used within this document:

Abbreviation	Meaning
AGL	Above Ground Level
AIP	Aeronautical Information Publication
ARP	Aerodrome Reference Point
ASL	Above Sea Level
C/I	Carrier to Interference
CAA	Civil Aviation Authority
CAP	CAA Publication

² Kilowatts (kW)

³ Megahertz (MHz)

⁴ Decibels relative to isotropic (dBi)

⁵ Declared Operational Coverage (DOC) as published in the UK Aeronautical Information Publication (AIP) AD 2.EGNO-1 dated 3rd Oct 2024).

Abbreviation	Meaning
CNS	Communications Navigation and Surveillance
Comms	Communications
dBi	Decibels relative to isotropic
DOC	Decalred Operational Coverage
ft	Feet
HTZ Comms	ATDI HTZ Communications
kW	Kilowatt
LOS	Line of Sight
m	Meters
MHz	Megahertz
NDB	Non-Directional Beacon
NGR	National Grid Reference
NM	Nautical Miles
Osprey	Osprey Consulting Services Limited
PSR	Primary Surveillance Radar
RCS	Radar Cross Section
RF	Radio Frequency
RX	Receiver
Sagentia Aviation	Osprey Consulting Services Limited
the Aerodrome	BAE Warton Aerodrome
the Client	GA Pet Food Partners Ltd
the Development	the Clients single WTG
the Report	GA Pet Food Wind Turbine, Warton Aerodrome CNS Safeguarding Assessment Report, 72054 001 dated 28th Nov 2024
TX	Transceiver
VHF	Very High Frequency
WTG	Wind Turbine Generator

Table 4 - Abbreviations

2 Radar LOS Assessment - Qualitative Appraisal

2.1 Introduction

This section presents the qualitative appraisal of the Radar LOS Assessment previously undertaken by Osprey and published in the Report.

2.2 Original Assessment

2.2.1 Overview

The Radar LOS Assessment was undertaken using composite optical line of site functions, coupled with Radio Frequency (RF) propagation and Fresnel zone calculations in ATDI HTZ Communications (HTZ Comms) which is an industry standard RF network planning toolset with extensive RF Propagation analysis and modelling capabilities. Analysis was conducted of point-to-point (optical) and RF (Fresnel) visibility between the In-Scope CNS and the WTG of the Development.

The assessment methodology is outlined in Section 2.4 of the Report.

2.2.2 Scope

As detailed in Section 1.3.3 of the Report, the Aerodromes In-Scope CNS that was considered in the LOS Assessment is as follows:

- PSR

2.2.3 Methodology

The detailed methodology for this assessment is described in Section 2 of the Report.

2.2.4 Conclusion

The LOS assessment conducted in the Report, concluded that the Development was expected to have direct optical visibility to the In-Scope CNS, and therefore without suitable mitigations might cause an impact.

2.3 Qualitative Appraisal

A qualitative appraisal has been conducted by the author of the Report, whereby the micrositing (as specified in Table 1) and reduction in tip height of the WTG were considered against the results published in the Report.

2.3.1 Results

The LOS Profile, Figure 8 in the Report was appraised, there is no interlaying terrain that would change the results of the LOS Assessment even with micrositing and a WTG tip height reduction of 19.46m.

2.3.2 Conclusions

The qualitative appraisal of the LOS Assessment published in the Report, concludes that the micrositied and reduced WTG of the Development will be Visible to the In-Scope CNS System (the WTG has direct optical LOS), and therefore without suitable mitigations might cause an impact. As such we consider that the results from the Report remain extant.

2.3.3 Recommendations

Sagentia Aviation recommends that the Aerodrome review the results of the assessment presented in the Report and this Addendum, against their operational coverage areas and identify suitable and appropriate mitigations that could reduce any operational impacts to a satisfactory level.

3 CNS Coverage Assessment - Qualitative Appraisal

3.1 Introduction

This section presents the qualitative appraisal of the CNS Coverage Assessment previously undertaken by Osprey and published in the Report.

3.2 Original Assessment

3.2.1 Overview

The CNS Coverage Assessment was undertaken using composite optical line of site (Intervisibility) functions in HTZ Comms to create coverage maps highlighting potential impacts on the CNS coverage (shadowing) caused by physical obstruction from the Development.

3.2.2 Scope

As detailed in Section 1.3.3 of the Report, the Aerodrome's In-Scope CNS that was considered in the CNS Coverage Assessment is as follows:

- PSR
- VHF Comms TX/ RX Site
- NDB

3.2.3 Methodology

The detailed methodology for this assessment is described in Section 3 of the Report.

3.2.4 Conclusion

The Coverage Assessment conducted in the Report, concluded that the Development will be visible to the Aerodromes PSR, VHF Comms TX/RX Site and NDB and might cause shadowing of the respective CNS systems signal in space as follows:

- PSR: 5,000ft Above Sea Level (ASL) and below.
- VHF Comms TX/ RX: 5,000ft ASL and below.
- NDB: 1,000ft ASL and below.

3.3 Qualitative Appraisal

A qualitative appraisal has been conducted by the author of the Report, whereby the micrositing (as specified in Table 1) and reduction in tip height of the WTG were considered against the results published in the Report.

3.3.1 Results

The coverage maps presented in Appendix 2, along with Tables 6, 7 and 8 of the Report were appraised. Micrositing of the WTG will cause a minimal reduction to the impacted sector widths identified, but this would hardly be quantifiable. The reduction in tip height will cause a small change to the starting position and small reduction in the length of the shadow regions.

3.3.2 Conclusions

The qualitative appraisal of the LOS Assessment published in the Report, concludes that the microsited and reduced WTG height of the Development will cause a very small reduction to the shadow impacts published in the Report. In reality, the delta between running a new coverage

assessment and the results published in the Report would not be noticeable. As such we consider that the results from the Report remain extant.

3.3.3 Recommendations

Sagentia Aviation recommends that the Aerodrome review the results of the assessment presented in the Report and this Addendum, against their operational coverage areas and identify suitable and appropriate mitigations that could reduce any operational impacts to a satisfactory level.

4 CAP 670 C/I Ratio Prediction Assessment - Qualitative Appraisal

4.1 Introduction

This section presents the results of the qualitative review of the CAP 670 C/I Ratio Prediction Assessment previously undertaken by Osprey and presented in the Report.

4.2 Original Assessment

4.2.1 Overview

The CAP 670 C/I Ratio Prediction Assessment uses the Network Interference functions in HTZ Comms to create C/I Sum maps following the methodology prescribed in the CAP 670 GEN 02⁶.

4.2.2 Scope

As detailed in Section 1.3.3 of the Report, the Aerodrome's In-Scope CNS that was considered in the CAP670 C/I Ratio Prediction Assessment is as follows:

- VHF Comms TX/ RX Site

4.2.3 Methodology

The detailed methodology for this assessment is described in Section 4 of the Report.

4.2.4 Conclusions

The C/I assessment conducted in report concludes that the Development could cause a very small area of approximately 0.4 NM localised to the Development where VHF communications at 1,000ft AGL might be sub optimal. The nature of the indicated areas where degradation could occur will be intermittent and changeable as the WTG has been modelled in the worst-case profile.

4.3 Qualitative Appraisal

A qualitative appraisal has been conducted by the author of the Report, whereby the micrositings (as specified in Table 1) and reduction in tip height of the WTG were considered against the results published in the Report.

4.3.1 Results

The coverage maps presented in Appendix 2, along with Table 9 of the Report were appraised. Micrositing of the WTG will cause a minimal change to location of the nucleus of C/I presented, but this would hardly be quantifiable.

C/I ratio is determined in accordance with the methodology prescribed in the CAP 670 GEN 02⁶, whereby an interfering RF field strength pattern is calculated for the Development, a fundamental parameter used in the calculation is the respective Radar Cross Section (RCS) of the WTG which is calculated from the physical dimensions of the WTG. Therefore, the calculated RCS and resultant C/I will be reduced proportional to the reduction in size of the WTG.

⁶ Part B, Section 4: Appendix A to GEN 02: Methodology for the Prediction of Wind Turbine Interference Impact on Aeronautical Radio Station Infrastructure.

4.3.2 Conclusions

The qualitative appraisal of the C/I Assessment published in the Report, concludes that the micrositied and reduced WTG height of the Development will cause a very small reduction to the C/I impacts published in the Report. In reality, the delta between running a new C/I assessment and the results published in the Report would not be noticeable. As such we consider that the results from the Report remain extant.

4.3.3 Recommendations

Sagentia Aviation recommends that the Aerodrome review the results of the assessment presented in the Report and this Addendum, against their operational coverage areas and identify suitable and appropriate mitigations that could reduce any operational impacts to a satisfactory level.

About Sagentia Aviation

Osprey Consulting Services Ltd (t/a Sagentia Aviation) specialises in delivering innovative technical and engineering consultancy services in civil and military aviation environments. It serves government agencies, regulatory authorities, equipment providers, and airport and spaceport operators to enable change and solve critical aviation challenges.

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