Galloper Wind Farm Project

Environmental Statement – Chapter 17: Military and Civil Aviation

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Drafted by		Sarah Strong	
Checked by		Peter Gaches	
Date/initials check		PG	09.09.2011
Approved by		Martin Budd	
Date/initials approval		MB	20.10.2011
GWFL Approved by		Kate Harvey	
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17 MILITARY AND CIVIL AVIATION

17.1 Introduction

17.1.1 This Chapter of the Environmental Statement (ES) addresses the potential impact that the proposed Galloper Wind Farm (GWF) project could have on military and civil aviation interests, including those specifically on the interests of National Air Traffic Services Limited (NATS), NATS (En-Route) Limited (NERL), the Ministry of Defence (MoD), the Civil Aviation Authority (CAA), airports and local aerodromes.

17.1.2 The aviation baseline for the proposed GWF project is described, taking account of consultation with aviation stakeholders and the desk based study on radar coverage (**Technical Appendix 17.A**). It includes a description of the potential effects predicted as a result of the construction, operation and decommissioning phases of the proposed GWF project. An assessment of these effects is undertaken and details provided of proposed mitigation measures, where applicable.

17.2 Guidance and Consultation

Legislation, policy and guidance

17.2.1 The assessment of potential impacts upon military and civil aviation has been made with specific reference to the relevant National Policy Statements (NPS). These are the principal decision making documents for Nationally Significant Infrastructure Projects (NSIP). Those relevant to GWF are:

- Overarching NPS for Energy (EN-1); and
- NPS for Renewable Energy Infrastructure (EN-3).

17.2.2 The specific assessment requirements for military and civil aviation, as detailed within the NPSs, are repeated in the following paragraphs. Where any part of the NPS has not been followed within this assessment, it is stated within in the ES why the requirement was not deemed relevant or has been met in another manner.

17.2.3 The Overarching National Policy Statement (NPS) for Energy (EN-1) (July 2011) (Department for Energy and Climate Change (DECC), 2011) states that civil and military aerodromes, aviation technical sites, and other types of defence interests (both onshore and offshore) can be affected by new energy development.

17.2.4 EN-1 (Paragraphs 5.4.11 to 5.4.12) state that if the proposed development may have an effect on civil and military aviation then the assessment should include:

- "*The applicant should consult the MoD, CAA, NATS and any aerodrome – licensed or otherwise – likely to be affected by the*

proposed development in preparing an assessment of the proposal on aviation or other defence interests"

see **Table 17.1**;

- "*Any assessment of aviation or other defence interests should include potential impacts of the project upon the operation of CNS infrastructure ,flight patterns (both civil and military), other defence assets and aerodrome operational procedures.* "; and
- "*It should also assess the cumulative effects of the project with other relevant projects in relation to aviation and defence*".

17.2.5 Paragraph 5.4.13 goes on to state that "*If any relevant changes are made to proposals during the pre-application and determination period, it is the responsibility of the applicant to ensure that the relevant aviation and defence consultees are informed as soon as reasonably possible"* (see **Table 17.1**).

17.2.6 In addition to the primary role of the NPS, due consideration has been given to the following planning guidance and policies relevant to the assessment of impacts on military and civil aviation interests:

- Annex 10 to The Convention on International Civil Aviation (International Civil Aviation Organisation (ICAO), 2006);
- Annex 14 to The Convention on International Civil Aviation (ICAO, 2006);
- Planning Policy Statement 22 (PPS22): Renewable Energy (now superseded by EN-1 for NSIPs);
- PPS22: Planning for Renewable Energy – A Companion Guide to PPS 22;
- CAA Civil Aviation Publication (CAP) 168 – Licensing of Aerodromes (CAA, 2011a);
- CAP670 – Air Traffic Services Safety Requirements (CAA, 2011b);
- CAP764 – CAA Policy and Guidelines on Wind Turbines (CAA, 2011c);
- The British Wind Energy Association (BWEA) – Best Practice Guidelines for Wind Energy Development (BWEA, 1994);
- BWEA – Best Practice Guidelines: Consultation for Wind Energy Development (BWEA, 2002);
- CAP 493 Manual of Air Traffic Services Part 1 (CAA, 2011d);
- Article 220 of the Air Navigation Order 2005 (since superseded by Article 220 of the Air Navigation Order 2009);
- Safeguarding, Aerodromes, Technical Sites and Military Explosives Storage Areas. Department for Transport (DFT) / Office of the Deputy Prime Minister (ODPM) Circular 1/2003 (DFT and ODPM, 2005).
- Policy Statement (2010) 'The Lighting of Wind Turbine Generators in United Kingdom Territorial Waters (CAA, 2010)'; and

- Wind Energy and Aviation Interests Interim Guidelines (Department of Trade and Industry (DTI) *et al.*, 2002).

Consultation

17.2.7 Consultation to inform the technical study (see **Technical Appendix 17.A**) that has informed this ES was undertaken in accordance with CAP764 (for civil aviation issues) and the Wind Energy and Aviation Interests Interim Guidelines (Department of Trade and Industry, MoD, CAA and BWEA, 2002) (for both civil and military consultation). In relation to the proposed GWF project, the following key bodies have been consulted to date:

- MoD (Defence Estates);
- NATS;
- CAA (Directorate of Airspace Policy); and
- NERL.

17.2.8 Consultation with the CAA and MoD was undertaken through a standard proforma (industry standard consultation document). Consultation with NERL was directed through the Directorate of Airspace Policy (DAP) to the CAA. NATS was subsequently commissioned to undertake a technical assessment of the impact of the proposed GWF project using their en route navigation facilities (see **Technical Appendix 17.A**).

17.2.9 Comments and recommendations from the Infrastructure Planning Commission's (IPC) Scoping Opinion were also taken into account during the assessment. Additional formal consultation was undertaken via section 42 consultation under the Planning Act 2008 (see **Chapter 7 Consultation**) through the submission of a Preliminary Environmental Report (PER). Responses received from these two consultation exercises are presented in the IPC Scoping Opinion report (IPC, 2010) and the Consultation Report that accompanies this Development Consent Order (DCO) application.

17.2.10 **Table 17.1** summarises issues that have been highlighted by the consultees throughout this consultation process and indicates which sections of the ES address each issue. Consultation with the relevant organisations has been ongoing throughout the development of the proposed GWF project and additional consultation has been required in regard to changing site layouts and increased turbine heights. **Table 17.1** details the final outcome of the consultation undertaken; full details of all consultation responses which have been received throughout this process are provided in **Technical Appendix 17.A**.

Table 17.1 Summary of consultation responses

Date	Consultee	Summary	Section where addressed
13.07.10	CAA (Scoping Opinion)	Unlikely that the CAA would wish to make any site-specific observations. The consultation did highlight a number of requirements and recommendations such as aviation warning lighting and markings / colour schemes.	Comments associated with generic requirements are detailed in Sections 17.6 and 17.7
August 2010	IPC (Scoping opinion)	Early consultation with relevant bodies required.	Section 17.2
January 2010 to July 2011	MoD	The MoD has no concerns with the GWF proposal, the application of which is for WTGs with a maximum height of 195m to blade tip*	Section 17.7 (further details provided in **Technical Appendix 17.A**)
05.11.09	CAA	Do not require the developer to undertake any further civil aviation consultation. Request for promoter to provide details on aviation lighting.	Section 17.7
March 2010 to July 2011	NATS	Development does not conflict with current safeguarding criteria. NATS concluded that even tip heights of 195m would be below the radar coverage - there is no need to mitigate.	Section 17.7 (further details provided in **Technical Appendix 17.A**)
21.06.11	CAA (Section 42)	In general the description of current civil aviation environment seems to represent a reasonable high level view of the traffic and it is assumed that further background will be in the full EIA. Greater Gabbard Offshore Wind Farm (GGOWF) will be operating a helicopter in support of its operations and maintenance activities and this may represent a high number of flights	Section 17.3, 17.4, 17.7 and **Technical Appendix 17 A**.

Date	Consultee	Summary	Section where addressed
		in the area. It may be worth discussing this.	
21.06.11	CAA (Section 42)	No assessment is made of the impact of Wind Turbine Generators (WTG) as offshore obstacles, or on helicopter operations.	Section 17.7
21.06.11	CAA (Section 42)	It is assumed that agreement in regards to safeguarding has been sought from the operators of the radar.	See below and Section 17.7
21.06.11	CAA (Section 42)	In regard to aviation warning lighting Article 220 of the UK Air Navigation Order (ANO) 2009 is a legal requirement in UK Territorial Waters as defined in paragraph (1)(b) of the Article. The CAA will always recommend the fitting of Aviation Warning Lights to WTGs. It is assumed that GWFL will be seeking further consultation with the CAA on this matter as part of the planning application.	Section 17.7
July - 2011	CAA (Section 42)	It is unlikely that there will be a need for any ongoing environmental monitoring of aviation issues.	Section 17.11
July - 2011	British Helicopter Association (BHA) (Section 42)	BHA has no objection to the GWF development.	Section 17.7
26.07.11	MoD (Section 42)	WTGs should be fitted with aviation lighting, the corner most turbines and six turbines in the middle of the proposal should be fitted with 25 candela omni-directional red lighting or infrared lighting with a flash pattern of 60 flashes per minute – 200ms or 500ms duration.	Section 17.7

Date	Consultee	Summary	Section where addressed
09.08.2011	GGOWL / Bond air services	No concerns raised with regard to potential interaction between GWF and future GGOWF helicopter activity.	Section 17.7
09.08.2011	NATS	Confirmed that, following on from CAA comments (see above) that they have no concerns regarding the individual radars.	Section 17.7
10.08.2011	Southend Airport	Confirmed that, following on from CAA comments (see above) that they have no concerns regarding potential effects on their radars.	Section 17.7
09.09.2011	Manston Airport	Due to the location of this proposal it will not have a significant impact on operation at Manston Airport, and a planning application for this proposal is unlikely to attract a safeguarding objection from Manston Airport.	Section 17.7
August 2011	Stansted Airport	Contacted by GWFL with a request to confirm that they have no concerns. No reply was received.	Section 17.7

17.3 Methodology

Study area

17.3.1 The study area for the assessment of military and civil aviation covers a wide area to ensure that any potential constraints that may be present in relation to activities undertaken by NATS, NERL, the MoD and the CAA are assessed. The study area includes, for example, air defence radar up to 70 nautical miles (nm) from the proposed GWF site, helicopter platforms up to 60nm from the proposed site, and radar propagation modelling up to 120nm from the relevant radars. These boundaries have been chosen to enable full consideration to be given to the nearest helicopter operating areas, radar stations, aerodromes and any other aeronautical installations with which the GWF could impact upon. Guidance set out in CAA publication CAP 764 (CAA Policy & Guidelines on Wind Turbines) illustrates that the distance between GWF and the nearest such installations is well in excess of that which would be expected to result in any issues.

Characterisation of existing environment

17.3.2 Wind Power Aviation Consultants Limited (WPAC) was commissioned by Galloper Wind Farm Limited (GWFL) to undertake an assessment of the likely effects of the proposed GWF project on military and civil aviation interests (see **Appendix 17.A**). The assessment incorporated a description of the existing environment and formal consultation with those organisations described in **Section 17.2**.

17.3.3 In order to characterise the current aviation constraints in the area, the CAA guidance CAP 764 (CAA, 2011c) was used, specifically those sections of relevance to offshore wind farms (Chapter 3 Safeguarding, and Chapter 5 Consultation criteria).

17.3.4 The level of information provided to describe the existing civil and military aviation interests is considered to be commensurate with the level of relevant activity taking place within the project vicinity and therefore provides sufficient detail to allow a robust assessment of the likely potential impacts to be undertaken.

Assessment of impacts

17.3.5 The methodology used to assess the potential impacts upon military and civil aviation comprised the following aspects (see **Technical Appendix 17.A**):

- Radar propagation modelling against all aviation related radars (including MoD Air Traffic Control (ATC) Radars, MoD Air Defence Radars, NATS En Route radars);
- Radar base of cover and line of sight modelling. This was performed for each WTG location using a worst case indicative layout that provided for WTG placed across all three development areas. In addition this was undertaken for every boundary point around the GWF area for the worst case development scenario (see **Section 17.5**), using radar propagation modelling software with the following parameters:
    - A smoothed digital terrain model with data spacing of 3 arc seconds;
    - Modelling of a radar beam in the atmosphere by applying median annual atmospheric refraction at the midpoint between the radar and the WTG; and
    - Radio propagation model ITU-R P.453.
- Consideration of the position of the proposed GWF project in relation to offshore aviation constraints in addition to radar impacts (as laid down in CAP764), which include:
    - Helicopter Main Routes; and
    - Offshore Helicopter Platforms.

17.3.6 No specific WTG visibility modelling for Civil Aerodrome radar was deemed necessary (in accordance with CAP764) as the site lies in excess of 30km from the nearest CAA licensed radar equipped aerodrome. Furthermore, no such modelling was requested during the various consultation phases (scoping and Section 42) of the project.

17.3.7 Impacts on military and civil aviation are assessed in line with the methodology detailed in **Chapter 4 EIA Process**.

17.4 Existing Environment

Overview

17.4.1 The airspace above and adjacent to the proposed GWF site is used by civil and military aircraft, which are tracked by radar systems operated by NATS and the MoD. NATS is split into two companies; NATS (Services) Limited (NSL) and NERL. The former is subcontracted by airport operators to provide ATC, primarily for take-off and landing, as well as helicopter aviation. The latter provides en-route ATC services and is responsible for the protection of electronic equipment, such as radar.

Civil aviation activity

17.4.2 The site is not located in an area of controlled airspace (airspace in which ATC is used to direct aircraft – such as that around busy international airports). Minimal amounts of low level civil traffic are likely to be operating in the area (see **Technical Appendix 17.A**). The airspace above the proposed GWF site is a complex arrangement of airways with varying base levels, the lowest of which has a base level of 6,500ft (1,981m)[1].

17.4.3 Aircraft using the airways system will be under the control of the London Area Control Centre using the NERL radar network (see **Appendix 17.A**). The NERL radar infrastructure that is considered of relevance (with regard to NATS assessment) is detailed in **Table 17.2**.

Table 17.2 NERL radar infrastructure of relevance to the proposed GWF project

Radar site	Distance from GWF (km)	Direction from GWF
Claxby	237	north-west
Clee Hill	328	west north-west
Cromer	122	north-west
Debden	120	west north-west
Pease Pottage	188	south-west

[1] 'Southern England and Wales Aeronautical Chart ICAO 1:500,000 Edition 37'. Produced by the Civil Aviation Authority

Radar site	Distance from GWF (km)	Direction from GWF
Stansted	132	west
TSF (Spec Hse)	182	south-west

Safeguarding

17.4.4 The nearest civil aerodromes to the proposed GWF project are at Southend to the south-west (84km), Manston to the south (57km) and Clacton (50km), all of which are in excess of 30km from the site (30km being the maximum distance for which safeguarding may be required, in accordance with CAP168).

17.4.5 CAP764 provides guidance in relation to offshore helicopter platforms and Helicopter Main Routes (HMR). Examination of the aviation and maritime charts shows that the proposed GWF site is 55nm to the south of the Southern North Sea HMR and is also at least 60nm to the south of any offshore helicopter platforms (this has been confirmed through consultation with the CAA).

17.4.6 As raised in consultation with the CAA, helicopters are used in the operation of GGOWF. GWFL has carried out consultation both with the operators of GGOWF and their helicopter company, Bond Air Services. This consultation has revealed that neither party has concerns over the proposed development of GWF.

Military aviation activity

MOD exercises and operations

17.4.7 The proposed GWF project is located in an area where there is minimal MoD aviation activity. There are no Danger or Exercise Areas within 25nm and aviation activity is limited to high level aircraft transiting the area under the control of the London Joint Area Organisation (part of the London Area Control Centre at Swanwick) (WPAC, 2011).

Royal Navy operations

17.4.8 Royal Navy activity in this area is also very limited and consists primarily of warships transiting from the channel ports into the North Sea. Helicopter operations may take place during transit of the warships; however, it is not Royal Navy policy to object to wind farms in relation to transiting warships (WPAC, 2011).

Military airfield radar

17.4.9 The closest military airfield radar is Honington, approximately 60nm from the proposed GWF project.

Air defence radar

17.4.10 The nearest Air Defence Radar is over 130km (70nm) to the north-west at Trimingham, on the coast near Cromer (WPAC, 2011).

UK Military Low Flying System

17.4.11 The UK Military Low Flying System (UKLFS) extends 3nm out from the coast. Military aircraft occasionally operate at low level in this area. The proposed GWF project is 25nm off the coast and therefore a considerable distance from the UKLFS (WPAC, 2011).

17.5 Assessment of Impacts – Worst Case Definition

17.5.1 WTGs have the potential to cause a variety of effects on military and civil aviation interests through effects on:

- Physical safeguarding (such as access limitation or safe passage issues);
- The generation of unwanted returns on primary radar and effects on radar performance; and
- Propagation of primary and/or secondary surveillance radar, navigation aids and communication facilities (CAA, 2009).

17.5.2 Full details on the range of project options being considered by GWFL are provided throughout **Chapter 5 Project Details**. For the purpose of the military and civil aviation impact assessment, the worst case scenario, taking into consideration these options, is detailed in **Table 17.3**. Establishing the worst case scenario from the range under consideration (see **Chapter 5**) has ensured that the assessment is focused on the maximum potential adverse impact that could arise from the development.

17.5.3 It is noted that only those design parameters detailed under each specific impact have the potential to influence the level of impact experienced by the relevant receptor. Therefore, if the design parameter is not discussed then it is not considered to have a material bearing on the outcome of the assessment.

17.5.4 The worst case scenarios identified below are also applied to the assessment of cumulative impacts. In the event that the worst case scenarios for the project in isolation do not result in the worst case for cumulative impacts, this is addressed within the cumulative assessment section of the Chapter (see **Section 17.10**).

Table 17.3 Worst case project design for military and civil aviation

Impact	Realistic worst case scenario	Justification
Construction and operation		
Impacts on air defence radar and civil aviation activity	Tallest turbines (maximum tip height of 195m) over the maximum extent of the proposed GWF site. Three met masts and up to four ancillary structures (this may comprise a combination of offshore substation platform(s) (OSP), collection platform(s) and/or accommodation platform)	The worst case scenario is influenced by the height and greatest spatial coverage of the structures. Therefore the highest turbines, over the maximum spatial extent (i.e. all three Development Areas), represents the greatest potential for interaction with air defence radar and civil aviation activity. The radar modelling (**Technical Appendix 17.A**) was undertaken in line with this scenario. Any changes to the site layout or WTG spacing to that considered within the assessment (see **Technical Appendix 17.A**) will not have a material bearing on the worst case.
Impacts on helicopter operations	The maximum number of structures (140 WTG plus three met. masts and up to four ancillary structures) over the greatest area.	No concerns have been raised by the BHA or other wind farm operators in the region in regard to helicopter operations. The worst case has therefore been based on a scenario providing for the maximum number of structures over the greatest extent on the basis that this would maximise the potential

Impact	Realistic worst case scenario	Justification
		for interaction between GWF and helicopter operations.
Impact of Wind Turbine Generators (WTG) as offshore obstacles	The maximum number of WTG (140) over the maximum extent of the GWF site. Maximum number of ancillary structures (three met masts and up to four ancillary structures (this may comprise a combination of offshore substation platform(s) (OSP), collection platform(s) and/or accommodation platform).	This option provides for the maximum number of possible obstacles. Any other option would have fewer structures and therefore, reduce the potential for obstruction.
Decommissioning		
Impacts on military and civil aviation	All structures left in situ	Arrangements associated with decommissioning will be determined prior to construction and a full Decommissioning Plan for the project will be drawn up and agreed with DECC. Until the arrangements have been clarified, the worst case scenario is that all structures will be left in place, although this is unlikely to occur.

17.6 Assessment of Impacts during the Construction Phase

17.6.1 As a result of the CAA, MOD and NATS consultation responses (see **Table 17.1** and **Appendix 17.A**), and the modelling undertaken (see **Section 17.7**), there is no pathway for impacts to occur and therefore, **no impact** is predicted during the construction phase.

Mitigation

17.6.2 Whilst no impacts are anticipated from the construction phase of the proposed GWF project on military or civil aviation interests, there are still a number of standard aviation management measures that will be implemented in accordance with CAA requirements.

17.6.3 Prior to construction and decommissioning, GWFL will consult with the CAA to inform them that tall cranes will be operating at the proposed GWF site.

17.6.4 As required by the CAA and the MoD, the CAA, MoD and Defence Geographic Centre will be notified prior to construction by GWFL of:

- The date construction starts and ends;
- The maximum height of construction equipment; and
- The latitude and longitude of every WTG.

17.7 Assessment of Impacts during the Operation Phase

Military and civil aviation radar

Air defence radar

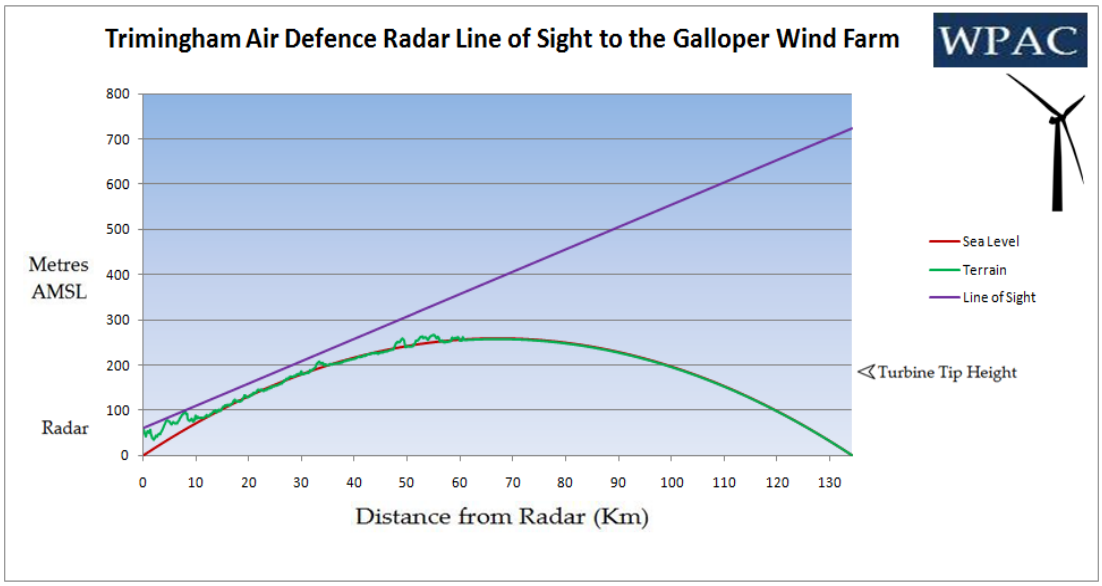
17.7.1 Radar propagation modelling undertaken by WPAC (2011) (see **Technical Appendix 17.A**) ensured that the possibility of WTG being placed within the full development boundary was assessed by modelling 19 boundary points of the GWF area for the Trimingham radar (the nearest Air Defence Radar). The results of the modelling show that the line of sight of the radar at any point within the boundary of the proposed GWF site varies from 364m to 854m above sea level. Radar projections were also undertaken for the worst case WTG scenario at that time (maximum tip height of 178m). The results show that at any location within the area there is a vertical gap of over 250m before the WTGs become visible to the radar. Consequently a tip height of 428m would be necessary for a WTG to be visible to the radar on the GWF site.

17.7.2 Since this modelling was undertaken, the maximum tip height has been increased to 195m. Given the results of the modelling study, a tip height of 195m will still provide a 233m vertical gap from the tip of a WTG rotor to the range of radar visibility. As such, WTG will not be visible to the nearest defence radar at Trimmingham by a significant margin and regardless of the location and or density of WTG within the Development Areas.

17.7.3 Consultation with both the MoD and NATS regarding the increased maximum tip height has been undertaken (see **Table 17.1** and **Appendix 17.A**) and no concerns have been raised (see **Appendix 17.A** for full details). As a result, it is considered that the GWF worst case WTG scenario (195m tip height) will not have the potential to interfere with the Trimmingham Air Defence radar or to create unwanted radar returns. The proposed GWF project will be out of

the line of sight from this, and more distant, radar as detailed by **Plot 17.1** (WPAC, 2011).

Plot 17.1 Trimingham air defence radar line of sight to GWF

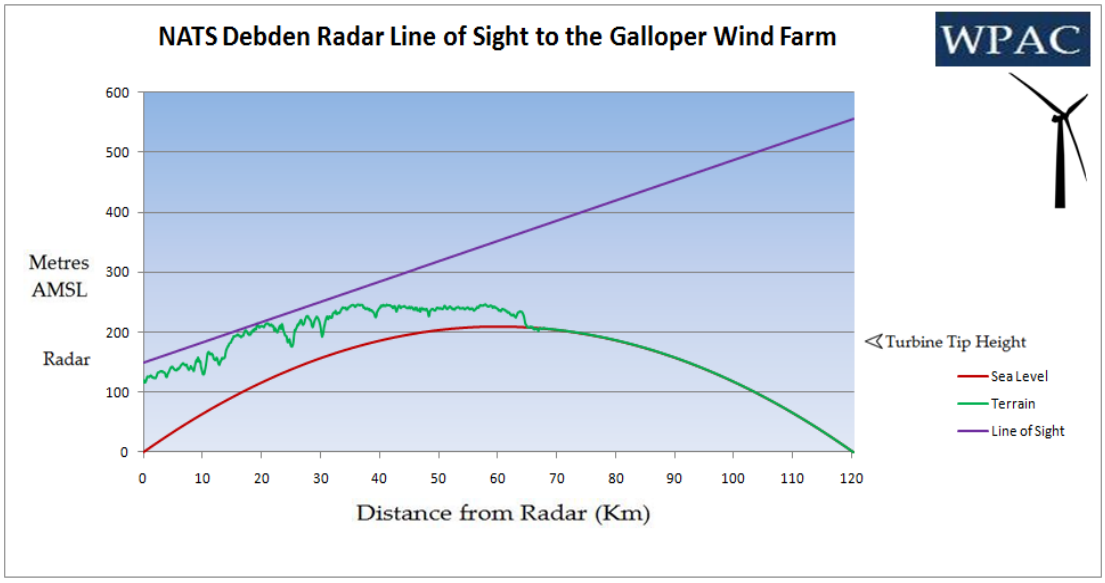


Source; WPAC, (2011)

Civil aviation activity

17.7.4 Radar projection modelling of each WTG location within the project boundary indicates that none of the WTG will be visible to the nearest NERL radar (Debden in Essex). The minimum line of sight of 530m above sea level was recorded over the centre of the GWF site (WPAC, 2011) (see **Plot 17.2**). Therefore, all of the NERL radars are at a sufficient distance such that the proposed GWF project will be considered out of the line of sight by a significant margin (WPAC, 2011).

Plot 17.2 Debden radar line of sight to GWF



Source; WPAC, (2011)

17.7.5 Consultation responses from CAA and NATS and local radar operators (Southend Airport and Manston Airport) indicate that the proposed GWF project does not pose a concern to civil aviation interests in the project vicinity and no objections were raised in relation to its development (see **Table 17.1**).

Summary

17.7.6 The technical studies carried out by WPAC (as discussed above) and the consultation undertaken to date indicate that there will be no potential pathways for impact on civil and military aviation radar from the operational stage of the proposed GWF project, given the distance of the project to the nearest military and civil aviation installations and activity areas.

17.7.7 As such it is anticipated that there will be **no impact** from the proposed GWF project on any current military or civil aviation radar interests during operation.

Existing MoD activity

17.7.8 The proposed GWF project is seen (**Section 17.4**) to be in an area of low MoD usage. Consultation with the MoD has not revealed any concerns with regard to the operation of GWF. These findings are in line with the conclusions drawn for the adjacent GGOWF project. Given the lack of a potential pathway for impact on MoD activity **no impacts** are anticipated.

Helicopter activity

17.7.9 As detailed in **Section 17.4**, the GWF site is 55nm to the south of the Southern North Sea HMR and is also at least 60nm to the south of any offshore helicopter platforms. Consultation with the British Helicopter Association (**Table 17.1**) has confirmed that they have no objection to the proposed GWF development.

17.7.10 The CAA has raised the issue of potential for conflict with GGOWF helicopter operations (see **Table 17.1**) as a result of the presence of GWF. Information provided by Greater Gabbard Offshore Wind Ltd. (GGOWL) indicates that the maximum number of flights per month could be up to 125. GGOWF helicopters are sourced from the Lowestoft area and therefore would not have to pass through or over the GWF site to access GGOWF. GGOWL (and their helicopter operating service providers, Bond Air Services Ltd.) have been consulted on potential concerns with regard to the proposed GWF project and no specific concerns have been raised.

17.7.11 Given that any potential disruption to helicopter operations would be restricted to that of the adjacent GGOWF project (who have not raised concerns with regard to GWF) and therefore, likely to be tolerable, the sensitivity of the receptor is considered negligible. The magnitude of potential impacts to helicopter activity is negligible, given the impact is

unlikely to occur. As a result, **no impacts** are anticipated on helicopter activity in the vicinity of the GWF site.

WTG as offshore obstacles

17.7.12 The CAA has raised the issue of potential for the GWF structures to act as obstacles to aviation interests (see **Table 17.1**).

17.7.13 As identified in **Section 17.4** there are no low flying civil or military aviation interests in the vicinity of the proposed GWF project and no concerns have been raised by any other consultees on this matter. Furthermore, the adjacent GGOWF project has been developed with no objection or concern from the aviation stakeholders.

17.7.14 It is considered therefore, that the likelihood for the WTG to act as obstacles to aviation is extremely low. The use of standard aviation management measures (detailed in the following sections), as required by the CAA, will further serve to reduce the risk of any interaction with the proposed GWF structures. Consequently **no impacts** are predicted.

Mitigation

17.7.15 Whilst no impacts will be anticipated from the operational phase of the proposed project on military or civil aviation interests, there are still a number of standard aviation management measures (as opposed to true mitigation) that will be carried out in accordance with CAA requirements.

Aviation warning lighting

17.7.16 In line with consultation responses received from the CAA (see **Table 17.1**) GWFL will use aviation warning lighting in accordance with Article 220 of the UK Air Navigation Order (ANO) 2009, The Lighting of Wind Turbine Generators in United Kingdom Territorial Waters (CAA, 2010). Furthermore, due consideration will be given to the latest guidance from DECC, who are undertaking investigations into WTG lighting (CAA, 2010).

17.7.17 It is noted within the CAA consultation response (WPAC, 2011) that:

> "*With the permission of the CAA, only those turbines on the perimeter of a windfarm need such lighting and routinely, for the purposes of Article 220, the CAA will require that those turbines on the periphery of any windfarm need to be equipped with aviation warning lighting*".

17.7.18 In addition, the MoD consultation (**Table 17.1**) states that:

> *"In the interests of air safety, the MOD requests that the turbines should be fitted with aviation lighting. The corner most turbines and six turbines in the middle of the proposal should be fitted with 25 candela omni-directional red lighting or infrared lighting with a*

flash pattern of 60 flashes per minute of 200ms or 500ms duration at the highest practicable point."

17.7.19 The precise nature of the aviation lighting for the WTG will be the subject of further consultation with the CAA and other relevant stakeholders once the final design is established post-consent.

Markings / colour scheme

17.7.20 GWFL will also apply the CAA advice on the marking and colouration of the WTG that is in line with international aviation regulatory documentation. This guidance requires that the rotor blades, nacelle and upper 2/3 of the supporting mast of WTGs that are deemed to be an aviation obstruction should be painted white, unless otherwise indicated by an aeronautical study (CAA, 2010). The development will also be marked on aeronautical charts.

17.8 Assessment of Impacts during the Decommissioning Phase

17.8.1 The construction and operational phases of the proposed GWF have been assessed as having **no impact** upon military and civil aviation interests and activity, even prior to the application of standard aviation management measures such as lighting, charting and paint work. During the decommissioning phase, tall vessels would be on site and notification of this would have to be provided to aviation stakeholders. The decommissioning worst case assumes that all turbines would be left in situ and therefore **no impact** would be predicted as for the construction and operation phases. However, should decommissioning entail the removal of all structures which could represent an aviation hazard (no matter how slight) this would remove the source and pathway of potential impacts to occur. As a result, while management will be necessary for removal works if they were to occur, the decommissioning phase represents **no impact** upon military and civil aviation.

17.9 Inter-relationships

17.9.1 The only potential inter-related impact associated with military and civil aviation is considered to be the potential indirect operational effects on ornithological interests as a result of aviation lighting (see mitigation within **Section 17.7**), in line with Paragraph 2.6.107 of EN-3. The implications of this inter-relationship are discussed as an indirect impact within **Chapter 11 Offshore Ornithology**.

17.9.2 **Chapter 29 Assessment of Inter-relationships** provides a holistic overview of all of the inter-related impacts associated with the project.

17.10 Cumulative Impacts

17.10.1 The findings of the GWF modelling and subsequent impact assessment indicate that there are no pathways for cumulative impacts on military and civil aviation interests during any of the stages of the proposed GWF project.

This corresponds to predictions made for the adjacent GGOWF where no impacts were predicted upon aviation infrastructure.

17.11 Transboundary Effects

17.11.1 This chapter has considered the potential for transboundary effects to occur on military and civil aviation as a result of the construction, operation or decommissioning of the proposed GWF project. In all cases it is concluded that the potential impacts arising, by virtue of the predicted spatial and temporal magnitude of the effects, would not give rise to significant transboundary effects on the environment of another European Economic Area (EEA) member state. A summary of the likely transboundary effects of the proposed GWF are summarised in **Chapter 31 Transboundary Effects**.

17.12 Monitoring

17.12.1 No monitoring of impacts upon military and civil aviation will be required due to there being no potential for significant impacts. This has also been confirmed through consultation with the CAA where they state that "*It is unlikely that there will be a need for any ongoing environmental monitoring of aviation issues*".

17.13 Summary

17.13.1 This Chapter discusses the existing military and civil aviation interests within the vicinity of the GWF site. The nearest MoD radar site (Trimmingham Air Defence site) is approximately 130km distant, whilst the nearest civil aerodrome is over 50km from the site. Consultation to date has indicated little concern from relevant stakeholders with regard to the proposed GWF project.

17.13.2 The impacts identified in this Chapter represent the maximum potential adverse impact as a result of having assessed the worst case (development) scenario for each receptor (as defined in **Table 17.3**). Therefore the predictions made will not be worse (more adverse) should any other development scenario (in line with those provided in **Chapter 5**), to that assessed within this Chapter, be taken forward in the final scheme design.

17.13.3 **Table 17.4** provides a summary of the potential impacts on military and civil aviation during the construction, operation and decommissioning phases as a result of the proposed GWF project.

Table 17.4 Summary of impacts on military and civil aviation

Description of Impact	Impact	Mitigation Measure	Residual impact
Construction Phase			
Impacts on military and civil aviation installation	No Impact	N/A*	N/A

Description of Impact	Impact	Mitigation Measure	Residual impact
and activity areas			
Operation Phase			
Impacts on military and civil aviation radar	No Impact	N/A*	N/A
Impacts on military activity	No Impact	N/A	N/A
Impacts on Helicopter activity	No Impact	N/A	N/A
Impacts resulting from WTGs acting as obstacles	No Impact	N/A	N/A
Decommissioning Phase			
Impacts on military and civil aviation installation and activity areas	No Impact	N/A*	N/A

*Standard aviation management measures will be carried out in accordance with CAA requirements (see **Section 17.6**)

17.13.4 No cumulative impacts are envisaged from any phases of the proposed GWF development.

17.13.5 No specific aviation monitoring for any of the phases of GWF is proposed.

17.14 References

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