



## **Rampion Offshore Wind Farm**



### **ES Section 16 –Aviation**

**RSK Environmental Ltd**

**Document 6.1.16**

**December 2012**

**APFP Regulation 5(2)(a)**

**Revision A**

**E.ON Climate & Renewables UK Rampion Offshore Wind Limited**

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## 16 AVIATION

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### 16.1 Introduction

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- 16.1.1 The purpose of this section of the Environmental Statement (ES) is to provide an understanding of the baseline aviation environment local to the proposed Rampion Offshore Wind Farm (the Project) site and to consider the possible direct or indirect effects that construction and operation of the proposed development could have on this environment. The section also details methods by which any impacts identified can be mitigated.

### 16.2 Legislation and Policy Context

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- 16.2.1 The interaction between wind turbines and aviation interests was first described in the Wind Energy and Aviation Interests Interim Guidelines published by the Civil Aviation Authority (CAA) Directorate of Airspace Policy (DAP) in 2002. This guidance was updated and incorporated in Civil Aviation Publication (CAP) 764, Policy and Guidelines on Wind Turbines, which Version 4.1. (January 2012). This document is framed upon legislation for civil aviation operations contained within the Air Navigation Order 2009, which is currently under review. The Ministry of Defence (MOD) is self-regulating and has its own regulations laid down in Military Aviation Authority Air Traffic Management (3000 series) Regulatory Instructions.

#### National Policy Statements (NPS)

- 16.2.2 The National Policy Statements (NPS) are the principal decision making documents for any Nationally Significant Infrastructure Project (NSIP). The specific assessment requirements for military and civil aviation in the relevant NPS are set out below.
- 16.2.3 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.
- 16.2.4 EN-1 (paragraphs 5.4.11 to 5.4.12) states that if the proposed development may have an effect on civil and military aviation then the assessment should include the following elements/requirements:
- *"The applicant should consult the MOD, CAA, NATS (National Air Traffic Services) 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";*

- *“Any assessment of aviation or other defence interests should include potential impacts of the project upon the operation of Communication, Navigation and Surveillance (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.”*

16.2.5 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”.*

### **Other Relevant Guidance**

16.2.6 There are a number of aviation guidelines in relation to wind farm developments including:

- CAP 764: CAA Policy and Guidelines on Wind Turbines, Directorate of Airspace Policy, Version 4 Change 1, Jan 2012;
- Wind Energy and Aviation Interests – Interim Guidelines, Wind Energy, Defence & Civil Aviation Interests Working Group, 2002;
- CAP 168: Licensing of Aerodromes, Safety Regulation Group, CAA, April 2011;
- CAP 670: Air Traffic Services Safety Requirements, Safety Regulation Group, February 2012; and
- Government aerodromes are similarly covered under the Town & Country Planning Act (General Permitted Development) Order 2000.

### *Civil Aerodromes*

16.2.7 Civil Aviation Publication (CAP) 764 states the distances from various types of airfields where consultation should take place. These distances include:

- Airfield with a surveillance radar - 30km;
- Non radar licensed aerodrome with a runway of more than 1100 metres - 17km;
- Non radar licensed aerodrome with a runway of less than 1100 metres – 5km;
- Licensed aerodromes where the turbines would lie within airspace coincidental with any published Instrument Flight Procedure;

- Unlicensed aerodromes with runways of more than 800 metres – 4km;
- Unlicensed aerodromes with runways of less than 800 metres – 3km; and
- Other aviation activity such as parachute sites and microlite sites within 3km, developers are referred to appropriate organisations.

16.2.8 CAP 764 goes on to state that these distances are for guidance purposes only and do not represent ranges beyond which all wind turbine developments will be approved or within which they will always be objected to. These ranges are intended as a prompt for further discussion between developers and aviation stakeholders.

16.2.9 As well as examining the technical impact of wind turbines on Air Traffic Control (ATC) facilities it is also necessary to consider the physical safeguarding of ATC operations using the criteria laid down in CAP 168, to determine whether a proposed development will breach obstacle clearance criteria.

#### *Ministry of Defence (MOD)*

16.2.10 It is necessary to take into account the aviation and air defence activities of the MOD. The type of issues that will be addressed include:

- MOD Airfields, both radar and non radar equipped;
- MOD Air Defence Radars;
- MOD Meteorological Radars;
- Physical Safeguarding of Military Airfields using the criteria laid down in Military Aviation Authority Manual of Aerodrome Design and Safeguarding; and
- Danger and Practice Exercise Area operations.

#### *National Air Traffic Services (NATS) Facilities*

16.2.11 It is necessary to take into account the possible effects of turbines upon the NATS radar systems, a network of primary and secondary radars and navigation facilities around the country.

### **16.3 Scoping and Consultation Responses**

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16.3.1 Consultation has taken place with various statutory and non-statutory consultees regarding the assessment of the Project on aviation interests. These consultations have informed the ES and associated application documents.

- 16.3.2 Initial consultation was carried out via the Rampion Offshore Wind Farm Scoping Document (E.ON/RSK, September 2010), as well as further consultation exercises in 2011. Responses received are presented in the Infrastructure Planning Commission (IPC) Scoping Opinion report (IPC, October 2010).
- 16.3.3 The information and advice received during the scoping process with regard to issues relating to other marine users is summarised in Table 16.1. The information drawn from the consultations and other research was presented in a Draft ES and subject to stakeholder consultation.

**Table 16.1: Scoping and consultation responses relating to aviation.**

| Date       | Consultee                             | Summary of issues                                                                                                                                                                                      | Sections where addressed    |
|------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 08/10/2010 | The UK Civil Aviation Authority (CAA) | DTI document on Wind Energy and Aviation Interests.                                                                                                                                                    | Section 16.2.1.             |
|            |                                       | Civil Air Publication 764 v. 4, change 1 (Jan 2012)                                                                                                                                                    | Section 16.2.1.             |
|            |                                       | Consultation with MOD, NATS, operators and service providers is required as part of the EIA.                                                                                                           | Section 16.4.1              |
|            |                                       | Aviation warning lights as per UK Air Navigation Order 2009 (Article 220) and publication from Director of Airspace Policy                                                                             | Section 16.7.6.             |
|            |                                       | Markings/Colour Scheme                                                                                                                                                                                 | Section 16.7.12             |
|            |                                       | Aviation Promulgation – contact Defence Geographic Centre                                                                                                                                              | Section 16.7.1.             |
| 12/10/2010 | Natural England                       | Shoreham airport (and associated aviation issues) is not mentioned.                                                                                                                                    | Addressed in section 16.5.9 |
| 12/10/10   | MOD                                   | The low flying system only extends up to 3nm off the coast and it is therefore very unlikely that the MOD would object to the location of the offshore wind farm based on effects on low level flying. | 16.6.6                      |

- 16.3.4 Full details of the consultation process and associated outcomes, including comments on the Draft ES can be found in the Consultation Report (Document 5.1). There were no comments directly relating to aviation issues.

## 16.4 Assessment Methodology

### Establishment of Baseline Environment

- 16.4.1 The baseline environment has been established through consultation with a number of relevant consultees including NATS, the MOD, the CAA and Shoreham Airport.

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## Identification and Assessment of Impacts and Mitigation Measures

- 16.4.2 The assessment of impacts has been based on consultation responses. The general approach to mitigation for aviation issues is to avoid impacts, where practical through appropriate turbine positioning, and to adopt technical solutions to address potential impacts where appropriate.
- 16.4.3 Detailed sensitivity, magnitude and significance tables have not been used for the assessment of aviation issues; rather, a qualitative approach has been adopted and informed by professional judgement to identify impacts of genuine potential significance.
- 16.4.4 An assessment has been made of the significance of residual effects, i.e. those remaining after mitigation.

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## 16.5 Environmental Baseline

### The General Area

- 16.5.1 The Project site is located in an area that is, at its closest point, 13.5km to the south of the entrance to Shoreham Harbour. Examination of the aviation chart (Figure 16.1) shows that the entire area comes under controlled airspace designated as the Worthing Control Area (CTA) marked as purple lines and designated as Class A Controlled Airspace. To the west of the Project site there is also an airway, designated A34, and Class A Controlled Airspace with a base level of Flight of 8500ft<sup>1</sup> (using an altimeter setting of 1013.2mb).
- 16.5.2 To the north of the Project site the closest aviation facility of note is the licensed aerodrome at Shoreham (Figure 16.1). The blue chevrons in the figure denote the existence of published instrument approach procedures that are not protected by controlled airspace. Further to the west, the eastern end of the Royal Navy Portsmouth Danger Area Complex is marked, the closest danger area D037 is marked by purple hashed lines. To the north east of the Project site, a large blue 'compass rose' marks the National Air Traffic Services (NATS) radio navigation beacon at Seaford, designated SFD.

### Military Airfields

- 16.5.3 The closest military airfield to the Project site is RAF Odiham in Hampshire, more than 74km away. Potential impacts could arise if the radar can detect the turbines in the offshore wind farm.

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<sup>1</sup> For the sake of clarity, given there is wide spread use of both imperial (feet) and metric (metres) units throughout this section, 1m= ~3.3ft and 1ft = .3048m.

## **Air Defence Issues**

- 16.5.4 There is a national network of air defence radars in locations where it has been determined by the MOD that coverage is required. None of the radars are close to the Project location, the nearest being at Trimingham in Norfolk, 250km away.

## **Meteorological Radars**

- 16.5.5 The Met Office operates a network of sophisticated weather and rainfall radars, which can be affected by wind turbines in line of sight. The Met Office use European guidance, entitled OPERA, to determine the impact of wind turbines. The Met Office will examine any turbine proposals within 20km of their radars.

## **MOD Low Flying**

- 16.5.6 The majority of UK airspace is divided up into a number of low flying areas (LFA), in which military aircraft can be authorised to fly as low as 250ft from the ground or objects on the ground. The Project site is technically to the south of the area known as LFA 18, which is a low priority LFA. The low flying system only extends up to 3nm off the coast; however, military aircraft low fly beyond 3nm but do so unregulated by the low level booking system. There is also very limited Royal Navy activity in this area, mainly helicopter activity from ships transiting the English Channel.

## **Radar Equipped Licensed Aerodromes**

### *London Gatwick International Airport*

- 16.5.7 In accordance with CAP 764, radar equipped licensed aerodromes are entitled to be consulted about wind turbine proposals out to a minimum of 30km. The closest radar equipped aerodrome to the Rampion wind farm site is at Gatwick Airport, 50km to the north.

## **Non Radar Equipped Licensed Aerodromes**

### *Shoreham Airport*

- 16.5.8 Shoreham Airport is a busy general aviation airfield, operating a large number of aircraft and aircraft types, flying clubs and training facilities including the Sussex Flying Club and the Real Aircraft Company. The airfield does not have a radar but does provide an approach procedural service, is equipped with 3 runways, the longest of which has a declared length of 1036m and an Accelerate Stop Distance Available (ASDA) also of 1036m. According to CAP 764 this type of aerodrome is entitled to be consulted about wind turbine development out to a distance of 5km; the closest point of the Project site to the Aerodrome Reference Point (ARP) is 15km.

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### **Unlicensed Aerodromes, Gliding, Hang Gliding and Parachuting Sites**

- 16.5.9 There are no such sites within an area that could be affected by the proposed Rampion offshore wind farm.

### **En Route Airspace and NATS En Route Radars**

- 16.5.10 The previous aviation chart extracts only show the airspace up to 5000ft and 10,000ft. Figure 16.2 is an extract from an en route chart that shows controlled airspace and other aviation features up to 24500ft. NATS En Route Ltd (NERL) operates a network of long-range ATC radars throughout the country. The green shaded areas in Figure 16.2 are controlled or regulated airspace and the white areas are unregulated airspace. The Project site is in an area of green, falling within the Worthing Control Area (CTA) and a number of airways that cross the area taking traffic across the English Channel.

### **En Route Low Level VFR Traffic**

- 16.5.11 General Aviation aircraft will be flying in this area whilst crossing the English Channel. They will be flying under the Visual Flight Rules (VFR), which require them to maintain 500ft separation from the surface or obstructions on the surface. Currently they would be able to fly down as low as 500ft above the sea subject to avoiding shipping by the stipulated distance.

### **Helicopter Support to Offshore Installations**

- 16.5.12 There are no plans to use helicopters as part of the routine maintenance programme for the Rampion offshore wind farm.

### **Helicopter Main Routes**

- 16.5.13 There are no Helicopter Main Routes in the vicinity of the Project site.

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## **16.6 Predicted Impacts**

### **Rochdale Envelope**

- 16.6.1 To comply with the principles of a Rochdale envelope assessment (see Section 5 - Environmental Management), worst-case scenarios have been considered in the assessment of impacts to aviation. The actual impacts of the Project on aviation are therefore likely to be lower than the scenarios considered in this impact assessment.
- 16.6.2 In line with the use of the "Rochdale Envelope" (see Section 5 – Environmental Management), the assessment in this section has been based on a development scenario which is considered to be the worst case in terms of impacts on aviation.

16.6.3 The components of the design of the marine part of the project that could influence the magnitude of impacts are:

- Height of turbines (highest turbines creating the greatest potential for impact); and
- Extent of the turbine array (the widest extent creating the greatest potential for impact).

16.6.4 Impacts to aviation interest have been considered on the basis that the turbines used have a tip height of 210m, and that the array of turbines fills the maximum extent of the Project Site.

### **Construction**

16.6.5 With the exception of possible low flying restrictions being applied due to the presence of construction vessels en-route to and from the offshore wind farm and within the Project site actually carrying out construction operations, the effects from the constructed wind farm will be the main source of impacts. The impacts described in sections 16.6.6 to 16.6.23 are augmented with text on construction issues where they have the potential to be different from those created by operation of the offshore wind farm.

### **Operation**

16.6.6 This section discusses the impacts on various aviation features in the same sequence that they have been described in the above baseline section (16.5).

#### *Military Airfields*

16.6.7 The initial scoping response from the MOD stated that it was not anticipated that the proposal would affect military air traffic movements; however, further consultation with the MOD will take place once a detailed layout is being developed, and one of the issues that the MOD will have to consider is the potential for impact of the turbines on military ATC radars. For completeness, the visibility of the radar from the Odiham site has been checked as part of the current EIA work, and it has been confirmed that there is no possibility of the turbines being detected by the radar. Therefore there will be no effect of the Project on Military Airfields.

#### *Air Defence Issues*

16.6.8 Given that the closest air defence radar to the Project site is located in Norfolk, there is no possibility of the offshore wind farm having any impact upon the performance of either individual radars or the system as a whole. Again, the initial MOD scoping response indicates that there will be no impact on military operations; however, this is an issue that the MOD will consider in detail once the application is submitted.

*Meteorological Radars*

- 16.6.9 There are no Met Office radars within 20km of the Project site, therefore individual radars, or the system as a whole cannot be impacted. However, this is an issue that the MOD<sup>2</sup> will examine as part of the consultation process.

*MOD Low Flying*

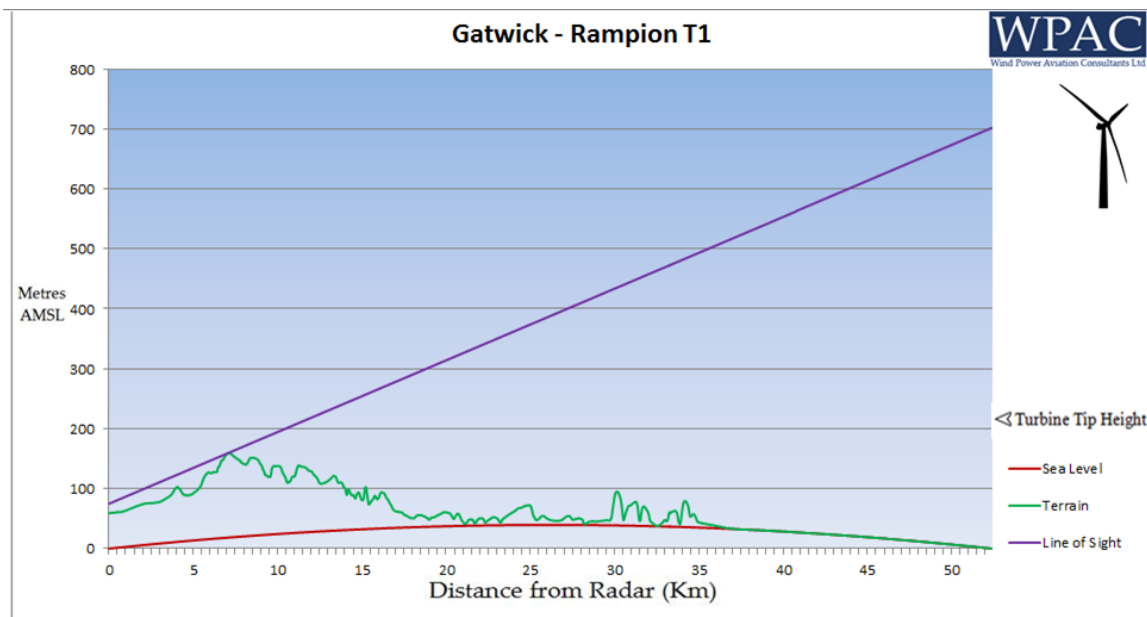
- 16.6.10 The low flying system only extends up to 3nm off the coast and it is therefore very unlikely that the MOD would object to the location of the offshore wind farm based on effects on low level flying. This was confirmed by their initial scoping response.
- 16.6.11 The limited level of Royal Navy activity in the area also implies that any restrictions to helicopter activity flying to and from vessels transiting the English Channel would be insufficient to result in an objection from the MOD. The impact is currently considered as either non-existent or minimal (as confirmed by the initial MOD scoping response).
- 16.6.12 The MOD will request that the turbines be lit; however, for this type of development, CAA lighting requirements will be in excess of any lighting that the MOD would require.

*Radar Equipped Licensed Aerodromes*

- 16.6.13 While it is recommended that radar equipped licensed aerodromes should be consulted about wind turbine proposals out to a minimum of 30km, and the closest such aerodrome is 50km away from the Project site, a line of sight review has been carried out for completeness (Figure 16.3). In this figure the radar is on the left and the turbine location is on the right. The green line shows the terrain as taken from the digital terrain model (in this case OS Landform Panorama data) and the purple line shows radar line of sight. It is clear that there is no possibility of the turbines being visible to the radar. Therefore consultation is not required and there is no impact of the Project on Gatwick ATC.
- 16.6.14 There are no other radar equipped airfields of interest at this location and there is no impact on any airport ATC radars.

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<sup>2</sup> The MOD will consult with the Met Office as part of the process



**Figure 16.3: Line of sight of Gatwick Radar in relation to maximum turbine tip height of the Rampion wind farm**

#### *Non Radar Equipped Licensed Aerodromes*

- 16.6.15 According to CAP 764, Shoreham Airport is entitled to be consulted about wind turbine development out to a distance of 5km. The closest point of the Project site to the Aerodrome Reference Point (ARP) is 15km. However, on the recommendation of the CAA, E.ON has consulted Shoreham Airport about the Project.
- 16.6.16 It has been established that there are no physical safeguarding impacts of the proposal as the Project site is beyond the safeguarded distances as laid down in CAP 168 '*Licensing of Aerodromes*'. There are also no technical impacts of the turbines on the radio navigation aids.
- 16.6.17 Shoreham Airport has published a number of non-precision instrument approach procedures, with one example shown in Figure 16.4. In this case when an aircraft is making an RNAV GNSS approach to runway 02, it will be at an altitude of 2200 ft as it passes over the offshore wind farm and will not commence a descent until it is 7.4nm from the runway and on the centreline, it will descend to an altitude not below 1500 ft until 3.9nm from touchdown, well clear of the offshore wind farm. It is clear that even in this worst case scenario there will be no impact on these procedures. However, to ensure to the satisfaction of Shoreham Airport management that the instrument approach procedure obstacle clearance criteria are maintained, and that pattern heights and minima are unaffected, Shoreham will need to instruct the Directorate of Airspace Policy (DAP) of the CAA or another accredited procedure design specialist to undertake a procedure design check once the maximum turbine tip height and turbine locations have been finalised.

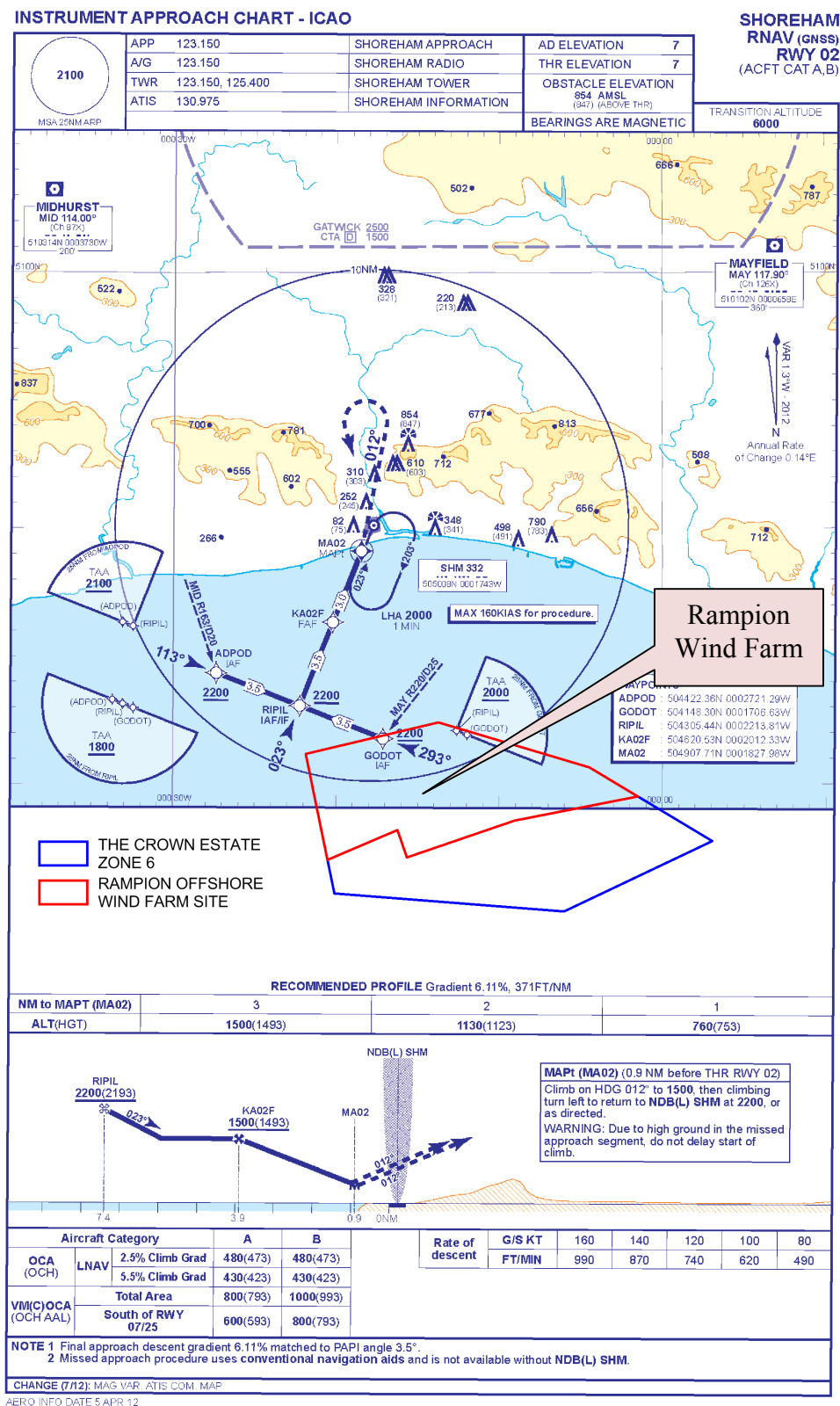
- 16.6.18 Subject to DAP instrument approach procedure checks, there will be no impact on operations at Shoreham Airport. At an initial meeting held with Shoreham Airport management on 17 November 2011, the site boundaries and typical turbine layouts were discussed and it was clear at the time that there would be no impact on Shoreham Airport's procedures. The airport management stated that they are developing a GPS based precision approach procedure which is very unlikely to be affected by the turbines, but a CAA Instrument Approach Minima check will be undertaken, to ensure that this is the case once the procedure has been designed. From first principles it is clear that the turbines will have no impact on any pattern heights or Instrument Approach Minima, subject to CAA confirmation.

*Unlicensed Aerodromes, Gliding, Hang Gliding and Parachuting Sites*

- 16.6.19 There are no such sites in the Project area; therefore there will be no impacts from the operation of the offshore wind farm.

*En Route Airspace and NATS En Route Radars*

- 16.6.20 At a meeting held at the London Area Control Centre, Swanwick in 2010, NERL conducted a basic review of all Round 3 offshore wind farms. In relation to Rampion, the initial view was that it was unlikely to generate an unacceptable impact on either NERL infrastructure or operations. However, if the Rampion wind farm turbines are detected by any NERL long-range ATC radars, an objection to the offshore wind farm may be raised. The potential for such an objection is dependent not only upon whether the turbines are detected by the radar, but also the type of airspace above the Project site. Radar visibility from NERL radars could therefore be a key issue. To determine the potential for impacts, radar projections for the Project site against the NERL radars in the area have been produced. These show that there is only one NERL radar that covers this area at low level, located at Pease Pottage near Gatwick. Line of sight projections were produced and a line of sight coverage map at a height of 210m above sea level is shown in Figure 16.5. Turbine tip heights at 210m above sea level are considered the worst-case scenario for this aviation assessment.



**Figure 16.4: Example of a non precision instrument approach to Shoreham Airport**

- 16.6.21 Figure 16.5 shows that there is a very small area where theoretical line of sight exists at 210m and this is shaded purple. However, the majority of the area will not be in line of sight of the radar. The consultation response received from NATS En Route Ltd (NERL) dated 17 February 2011 states that there was no safeguarding objection '*provided the wind farm remains in the area defined by the Zone 6 boundary*', which remains the case. For completeness it is considered prudent to re-consult with NERL once a final site layout has been determined.

#### *En Route Low Level VFR Traffic*

- 16.6.22 Once the turbines are erected, aircraft will be required under VFR to maintain 500ft separation from the turbines (this restriction will begin to apply during the construction period as turbines are erected). This will require aircraft that could previously fly through the area at 500ft altitude having to fly over the wind farm at a minimum altitude of approximately 1140ft. This may result in objections from the general aviation community; however, there are no airspace restrictions around the Project site to prevent aircraft routing around the wind farm.

#### *Helicopter Main Routes*

- 16.6.23 There are no such routes in the Project area; therefore there will be no impacts from the operation of the offshore wind farm.

#### **Decommissioning**

- 16.6.24 Impacts from the decommissioning of the offshore wind farm are likely to be minimal as the operations will be marine vessel based. Once the turbines have been removed the baseline environment in terms of aviation will be restored.

### **16.7 Mitigation Measures**

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#### **During Construction**

- 16.7.1 No specific mitigation measures are proposed for the construction period, with the exception of notifications being provided to the relevant aviation authorities and other stakeholders on the likely programme for installation of the turbines. Once the final plans for the wind farm have been approved, the locations of the turbines will be provided to the Defence Geographic Centre such that they can be charted for aviation purposes.
- 16.7.2 It is noted that there is guidance on the type of lighting used on operational offshore wind turbines such that they are visible to aircraft (see Section 16.7.6). There will be a period between installation of the monopiles and turbines and commencement of operation of the wind farm, E.ON will agree with the CAA the timing of installation of the lights, with the intent being to minimize the period when the turbines are installed but not displaying lights. Lighting will be in line with the regulations in place at the time of construction.

## During Operation

16.7.3 There are several key areas in which mitigation measures have been considered in the aviation impact assessment process. These fall in to two categories:

- Consultation with various stakeholders, taking their concerns into consideration in the design of the development;
- Using industry guidance to ensure the development is as visible as possible to aviation interests.

### *Stakeholder Concerns*

16.7.4 The impacts section above notes in several places that further modelling and assessment work will be required to confirm that the final design of the offshore wind farm will not interfere with aviation interests across the Project site. Where possible E.ON will consider the potential impacts on radar systems etc. when locating turbines, and will be in communication with stakeholders during the design phase.

16.7.5 The specific further assessment work which will be carried out includes:

- Procedure design check for Shoreham to ensure that instrument approach procedure obstacle clearance criteria are maintained. This will be carried out either by the Directorate of Airspace Policy (DAP) of the CAA or another accredited procedure design specialist once the maximum turbine tip height and turbine locations have been finalised. It is a requirement of the CAA that the airport instruct a check on the instrument approach procedures.
- Radar impact assessment to be carried out by NERL in respect of their long range ATC radars. Given the NERL previous response, any impact is highly unlikely but for completeness, should be undertaken once the turbine layout has been designed.

### *Industry guidance*

16.7.6 Both the CAA and the MOD have published guidance to developers on the type of lighting which will be required on developments above a threshold height. Legislation also exists on this subject. Guidance published by the MOD is less stringent than that issued by the CAA. Marking and lighting requirements are summarised below. E.ON will ensure that legislation and guidance is followed in the design of these aspects of the Rampion offshore wind farm.

### Marking and Lighting

16.7.7 The lighting requirement for offshore wind turbines is evolving as there have been differing requirements from the aviation and maritime regulators. CAP 764 captures the latest position:

### Offshore Obstacle Lighting Requirement

- 16.7.8 Legislation requires the fitting of obstacle lighting, primarily for night-time use, on offshore wind turbines with a height of 60m or more above the highest astronomical tide. Whilst Article 220 of ANO (2009) refers, in general, offshore wind turbines of 60m and higher are required to be fitted with aviation obstruction lighting as follows:
- a) At least one medium intensity steady red light positioned as close as possible to the top of the fixed structure;
  - b) Where four or more wind turbines are located together in the same group, with the permission of the CAA only those on the periphery of the group need be fitted with obstruction lighting;
  - c) The downward spread of light is restricted as far as possible to minimize any potential confusion with maritime lighting whilst maintaining flight safety.
- 16.7.9 When considering offshore lighting requirements for wind turbines, the Maritime and Coastguard Agency should also be consulted. Currently there are disparities between the maritime and aviation requirements for offshore lighting. Until such time that these have been resolved, Article 220 remains extant as the aviation requirement. A related policy statement, The Lighting of Wind Turbine Generators in UK Territorial Waters, provides the most current advice.
- 16.7.10 CAP 437 (Offshore Helicopter Landing Areas) gives guidance on lighting requirement for helicopter winching operations onto offshore wind turbines.
- 16.7.11 Consequently the CAA recommends that all offshore obstacles (regardless of their location within or outside of territorial waters) that are over 60 m above sea level should be fitted with one, medium intensity steady red light positioned as close as possible to the top of the obstacle.
- 16.7.12 There are also recommendations in relation to the colour scheme to be applied to wind turbines as laid down in CAP 764 Chapter 3 which states:
- ICAO regulations require that structures away from the immediate vicinity of an aerodrome, which have a height of 150m or more Above Ground Level (AGL) are:... *painted appropriately: the rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines that are deemed to be an aviation obstruction should be painted white, unless otherwise indicated by an aeronautical study.*
- 16.7.13 Given the distance from Shoreham Airport, the colour scheme applied to the wind turbines is unlikely to be governed by CAP 764, the colour scheme is discussed in more detail in Section 2a – Offshore Project Description.

### Helicopter maintenance flights

- 16.7.14 There are no proposals to use helicopters in the operations and maintenance phase. However, in the design of the offshore wind farm layout the guidance provided in CAP 764 will be followed, which states that:

*“In order to facilitate construction or maintenance flights within the boundaries of wind turbine developments, consideration should be given to the use of flight corridors being built into the development lay out plans. Such corridors should be oriented in line with the prevailing wind direction, and their width should be designed in consultation with the helicopter operators, given that it will be governed by the Visual Flight Rules performance of the aircraft in use.”*

### **During Decommissioning**

- 16.7.15 No specific mitigation measures are proposed for the decommissioning period, with the exception of notifications being provided to the relevant aviation authorities and other stakeholders on the likely programme for removal of the turbines. It is also expected that aviation lights will remain in place on every turbine until it is disassembled from its foundation.

## **16.8 Significance of Residual Effects**

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- 16.8.1 For the majority of the aviation interests described in the baseline section, effects from the construction and operation of the Project will be negligible. For some features such as radar systems further modelling work will be required as the Project progresses. By liaising closely with the radar operators throughout the more detailed design stages, it is anticipated that any residual impacts that may exist on the radar systems can be reduced to a negligible level. Residual effects on aviation features are summarised in Table 16.2.

## **16.9 Cumulative Impacts**

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- 16.9.1 Given the predicted negligible impacts on aviation features from the installation, operation and decommissioning of the Project, there will be no cumulative impacts.

## **16.10 References**

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AWC/WAD/72/652/Trials

**Table 16.2: Summary of Residual Effects and Mitigation Measures**

| Aspect                                               | Effect                                                          | Proposed Mitigation Measures                         | Sensitivity | Magnitude  | Residual Effect |
|------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------|-------------|------------|-----------------|
| <b>Construction Phase</b>                            |                                                                 |                                                      |             |            |                 |
| Turbine/nacelle installation operations              | Physical obstruction by tall cranes                             | Inform aviation authorities                          | Low         | negligible | negligible      |
|                                                      | Physical obstruction by installed but non-commissioned turbines | Lighting to be installed on all structures above 60m | Low         | negligible | negligible      |
| <b>Operational Phase</b>                             |                                                                 |                                                      |             |            |                 |
| Presence of operational turbines on the Project site | Possible small area of radar clutter on NATS En Route Radars    | None required                                        | medium      | negligible | negligible      |
| <b>Decommissioning Phase</b>                         |                                                                 |                                                      |             |            |                 |
| Turbine/nacelle removal operations                   | Physical obstruction by tall cranes                             | Inform aviation authorities                          | Low         | negligible | negligible      |