

Vattenfall Wind Power Ltd
Thanet Extension Offshore Wind Farm

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11 AVIATION AND RADAR

11.1 Introduction

11.1.1 This chapter describes the existing environment with regard to aviation within and around the proposed development, through the evaluation of existing data sources and desktop studies, and consultation with key stakeholders. This chapter presents the results of a desk top assessment of the construction, Operations and Maintenance (O&M) and decommissioning phases of Thanet Extension Offshore Wind Farm (Thanet Extension). Details of mitigation are also presented.

11.1.2 This chapter has been prepared by Osprey Consulting Services Limited (Osprey).

11.1.3 The potential effects of wind farms on aviation generally fall into two scenarios:

- Physical Obstruction: Infrastructure can present a physical obstruction at, or close to, an aerodrome, flight path or other landing/ take off point; and
- Radar/ air traffic services: clutter resulting from infrastructure, appearing on a radar display, can affect the safe provision of air traffic services as it can mask unidentified aircraft from air traffic controllers and/ or prevent accurate identification of aircraft under their control. In some cases, radar reflections from the Wind Turbine Generators (WTGs) can affect the detection performance of the radar system itself.

11.1.4 The potential effects on aviation have been assessed conservatively using realistic ‘worst-case’ scenarios for the project.

11.1.5 A number of other potential effects including impacts on Search and Rescue (SAR) flight operations, at sea, and over-flight consideration, among others, are also relevant to the consideration of aviation impact.

11.1.6 Some of the effects discussed in this chapter cross reference the content of Volume 2, Chapter 9: Shipping and Navigation (Document Ref: 6.2.9), Volume 2, Chapter 1: Project Description (Offshore) (Document Ref: 6.2.1) and Volume 5, Annex 11-1: Radar Line of Site Technical Report (Document Ref: 6.5.11.1).

11.1.7 In aviation terms, the standard measurement of altitude or vertical distance is in feet (ft), and nautical miles (NM) are used for navigational distances: 1 ft equates to 0.305 metres (m); and 1 NM equates to 1.852 kilometre (km).

11.2 Statutory and policy context

11.2.1 The assessment of potential impacts on aviation has been undertaken with specific reference to the relevant National Policy Statements (NPS). Those relevant to the proposed development are as follows:

- Department of Energy and Climate Change¹ (DECC, 2011a) National Policy Statement for Renewable Energy Infrastructure (EN-3); and
 - Overarching NPS for Energy (DECC, 2011b) (EN-1).
- 11.2.2 Relevant guidance from NPS EN-1 and EN-3 to which Vattenfall Wind Power Ltd (VWPL) will give due consideration is outlined in Table 11.1.

¹ DECC was merged with the Department of Business, Innovation and Skills (BIS) during 2016, creating the Department of Business, Energy and Industrial Strategy (BEIS).

Table 11.1: Legislation and policy context

Policy/legislation	Key provisions	Section where provision addressed
NPS EN-1	<p>Paragraphs 5.4.10 to 5.4.13 of EN-1 informs that if the proposed development could have an effect on civil and military aviation then the assessment should be considered:</p> <ul style="list-style-type: none"> Consult the Ministry of Defence (MoD), the Civil Aviation Authority (CAA) and 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. 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. Assess the cumulative effects of the project with other relevant projects in relation to aviation and defence. 	Section 11.3
NPS EN-1	<p>Paragraph 5.4.15 of EN-1 informs that if there are conflicts between the Government’s energy and transport policies and military interests in relation to the application, the decision maker should expect the relevant parties to have made appropriate efforts to work together to identify realistic and pragmatic solutions to the conflicts. In so doing, the parties should seek to protect the aims and interests of the other parties as far as possible.</p>	Section 11.3
NPS EN-1	<p>Paragraph 5.4.16 of EN-1 advises that there are statutory requirements concerning the fitting of lighting to tall structures. Where lighting is requested on a structure that goes beyond statutory requirements by any of the relevant aviation and defence consultees, the decision maker should satisfy itself of the necessity of such lighting taking into account the case put forward by the consultees. The effect of such lighting on the landscape and ecology may be a relevant consideration.</p>	Section 11.8.3
NPS EN-1	<p>Paragraph 5.4.17 of EN-1 informs that where, after reasonable</p>	Section 11.5

	<p>mitigation, operational changes, obligations and requirements have been proposed, the decision maker considers that:</p> <ul style="list-style-type: none"> A development would prevent a licensed aerodrome from maintaining its licence; The benefits of the proposed development are outweighed by the harm to aerodromes serving business, training or emergency service needs, taking into account the relevant importance and needs for such aviation infrastructure; The development would significantly impede or compromise the safe and effective use of defence assets or significantly limit military training; or The development would have an impact on the safe and efficient provision of en-route air traffic control services for civil aviation, in particular through an adverse effect on the infrastructure required to support communications, navigation or surveillance systems then consent should not be granted. 	
NPS EN-3	<p>Paragraph 2.6.187 of EN-3 informs that detailed discussions between the applicant for the Offshore Wind Farm (OWF) and the relevant consultees should have progressed as far as reasonably possible prior to the submission of an application to the decision maker. As such, appropriate mitigation should be included in any application to the decision maker, and ideally agreed between relevant parties.</p>	Section 11.5
NPS EN-3	<p>Paragraph 2.6.107 indicates that aviation and navigation lighting should be minimised to avoid attracting birds, taking into account impacts on safety.</p>	Section 11.2.3

11.2.3 A variety of civil aviation publications contain information and guidance relating to the potential effects of an offshore wind development on aviation stakeholders. The following documents inform the desk based study of potential impacts of the assessment:

- Civil Aviation Policy (CAP) 168: Licensing of Aerodromes sets out the standards required at United Kingdom (UK) licensed aerodromes relating to its management systems, operational procedures, physical characteristics, assessment and treatment of obstacles, and visual aids. (CAA, 2014);

- CAP 393: The Air Navigation Order 2016 and Regulations sets out the provisions of the Air Navigation Order as amended together with regulations made under the Order. It is prepared for those concerned with day-to-day matters relating to air navigation that require an up-to-date version of the air navigation regulations and is edited by the Legal Advisers Department of the CAA. CAP 393 also includes application of lighting to WTGs in UK territorial waters. (CAA, 2017);
- CAP 437: Standards for Offshore Helicopter Landing Areas – Guidance on Standards provides the criteria applied by the CAA in assessing helicopter landing areas for worldwide use by helicopters registered in the UK. It includes design of winching area arrangements located on WTG platforms to represent current best practice. (CAA, 2016);
- CAP 764: Policy and Guidelines on Wind Turbines provides assistance to aviation stakeholders to help understand and address wind energy related issues, thereby ensuring greater consistency in the consideration of the potential impact of proposed wind farm developments. (CAA, 2016a); and
- CAP 670: Air Traffic Services Safety Requirements sets out the safety regulatory framework and requirements associated with the provision of an air traffic service. (CAA, 2014a).

11.2.4 Other data sources and guidance considered under a desktop review of the baseline environment definition include the following:

- CAA Visual Flight Rules Chart (CAA, 2016b);
- Military Aeronautical Information Publication (Mil AIP) (MoD, 2018);
- MoD UK Low-Flying System (UKLFS) Priority Areas Map (MoD, 2011)²;
- CAA, CAP 032 UK Integrated Aeronautical Information Package (UKIAIP). The UKIAIP is the main resource for information and flight procedures at all licensed UK airports as well as airspace, en-route procedures, charts and other air navigation information (NATS, 2018); and

² Note: The MOD UKLFS Priority Maps have since been withdrawn; the detail is still considered relevant in the identification of military low flying priority areas, the priority maps are not however intended as a binding statement on MoD procedure or policy.

- Maritime and Coastguard Agency (MCA) Maritime Guidance Notes (MGN) 543: Safety of Navigation Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2016) contains information for operators and developers in formulating their emergency response plans and site safety management.

11.3 Consultation and scoping

11.3.1 Whilst not definitive, CAP 764 (CAA, 2016a) provides criteria for assessing whether any WTG development might have an impact on civil aerodrome related operations. Consideration of the proposed development's potential to impact on aviation stakeholders and receptors has been undertaken in accordance with the standard consultation distances stated in CAP 764. A number of consultees and receptors were scoped out from the consultation process as they were out-with the CAP 764 consultation zones or criteria which include:

- Within 30 km of an aerodrome with surveillance radar – although it is acknowledged that the distance quoted in CAP 764 can be greater than 30 km dependent on a number of factors at individual aerodromes, including type and coverage of radar utilised. There are no such operational aerodromes within 30 km of the proposed development; however, a Development Consent Order (DCO) has been submitted for the reopening of Manston Airport (formerly Kent International Airport), which has subsequently been withdrawn. It is understood that the applicant is planning to resubmit the DCO for Manston Airport; but, the timescales for this are unknown (National Infrastructure Planning, 2018). The former airport is presently closed and if reopened would be located inside of 30 km from the proposed development³. In addition, London Southend Airport (LSA) operates Primary Surveillance Radar (PSR) which is located outside the 30 km consultation distance suggested by the CAA and it is considered may be affected by the project.;
- Airspace coincidental with published Instrument Flight Procedures (IFP) to take into account the requirement for an aerodrome's requirement to protect its IFP's; there is presently no such airspace within the proposed development vicinity; and
- Within 17 km of a non-radar equipped licensed aerodrome with a runway of 1,100 m or more; there are no such aerodromes within 17 km of the proposed development.

³ Manston Airport is assessed as a project in planning within the Cumulative Impact Assessment at Section 11.10.21

- 11.3.2 The offshore location of the proposed development excludes consideration of other aerodrome related distances included within CAP 764.
- 11.3.3 It is necessary to take into account the aviation and air defence activities of the MoD, the type of receptor including MoD airfields both radar and non-radar equipped, MoD Air Defence Radar (ADR), Meteorological Radar and Practice & Exercise Areas (PEXAs).
- 11.3.4 The Planning Inspectorate (PINS) Scoping Opinion (PINS, 2017) states that given that the spatial extent of Thanet Extension extends beyond that of the operational Thanet Offshore Wind Farm (TOWF) in all directions that MoD and NATS infrastructure should be considered within the Preliminary Environmental Information Report (PEIR) including military PEXA. Furthermore, the Scoping Opinion welcomed the provision of an Emergency Response Co-operation Plan (ERCoP) which will be referred to as part of the ES.
- 11.3.5 VWPL has consulted a number of aviation stakeholders throughout the scoping of the proposed development and the pre-submission phase of the project, the consultation activities to date are summarised in Table 11.2.

Table 11.2: Summary of consultation relating to aviation and radar impact assessment

Date and consultation phase/ type	Consultation and key issues raised	Section where provision addressed
16/01/17 MCA Reply to Scoping Report	The MCA stated that particular attention should be given to the implications of the site size and location on SAR resources and ERCoPs.	The scope of the assessment is set out in Section 11.8.5
31/01/17 CAA Reply to Scoping Report	The CAA has reviewed the Scoping Report and in their response the CAA recommended that the Emergency Service Helicopter Support Units are consulted. In addition, the Defence Geographic Centre (DGC) should be provided with details of the proposed development for the requirement of inclusion on aeronautical charts.	Consultation with NPAS is set out in Section 11.5.16. Details of consultation with the DGC are provided in Section 11.8
10/04/17 Scoping Report Response	Email correspondence sent with details of the proposed development for comment on operations conducted by the National Police Air Service (NPAS). At the date of this document no response has been received from NPAS.	

Date and consultation phase/ type	Consultation and key issues raised	Section where provision addressed
31/01/17 NATS Reply to Scoping Report	NATS state that from a technical safeguarding aspect the proposed development does not conflict with any safeguarding criteria, accordingly NATS (En Route) Public Limited Company (NERL) has no Safeguarding objection to the proposal. NATS were consulted at the Scoping stage of the TEOWF, which presented a blade tip height of 210 m above HAT. NATS responded stating that they have no safeguarding concerns but should be kept informed if the application is revised or amended. With the considered worst-case of increased blade height up to 250 m above HAT consultation with the NATS Safeguarding Team has been completed in order to establish whether their position of no safeguarding objection can be maintained.	The scope of NATS consultation is provided in Sections 11.5.8 to 11.5.11
03/05/18	NATS confirmed that based on the information provided to them that no predicted impact to NATS En-Route infrastructure was predicted at the increased blade tip height of 250 m above HAT.	
14/02/17 MoD Reply to Scoping Report	In a reply to the Scoping Report the Defence Infrastructure Organisation (DIO) on behalf of the MoD (DIO Reference 100038701) (DIO, 2017) assessed grid references which provided the boundary outline of the proposed development in which the WTGs would be located. The DIO states that the MoD has no objection to the proposal, the principal safeguarding concern relating to physical obstruction to air traffic movements and potential to cause interference to Air Traffic Control (ATC) and ADR radar installations.	Consultation with the MOD is set out in Section 11.5.13
10/04/17 Scoping Report Response	A number of MoD PEXAs are in close proximity to the development area; confirmation was requested by email to DIO that the MoD has considered PEXA within their no objection response.	

Date and consultation phase/ type	Consultation and key issues raised	Section where provision addressed
12/04/17 Reply from MoD	The MoD confirmed that offshore safeguarding interests with regards to MoD PEXAs were considered during the initial assessment and there are no offshore safeguarding concerns.	
12/01/18 MoD Reply to Section42 Consultation	<p>The MoD accepted that the PEIR took into account military PEXAs, the use of airspace for defence purposes and potential impact to defence radar systems.</p> <p>Military low flying may be conducted over the sea beyond the mapped area of the UK Low flying system, the MoD may request that supporting associated infrastructure are fitted with aviation warning lighting where there is no mandatory requirement for installation.</p> <p>The MoD highlighted the potential for the offshore development area to contain unexploded ordnance which is considered throughout the Environmental Statement as appropriate.</p> <p>Subject to the consideration of the two issues above the MoD have no safeguarding concerns.</p>	
11/05/17 Belgium Air Navigation Service Provider S42 Consultation	Consultation was instigated with the Belgian Supervising Authority for Air Navigation Services. At the date of this document no reply has been received.	N/A
11/05/17 The French Directorate for Safety of Civil Aviation	Consultation was instigated with the French Supervising Authority for Air Navigation Services. At the date of this document no formal reply has been received.	N/A

Date and consultation phase/ type	Consultation and key issues raised	Section where provision addressed
11/05/17 The Netherlands Ministry of Infrastructure and Environment	Consultation was instigated with the Dutch Supervising Authority for Air Navigation Services. At the date of this document no formal reply has been received.	N/A
09/06/17 Offshore Helicopter Operators	<p>The following offshore helicopter operators were contacted with details of the Thanet Extension:</p> <ul style="list-style-type: none"> • Babcock International; • Bristow Helicopters; • CHC Helicopters; • NHV Helicopters; and • Unifly Helicopters. <p>At the date of this document no response was received by any of the offshore helicopter operators contacted.</p>	N/A
10/04/17 LSA Post Scoping Response	Details of the proposed development, which included a copy of the 34-WTG layout iteration, were provided to the airport for their assessment of safeguarding considerations and comment.	N/A
11/04/17 Reply from LSA	LSA stated that the operational TOWF is detectable by the LSA PSR. LSA requested the individual WTG location coordinates of the Thanet Extension in order to complete an LSA internal assessment of predicted impact. An indicative WTG layout and associated WTG coordinate information was provided to LSA on 08/06/17.	Section 11.12

Date and consultation phase/ type	Consultation and key issues raised	Section where provision addressed
17/07/17	LSA informed VWPL that a cumulative impact in conjunction with the TOWF WTGs is predicted and that the airport would be investigating the potential use of a technical radar mitigation solution such as a Non-Automatic Initiation Zone (NAIZ) to mitigate the individual and cumulative impact. The investigation will consider and confirm the most efficient use of this technology in order to minimise total area of the NAIZ presented to the LSA radar system.	
11/10/17	On review of the provided project information LSA indicated that the Thanet Extension would be predicted to be detectable by their PSR and create impact that would require technical mitigation. LSA proposed to mitigate the additional radar clutter created by the project by the introduction of a dedicated NAIZ which has previously been successfully implemented at LSA in mitigation of a number of operational windfarm developments.	
14/03/18	A meeting was held at LSA between LSA, VWPL and Osprey to discuss the impact the Thanet Extension would create to LSA aviation operations and to investigate further the use of a radar technical mitigation solution. It was agreed at the meeting that a NAIZ solution to the LSA PSR would be the most effective solution in mitigation of impact created by the detectability of the WTGs. Consultation with LSA is continuing to confirm the details of a draft Statement of Common Ground (SoCG) and Primary Radar Mitigation Scheme agreement for the use of the NAIZ solution.	

11.4 Scope and methodology

11.4.1 The potential development parameters and scenarios are defined as a design envelope presented in Volume 2, Chapter 1: Project Description (Offshore), and Volume 3, Chapter 1: Project Description (Onshore) respectively with a summary of the parameters for assessment presented in section 11.4.2. The assessment of potential impacts on civil and military aviation is based on the worst-case scenario as identified from this design envelope, and is specific to the potential impacts identified in this chapter. For the assessment, the key parameters for the worst-case scenario include consideration of the maximum number of WTGs across the largest area and the maximum blade tip height of 250 m above Highest Astronomical Tide (HAT).

- 11.4.2 During construction, and prior to commissioning, WTG blades will not be rotational. As a result the infrastructure will not be processed and presented onto control displays by aviation radar; therefore, there will be no impacts on air traffic radar during these phases. The worst-case scenario for impacts on radar services assumes that the entirety of the Red Line Boundary (RLB) for Thanet Extension will be populated with WTGs at the maximum blade tip height of 250 m above HAT. This is because the largest area of the highest WTGs will create the largest impact from an obstruction perspective, leading to a greater effect on aviation services. Any aspects of the infrastructure that are lower in height than the WTGs and within the RLB will not create an incremental effect on aviation interests
- 11.4.3 As the entire Offshore Export Cable Corridor (OECC) is below sea level, it will not have an impact on aviation interests and therefore is not assessed in this chapter.
- 11.4.4 The project will comply with the Air Navigation Order 2016 and Regulations or as otherwise instructed by the CAA, MCA or the MoD.

11.5 Identified Aviation Receptors

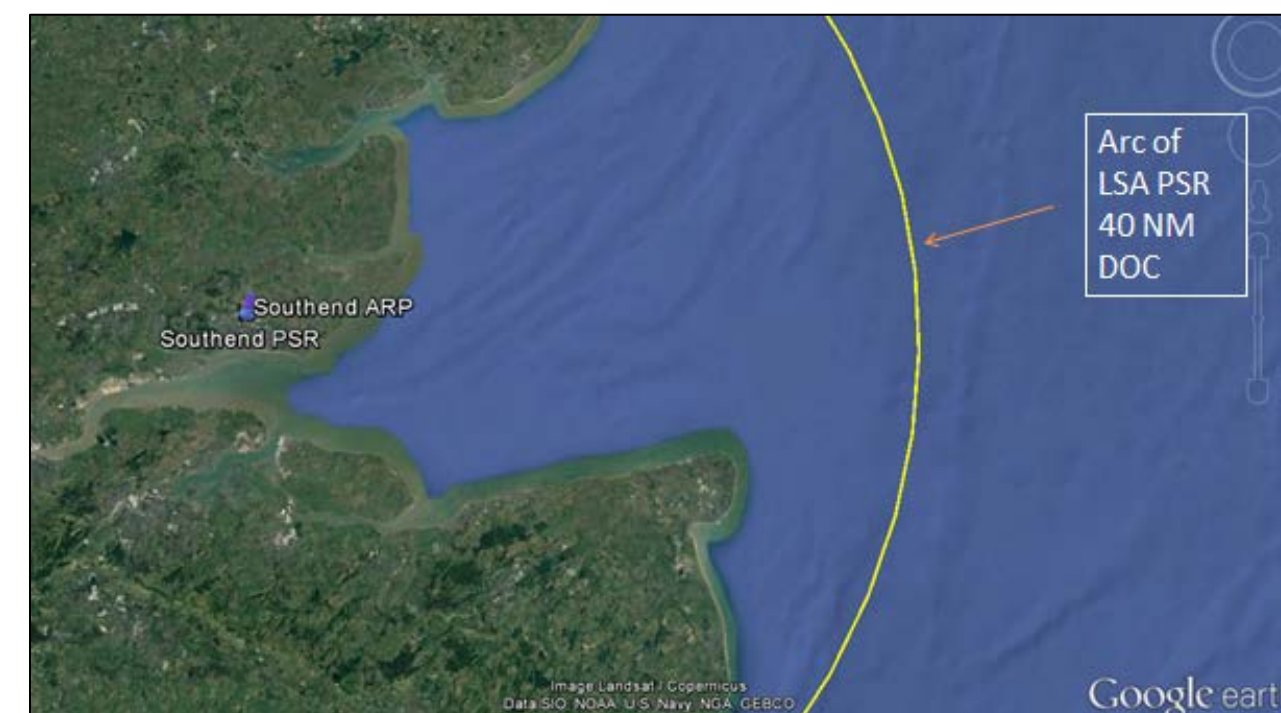
- 11.5.1 Identification of receptors in the following description of the baseline environment within the development area is based upon:
 - A desktop study utilising documentation listed in section 11.2.3;
 - Radar systems (civil and military) that could potentially detect 250 m above HAT (blade tip) WTGs within the site boundary;
 - The results of a radar line of sight analysis;
 - Consultation with relevant stakeholders using standard consultation distances stated in CAP 764 as described in section 11.2.4 and as required within the scoping response and other consultation described within Table 11.2; and
 - Consideration of key legislative and planning information.
- 11.5.2 This assessment considers all radar systems within operational range of the project, as well as military areas of operation. For each identified receptor, the physical obstruction and/ or radar effect, and then subsequently the operational impacts were considered with any other potential impacts. The operational impact considers the orientation of approach and departure flight paths, physical safeguarding of flight, airspace characteristics and flight procedures as published in the UKIAIP (NATS, 2018) and the Mil AIP (MoD, 2018).

Radar and Aviation Receptors

Airports and Airport Radar

- 11.5.3 The location of the disused Manston Airport is less than 30 km from the proposed development, the airport is presently closed. Consultation, under the Planning Act 2008 for a Nationally Significant Infrastructure Project (NSIP), prior to submission for a DCO and Compulsory Purchase Order, has taken place to commence reopening of the airport. The Manston Airport DCO application has been submitted and subsequently withdrawn, it is expected that the Manston Airport DCO will be resubmitted although timescales are unknown. The future aviation related infrastructure has yet to be defined; notwithstanding the consultation, and any DCO decision, there is potential for the proposed operational development to be detected by a Manston Airport ATC PSR system located at the airport, equally, there is potential for the proposed development to affect IFPs associated with future airport flight operations.
- 11.5.4 VWPL will enter into a SoCG with regard to the reopening of Manston Airport as required. It is expected that any redevelopment of the airport including the addition of a PSR system, the establishing of airport IFPs and safeguarded areas will take into account the TOWF and the Thanet Extension.
- 11.5.5 LSA is an international airport which has seen recent redevelopment with a new passenger terminal, control tower and extended runway. LSA provides radar based air traffic services to pilots operating to and from the airport and on request, a Lower Airspace Radar Service (LARS). LARS is available to all aircraft flying outside of Controlled Airspace (CAS) up to Flight Level (FL) 100, within the limits of radar and radio cover. The service is provided by LSA to a service radius of 25 NM. The proposed development is located 58.7 km, (31.7 NM) at its closest point from the LSA Air field Reference Point (ARP) on a bearing of 103° and is not likely to impact the provision of LARS; however, the Documented Operational Range (DOC) of the LSA PSR is 40 NM, WTG derived radar clutter will impact the provision of LSA radar based air traffic service provision.

Figure 11.1: Southend 40 NM DOC Arc.



- 11.5.6 Although outside of the CAP 764 recommended consultation distances, the proposed development will theoretically be detectable by the LSA PSR system. Potential interference from the proposed development of WTGs on the LSA PSR system during the Operation and Maintenance (O&M) phase requires that the effects on the LSA PSR are carried forward to assessment.

Civil and Military Secondary Surveillance Radar

- 11.5.7 PSR data presented to ATC is invariably supplemented by Secondary Surveillance Radar (SSR) data, which is not subject to clutter in the same way as a PSR. SSR works by interrogating aircraft transponders to obtain information on aircraft heading, height, identification and this information is displayed on an ATC Radar Data Display System (RDDS) at the aircrafts position. However, not all aircraft are equipped with an SSR transponder. The CAA suggests that WTG effects are likely to be apparent with WTG radar LOS within 10 km from an SSR facility. There are no such SSR systems within the defined distance therefore SSR systems are not carried forward to the assessment.

En Route Radar

- 11.5.8 NATS En Route – NATS operate a number of long range radars positioned to provide maximum coverage of UK airspace. Wind farm developments have the potential to impact NATS radar and operations and by association other users of radar data supplied by NATS. The NATS Safeguarding Team has replied to Scoping and the reply is included in the PINS Scoping Opinion. NATS states that NATS En Route have no objection to the proposal.

- 11.5.9 NATS were consulted at the Scoping stage of the TEOWF, which presented a blade tip height of 210 m above HAT. NATS responded stating that they have no safeguarding concerns but should be kept informed if the application is revised or amended.
- 11.5.10 The development site is within the operational range of the NATS Cromer and Debden PSR systems. Radar LOS analysis indicates that the Cromer PSR will not theoretically detect wind turbines at 250 m above HAT blade tip. Analysis cannot rule out occasional detection by the Debden PSR to three of the wind turbines at 250 m above HAT blade tip; the remaining wind turbines are unlikely to be detectable (apart from Turbine 19) at a blade tip height of 250 m above HAT although analysis cannot rule out intermittent detectability.
- 11.5.11 With the considered worst-case of a blade height up to 250 m above HAT consultation with the NATS Safeguarding Team was completed to confirm that their response to Scoping applies to the increased worst-case scenario blade tip height.
- 11.5.12 NATS responded on the 3 May 2018 stating that based on the information provided of a maximum blade tip height of 250 m above HAT there will be no predicted impact to NERL infrastructure.

Air Defence Radar

- 11.5.13 ADR – A series of fixed air defence radar feed into the Control and Reporting Centres (CRC) at RAF Boulmer and RAF Scampton, where the UK Recognised Air Picture (RAP) is produced. Radar LOS analysis at 250 m above HAT indicates that theoretically the Trimmingham ADR will not detect the wind turbines. The MoD has not raised any concerns regarding impacts on ADR, therefore ADR is not considered further in the assessment.

Met Office Radar

- 11.5.14 Meteorological Office (Met Office) weather radar – The Met Office operates a network of radar sites across the UK known as the UK weather radar network. The network comprises sixteen safeguarded sites which contribute to forecasting and precipitation monitoring, aiding not only domestic forecasting operations but also playing an important role for the MoD, NATS, aviation operators and other organisations. Guidance provided by the Met Office includes information on the distances from met radar from which a WTG could be anticipated to have an impact. The recommendation is that no WTGs should be located within five km of a met radar antenna as WTGs can cause unacceptable beam blockage. The Met Office request that if WTGs are proposed at distances greater than five km out to 20 km radius from the Met Office antenna then they are consulted as WTGs would be located within their safeguarded zones. The closest Met Office radar system is at Thurnham, approximately 60 km from the proposed development and is outside of the distances required by the Met office for consultation; therefore, Met Office weather radar is not discussed further within the assessment.

Airborne Search and Rescue (SAR)

- 11.5.15 SAR – The SAR force provides 24 hour aeronautical SAR cover in the UK. The SAR role is operated from ten strategically located bases across the UK. The bases are positioned close to SAR hotspots so that aircraft can be brought to bear as quickly and efficiently as possible. Bristow Helicopters were awarded the contract to provide SAR helicopter services for the UK in 2013 and have not responded to a consultation request. The development of Thanet Extension will lead to a change of the operating environment should a SAR operation be required within or close to the proposed development, potential impacts to SAR operations are therefore carried forward to the assessment.

National Police Helicopter Services

- 11.5.16 NPAS provide air support to the 43 police forces of England and Wales from their network of 15 bases. The NPAS supports police forces across England and Wales to keep communities safe through the provision of a constant borderless service in which the tasks posing the highest risk to communities are prioritised in line with local police and crime plans. Impact to operations conducted by NPAS is unlikely to occur offshore, NPAS have not responded to a consultation request. There may be impact created by onshore construction activities therefore operations conducted by NPAS is taken forward to the assessment.

Military PEXA

- 11.5.17 Military PEXA are sites available for training use primarily by the UK armed forces but also those of overseas nations. They can be over land or water, or both, and may involve the firing of live ammunition. The MoD has confirmed that it has no concerns with any element of the proposed development, as such; this potential impact is not carried forward to the assessment.

Offshore Oil and Gas Platforms

- 11.5.18 Offshore Oil and Gas Industry – Offshore oil and gas platforms in the North Sea are supported by a number of helicopter operators who ferry crews and supplies to and from the mainland. None of the helicopter operators, likely to operate in the region have responded to consultation. The routes taken by helicopters on such flights often follow what are known as Helicopter Main Routes (HMRs) which form a network of corridors between offshore platforms and the main support bases at Norwich Airport and Humberside Airport. A large wind farm development beneath an HMR may lead to problems, by forcing a helicopter to fly higher (and thus risk entering cloud) to avoid compromising the minimum vertical separation height above the WTGs. There are no HMRs or Oil and Gas Platforms within 90 NM of the proposed development therefore this receptor is scoped out of the assessment and is not discussed further.

UKLFS

11.5.19 The UKLFS covers the open airspace of the whole UK below 2,000 ft above ground level. Low Flying by military aircraft is permitted within established low flying areas which exclude large urban areas. The UKLFS extends 3 NM out from the coast and military aircraft do conduct low level operations over the sea. The MoD has not raised any concerns regarding impacts on the low flying network other than a possible request for the lighting of supporting associated infrastructure where there is no mandatory requirement for installation; therefore the UKLFS and military low flying operations conducted within it is scoped out of the assessment and is not considered further.

11.5.20 It has been possible to exclude the following receptors from the assessment:

- Military ATC radar systems due to the distance of Thanet Extension from such installations, the MoD did not raise any safeguarding concerns of impact to military ATC PSR systems;
- Civil and Military SSR systems due to location of the Thanet Extension;
- NATS radar sites due to the response from NATS at the Scoping stage; however, radar LOS results indicate that theoretical intermittent detectability by the Debden PSR cannot be ruled out. Consultation with NATS has been completed to establish if the NATS response to Scoping applies to wind turbines at a blade tip height of 250 m above HAT. NATS responded stating that that would be no predicted impact to NERL infrastructure at the increased blade tip height;
- ADR the MoD did not raise any safeguarding concerns of impact to ADR systems;
- Met Office Weather Radar installations due to the distance of such installations from Thanet Extension;
- Military PEXA used by the UK military and other forces;
- Offshore helicopter operations to Oil and Gas Platforms owing to the location of Thanet Extension to existing HMRs and oil and gas platforms; and
- The UKLFS the MoD may request the fitting of nonstandard aviation lighting to be fitted to supporting associated infrastructure which will mitigate any potential impact.

11.5.21 The following Table 11.3 lists the conclusion for each receptor and confirms which are carried forward to the assessment.

Table 11.3: Summary of the receptors taken forward to the assessment

Receptor	Scoped into impact assessment?
Military ATC PSR	No
Civil/ Military SSR	No
Manston Airport	Yes, as part of a cumulative assessment
London Southend Airport Radar	Yes
NATS En Route Radar	No
Air Defence Radar	No
Met Office Radar	No
Search and Rescue (Aviation)	Yes
National Police Air Service	Yes
Military Practice and Exercise Areas	No
Offshore Oil and Gas Platforms including HMRs	No
UK Military Low Flying System	No

11.6 Existing Aviation Baseline Environment

Study Area

11.6.1 The project study area depends on the maximum operating ranges of each of the radar systems scoped in to the assessment; this will vary from system to system, and even between different installations of the same system. The operational range of the radar system is dependent on the type of radar used, its function and its operational requirement: consequently, the study area can vary significantly. Where relevant, the maximum operating range of the radar system identified is used within the baseline study.

Airspace Environment

- 11.6.2 In the UK Flight Information Region (FIR) and Upper Information Region (UIR), airspace is classified as A to G in accordance with International Civil Aviation Organisation (ICAO) standards (Note: There is no airspace designated as Class B or Class F in UK airspace). Airspace Classes A to E are variants of CAS in which aircraft require an ATC clearance. Class G Airspace is airspace in which aircraft can operate autonomously without any ATC clearance required.
- 11.6.3 The classification and the controlling authority of the various airspace sectors in the region of Thanet Extension are described and categorised as follows:
- Class G Airspace bisects the Development Area; airspace on the western half up to FL 65 overhead Thanet Extension (approximately 6,500 ft above mean sea level) which rises to FL 105 to the eastern half of the Development Area; any aircraft can operate in this area of uncontrolled airspace without any requirement to be in communication with an ATC Unit. Pilots of aircraft operating in Class G airspace are ultimately responsible for seeing and avoiding other aircraft and obstructions;
 - Class A CAS established from FL 65/FL 105 up to FL 195 (Clacton Control Area (CTA)); all aircraft operating in this airspace must be in receipt of an ATC clearance and must fly strictly in accordance with that clearance. They must also be in receipt of an ATS from NATS or Military controllers located at a NATS Area Control Centre (ACC), or Military Air Defence (AD) Controllers;
 - Class C CAS established from FL 195 up to FL 245 (Southern CTA); all aircraft operating in this airspace must also be in receipt of an ATC clearance and must fly strictly in accordance with that clearance. They must also be in receipt of an ATS from NATS or Military controllers located at a NATS ACC, or Military AD Controllers; and
 - A subdivision of Class C CAS is established above FL 245; again all aircraft operating in this airspace must be in receipt of an ATC clearance and an ATS from NATS or Military controllers located at a NATS ACC, or Military AD Controllers.

11.7 Identification of Potential Impacts

Table 11.4: Maximum design scenario assessed

Potential effect	Maximum design scenario assessed	Justification
Construction		
LSA PSR System	N/A	During construction, and prior to commissioning WTG blades will not be rotational. As a result the infrastructure will not be processed and presented onto the RDDS by the radar. Therefore, there will be no impacts on radar systems during the construction phase.
NPAS	Thanet Extension WTG and construction infrastructure considered as physical obstructions to flight operations. WTGs can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk.	During the construction phase, the presence and movement of construction infrastructure may present a potential collision risk to NPAS flight operations.
SAR (Aviation)	Thanet Extension WTGs and construction infrastructure considered as physical obstructions to flight operations. WTGs can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk.	During the construction phase, the presence and movement of construction infrastructure may present a potential collision risk to SAR flight operations.
O&M		
LSA PSR System	Maximum blade tip height of 28 WTGs up to 250 m above HAT. Detectability of the proposed development WTGs by the LSA PSR system during the Operation Phase will provide a distraction to radar operators and impact their provision of ATS to aircraft.	Maximum blade tip heights have the potential to introduce detectability to radar systems. WTGs detectable by a PSR system might degrade the system by creating false targets, reduce system sensitivity and saturate the radar receiver leading to clutter potentially concealing real aircraft targets.
NPAS	Maximum blade tip height of 28 WTGs up to 250 m above HAT. Thanet Extension WTGs considered as physical obstructions to flight operations. WTGs can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk.	WTGs at a maximum blade tip height of up to 250 m above HAT are likely to cause an obstruction to NPAS and SAR operations. The worst-case scenario for impacts on NPAS Helicopter operations assumes that the entirety of the Development Area will be populated with WTG's, creating an impact from a physical obstruction perspective, leading to a potential effect on NPAS flight operations.
SAR (Aviation)	Maximum blade tip height of 28 WTGs up to 250 m above HAT. Thanet Extension WTGs considered as physical obstructions to flight operations, can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk.	WTGs at a maximum blade tip height of up to 250 m above HAT are likely to cause an obstruction to NPAS and SAR operations. The worst-case scenario for impacts on SAR Helicopter operations assumes that the entirety of the Development Area will be populated with WTG's, creating an impact from a physical obstruction perspective, leading to an effect on SAR flight operations.
Decommissioning		
LSA PSR System	Adverse scenario as per Operation phase until all WTG are decommissioned and have stopped rotation.	Any agreed mitigation will be maintained until the last WTG is non-operational and incapable of rotation in the decommissioning phase.
NPAS	Thanet Extension WTGs and decommissioning infrastructure considered as physical obstructions to flight operations, can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk.	During the decommissioning phase, the presence and movement of decommissioning infrastructure may present a potential collision risk to NPAS flight operations.
SAR (Aviation)	Thanet Extension WTGs and decommissioning infrastructure considered as physical obstructions to flight operations, can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk.	During the decommissioning phase, the presence and movement of decommissioning infrastructure may present a potential collision risk to SAR flight operations.
Cumulative effects		
LSA PSR System	All other WTG developments (offshore and onshore) that are unmitigated and within operational range and within radar line of sight to the PSR may lead to a cumulative effect on the system.	All WTG that do not benefit from any operational or technical mitigation to resolve effects would combine to cumulatively affect the system.
NPAS	Cumulative WTGs considered as physical obstructions to flight operations.	WTG can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk.
SAR (Aviation)	Cumulative WTGs considered as physical obstructions to flight operations.	WTG can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk

11.8 Embedded Mitigation

General

11.8.1 It is good practice to notify aviation stakeholders of the location and dimension of any wind energy development and the associated construction activities. Information regarding construction should be passed to the DGC and the GAAC at least 6 weeks in advance of the erection of the first WTG and to follow up on the day with a confirmation that the activity has taken place. The data should include:

- Location, height (of all structures over 150 ft), date of erection, date of removal and lighting type (none, infra-red or lighting brightness);
- Local aerodromes identified during consultation should be notified, particularly any police helicopter or air ambulance unit; and
- Information will be circulated to relevant military and aviation stakeholders including NATS, MoD, and RenewableUK. Information on potential aviation obstructions will be promulgated within the UKIAIP and notified to the DGC for marking on aeronautical related charts and documentation.

11.8.2 Appropriate information about the site construction and any associated lighting (where applicable), for example the height and temporary location of construction cranes, should be provided to the UK Aeronautical Information Service (NATS AIS) for promulgation throughout the UKIAIP (NATS, 2018).

Physical Obstruction

11.8.3 A range of embedded mitigation measures to minimise environmental effects would apply to the development of Thanet Extension. These will comply with current guidelines and be agreed with the appropriate stakeholders, as follows:

- CAP 393: The Air Navigation Order 2016 and Regulations Article 223 (CAA, 2017) sets out the mandatory requirements for lighting of offshore WTGs:
 - Legislation requires the fitting of obstacle lighting on offshore WTGs with a height of 60 m or more above the level of the sea at the HAT;
 - Where four or more WTG are located together in the same group, with the permission of the CAA only those on the periphery of the group need to be fitted with at least one medium intensity steady red light positioned as close as reasonably practicable to the top of the fixed structure, this is typically translated to mean the fitting of lights on the top of the supporting structure (the nacelle) rather than the blade tips; and

- The obstruction light or lights must be fitted to show when displayed in all directions without interruption. The requirements of the angle of the plane, of the beam and peak intensity levels are defined within CAP 393 (CAA, 2017).

- CAP 437: Standards for Offshore Helicopter Landing Areas (CAA, 2016) sets out a procedure to indicate to a helicopter operator that the WTG blades and nacelle are safely secured in position prior to helicopter hoist operations commencing:

- CAP 437 states that this is best achieved through the provision of a helihoist status light located on the nacelle of the WTG within the pilot's field of view, which is capable of being operated remotely and from the platform itself or from within the nacelle;
- A steady green light is displayed to indicate to the pilot that the WTG blades and nacelle are secure and it is safe to operate. A flashing green light is displayed to indicate that the WTG is in a state of preparation to accept hoist operations or, when displayed during hoist operations, that parameters are moving out of limits. When the light is extinguished this indicates to the operator that it is not safe to conduct helicopter hoist operations; and
- Obstruction lighting in the vicinity of the winching area that has a potential to cause glare or dazzle to the pilot or to a helicopter hoist operations crew member should be switched off prior to, and during, helicopter hoist operations.

11.8.4 Appropriate liaison will be completed to ensure information on the construction of the wind farm is circulated in a Notice to Airmen (NOTAM) and other appropriate media.

SAR Flight Operations

11.8.5 An ERCoP will be in place for the construction, O&M and decommissioning phases of Thanet Extension.

- The ERCoP will be completed initially in discussion between the developer and the MCA, Search and Rescue and Navigation Safety Branches. Detailed completion of the plan will then be in cooperation with the Coastguard Operations Centre (CGOC) responsible for maritime emergency response in the area of Thanet Extension. The ERCoP will then be submitted to and approved by the MCA (MCA, 2016); and
- The ERCoP or alternative document will detail specific locations, marking and lighting of the WTGs. Furthermore, the arrangements for liaison between the wind farm developer and HM Coastguard in the event of an emergency response will be detailed, together with an explanation of procedures and processes carried out at the Thanet Extension control centre to shut down the WTGs and the procedures for the CGOC to request this.

11.9 Assessment criteria and assignment of significance

Sensitivity Criteria

11.9.1 The sensitivity of a receptor is subjective in aviation terms and therefore difficult to quantify. Whereas an ADR system would be an obvious high value and high sensitivity receptor (due to its role in UK national security), the sensitivity of a local aerodrome can also often be rated high if PINS considers the receptor to be a significant asset to the local area. The identified aviation receptors in this analysis are considered to have a high sensitivity to effects, given their safety critical function.

Table 11.5 Definition of terms relating to the sensitivity of aviation receptors

Receptor sensitivity/ importance	Description/ reason
Very high	Receptor provides a service which is of critical importance to the local, regional or national economy, and/ or the receptor is highly vulnerable to impacts that may arise from the project, and/ or recoverability is long-term or not possible.
High	Receptor provides a service which is of high value to the local, regional or national economy, and/ or the receptor is generally vulnerable to impacts that may arise from the project, and/ or recoverability is slow and/ or costly.
Medium	Receptor provides a service which is of moderate value to the local, regional or national economy, and/ or the receptor is somewhat vulnerable to impacts that may arise from the project, and/ or has moderate to high levels of recoverability.
Low	Receptor provides a service which is of low value to the local, regional or national economy, and/ or the receptor is not generally vulnerable to impacts that may arise from the project, and/ or has high recoverability.
Negligible	Receptor provides a service which is of negligible value to the local, regional or national economy, and/ or the receptor is not vulnerable to impacts that may arise from the project, and/ or has high recoverability.

Magnitude Criteria

11.9.2 The magnitude criterion of the potential effects on aviation and radar receptors is assessed using the method and terminology given in Table 11.6.

Table 11.6: Magnitude of Aviation Impact Definitions

Magnitude	Definition
High	Total loss of ability to carry on activities and/ or impact is of extended physical extent and/ or long-term duration (i.e. total life of project and/ or frequency of repetition is continuous and/ or effect is not reversible for project).
Medium	Loss or alteration to significant portions of key components of current activity and/ or physical extent of impact is moderate and/ or medium term duration (i.e. O&M period) and/ or frequency of repetition is medium to continuous and/ or effect is not reversible for project phase.
Low	Minor shift away from baseline, leading to a reduction in level of activity that may be undertaken and/ or physical extent of impact is low and/ or short to medium term duration (i.e. construction period) and/ or frequency of repetition is low to continuous and/ or effect is not reversible for project phase.
Negligible	Very slight change from baseline condition and/ or physical extent of impact is negligible and/ or short-term duration (i.e. less than two years) and/ or frequency of repetition is negligible to continuous and/ or effect is reversible.
No change	No change from baseline conditions.

Significance Criteria

11.9.3 Significance criteria for aviation impacts are typically difficult to establish; they are not strictly based on the sensitivity of the receptor or magnitude of change but on whether the industry regulations for safe obstacle avoidance or radar separation (from radar clutter) can be maintained in the presence of WTGs.

11.9.4 Any anticipated impact upon aviation stakeholders which results in restricted operations is considered to be of significance. The following approach identified in Table 11.7 is used and summarises the assessment of significance, with any effect of moderate or major significance reflecting a significant effect in respect of the EIA Regulations.

11.9.5 The determined effects have been informed by the results of the desktop assessment, professional knowledge and opinion and additional consultation with reference to the existing evidence base regarding the effects of WTGs on aviation receptors.

Table 11.7 Significance of potential effects

		Sensitivity			
		High	Medium	Low	Negligible
Negative Magnitude	High	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Minor	Minor	Negligible	Negligible
Beneficial Magnitude	Negligible	Minor	Minor	Negligible	Negligible
	Low	Moderate	Minor	Minor	Negligible
	Medium	Major	Moderate	Minor	Negligible
	High	Major	Major	Moderate	Minor

Note: shaded cells are defined as significant effects in respect of the EIA.

11.10 Aviation Receptors Assessment of Significance

LSA PSR System

Impacts in the Construction Phase

11.10.1 During construction, and prior to commissioning WTG blades will not be rotational. Radar reflections from the static infrastructure will not be processed as moving targets and subsequently presented onto a RDDS by the radar. Construction infrastructure will similarly not affect the radar system. The sensitivity of the receptor is Medium. The magnitude of impacts is assessed as Negligible; therefore, the impacts would be of **Minor** adverse significance on radar systems during the commissioning phase, which is not significant in Environmental Impact Assessment (EIA) terms.

Impacts in the O&M Phase

11.10.2 The presence of operational WTGs will interfere with the LSA PSR system. WTG clutter appearing on a radar display can affect the safe provision of ATS by LSA as it can mask unidentified aircraft from the air traffic controller and/ or prevent accurate identification of aircraft under control or the identification/ tracking of conflicting aircraft. The sensitivity of the receptor is Medium. The magnitude of impacts is assessed as Medium; therefore, the impacts would be of **Moderate** adverse significance on the provision of ATS by LSA ATC which is significant in EIA terms.

Impacts in the Decommissioning Phase

11.10.3 Any agreed mitigation will be maintained until the last WTG is non-operational in the decommissioning phase and has stopped rotation, or as agreed with the aviation stakeholder. Once all WTGs are stationary the decommissioning infrastructure is not predicted to affect the radar system or be processed and presented as clutter on the RDDS by the radar. The sensitivity of the receptor is Medium. The magnitude of impacts is assessed as Negligible; therefore, the impacts would be of **Minor** adverse significance on radar systems during the decommissioning phase, which is not significant in EIA terms.

NPAS

Impacts in the Construction Phase

11.10.4 The infrastructure required in the construction of Thanet Extension may present a physical obstruction and effect operations of NPAS. Only a small number of NPAS helicopter bases which have a coastal location are likely to operate over the sea. The sensitivity of the receptor is Medium; however, the magnitude of effect is considered as Low and the impact is assessed as of **Minor** adverse significance on operations, subject to the completion of standard notification to aviation authorities as detailed in section 11.8, which is not significant in EIA terms.

Impacts in the O&M Phase

11.10.5 Pilots are obliged to plan their flying activities in advance and to be familiar with any en-route obstacles they may encounter; however, during flight, weather conditions or operational requirements may necessitate route adjustments. Pilots are ultimately responsible for seeing and avoiding obstructions in the Class G Airspace surrounding the development and its WTGs. Despite this, it is acknowledged that there is an increased risk in low visibility conditions where pilots could experience a delay in visually acquiring WTGs, thus resulting in a potentially unsafe situation. The sensitivity of the receptor is assessed as Medium. The magnitude of impacts is assessed as Low; therefore, the impacts would be of **Minor** adverse significance, which is not significant in EIA terms.

Impact in the Decommissioning Phase

11.10.6 The infrastructure required in the process of decommissioning may present a physical obstruction and affect NPAS flight operations. The sensitivity of the receptor is Medium; however, the magnitude of effect is considered as Low, and the impact is assessed as of **Minor** adverse significance subject to the completion of standard notification to aviation authorities as detailed in section 11.12, which is not significant in EIA terms.

SAR (Aviation)*Impacts in the Construction Phase*

11.10.7 The infrastructure required in the construction of the Site may present a physical obstruction and affect helicopter SAR operations. The sensitivity of the receptor is Medium; however, the magnitude of effect is considered as Low and the impact is assessed as of **Minor** adverse significance, which is not significant in EIA terms, subject to the completion of standard notification to aviation authorities as detailed in section 11.12.

Impacts in the O&M Phase

11.10.8 SAR operations could be affected by the presence of the Site. When on an operational mission, SAR aircraft are not constrained by the normal rules of the air and operate in accordance with their Aircraft Operator Certificate (AOC). This allows them total flexibility to manoeuvre using the pilot's best judgement. The pilot is therefore not prevented from operating in proximity to Thanet Extension.

11.10.9 While the SAR operations are of extreme importance, the sensitivity of the helicopter can be considered to be Medium due to their adaptability to the environment in which they operate as they are not constrained by the normal rules of the air. The sensitivity of the receptor is concluded as Medium, the magnitude of effect is considered as Low, and is therefore assessed to of **Minor** adverse significance, which is not significant in EIA terms.

Impacts in the Decommissioning Phase

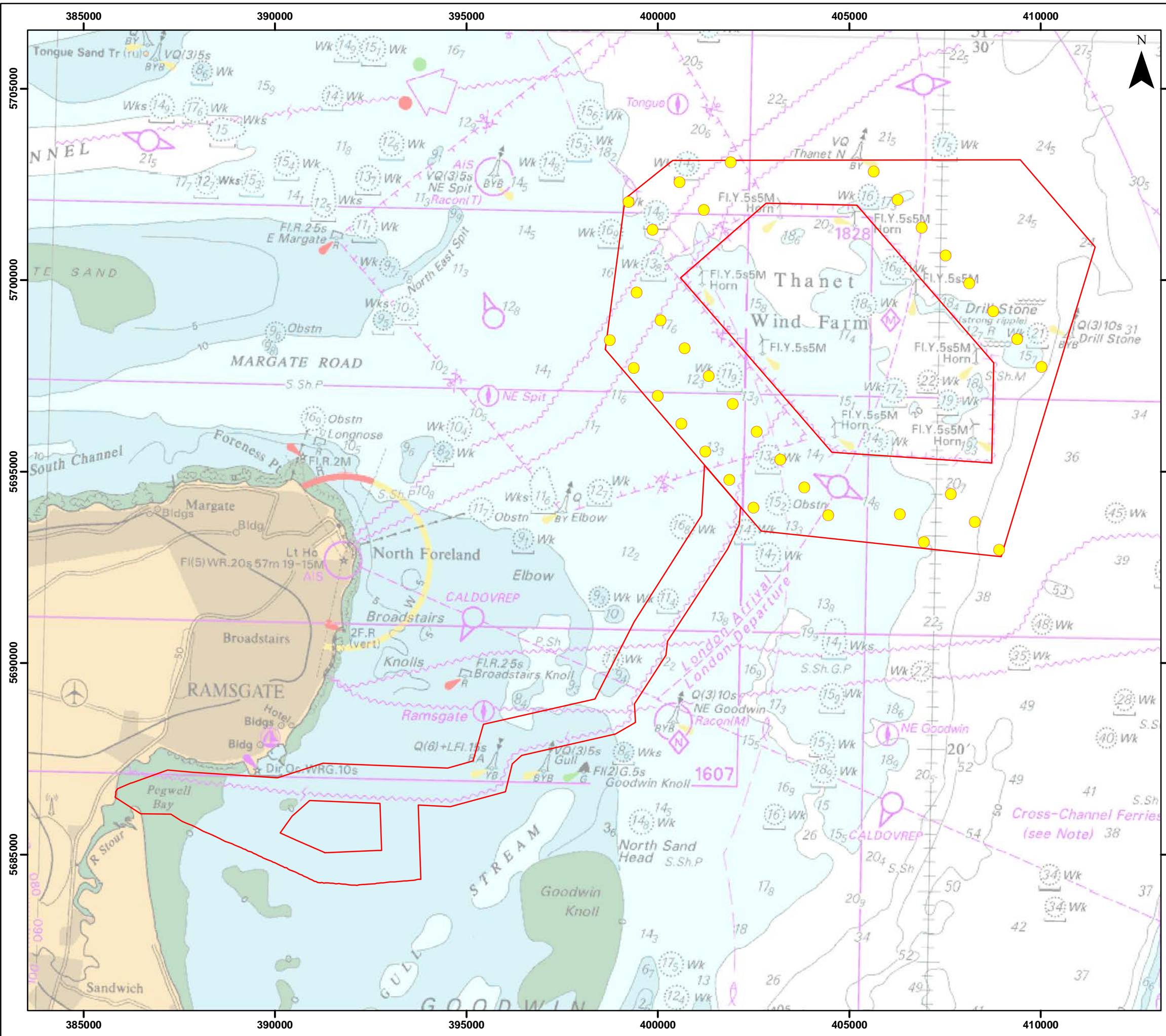
11.10.10 The infrastructure required in the process of decommissioning may present a physical obstruction and affect SAR operations. The sensitivity of the receptor is assessed as Medium; the magnitude is assessed as Low therefore, an impact of **Minor** adverse significance on operations is expected, which is not significant in EIA terms, subject to the completion of standard notification to aviation authorities as detailed in section 11.12.

THANET EXTENSION OFFSHORE WIND FARM

Figure 11.2
Thanet Extension Offshore Boundary.

Legend

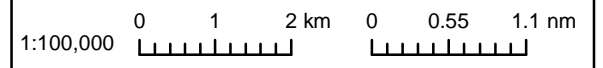
- Offshore Red Line Boundary
- Indicative Turbine Layout



Datum: ETRS 1989
Projection: UTM31N



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© Crown Copyright, 2016. All rights reserved License No. EK001-412013. NOT TO BE USED FOR NAVIGATION



Drg No	TEOW_Avi_Radar_Dev_bound
Rev	0.1 Date 29/05/2018
By	PN Layout N/A

Figure 11.2

11.11 Environmental assessment: cumulative effects

- 11.11.1 Cumulative effects refer to effects upon receptors arising from Thanet Extension when considered alongside other proposed developments and activities and any other reasonably foreseeable project(s) proposals. In this context the term projects is considered to refer to any project with comparable effects and is not limited to offshore wind projects.
- 11.11.2 The approach to cumulative assessment for Thanet Extension takes into account the Cumulative Impact Assessment (CIA) Guidelines issued by RenewableUK in June 2013, together with comments made in response to other renewable energy developments within the Southern North Sea, and the (PINS) 'Advice Note 9: Rochdale Approach'. The renewable energy developments that have informed this approach have been agreed within the Scoping Opinion, the suggested tiers, and the CIA conducted for Thanet Extension.
- 11.11.3 In assessing the potential cumulative impact(s) for Thanet Extension, it is important to bear in mind that some projects, predominantly those 'proposed' or identified in development plans etc. may or may not actually be taken forward. There is thus a need to build in some consideration of certainty (or uncertainty) with respect to the potential impacts which might arise from such proposals. For example, relevant projects/ plans that are already under construction are likely to contribute to cumulative impact with Thanet Extension (providing effect or spatial pathways exist), whereas projects/ plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors.
- 11.11.4 For this reason, all relevant projects/ plans considered cumulatively alongside Thanet Extension have been allocated into 'Tiers', reflecting their current stage within the planning and development process. This allows the CIA to present several future development scenarios, each with a differing potential for being ultimately built out. Appropriate weight may therefore be given to each scenario (Tier) in the decision making process when considering the potential cumulative impact associated with Thanet Extension (e.g. it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2).
- 11.11.5 The projects and plans selected as relevant to the assessment of impacts to Aviation and Radar are based upon an initial screening exercise undertaken on a long list. Each project, plan or activity has been considered and scoped in or out on the basis of effect–receptor pathway, data confidence and the temporal and spatial scales involved. For the purposes of assessing the impact of Thanet Extension on Aviation and Radar in the region, the cumulative impact technical note forming the CIA Technical Annex (Volume 4, Annex 3-3) of this ES screens in the following projects and activities.

- 11.11.6 The proposed Tier structure that is intended to ensure that there is a clear understanding of the level of confidence in the cumulative assessments provided in the Thanet Extension ES is as follows:

Tier 1

- 11.11.7 Thanet Extension considered alongside other projects/plans currently under construction and/ or those consented but not yet implemented, and/ or those submitted but not yet determined where data confidence for the projects falling within this category is high.

- 11.11.8 Built and operational projects will be included within the CIA where they have not been included within the environmental characterisation survey, i.e. they were not operational when baseline surveys were undertaken, and/ or any residual impact may not have yet fed through to and been captured in estimates of 'baseline' conditions or there is an ongoing effect.

Tier 2

- 11.11.9 All projects included in Tier 1 plus other projects/ plans consented but not yet implemented and/ or submitted applications not yet determined where data confidence for the projects falling into this category is medium.

Tier 3

- 11.11.10 The above plus projects on relevant plans and programmes (the PINS Programme of Projects and Marine Management Organisation (MMO) 'Marine Case Management System' being the source most relevant for this assessment). Specifically, all projects where the developer has advised PINS in writing that they intend to submit an application in the future were considered. This includes, for example, East Anglia 1 North and East Anglia 2 for which scoping reports have been submitted and data availability is limited and/ or data confidence is low.

- 11.11.11 RiverOak Strategic Partners (RSP) is proposing to reopen the former Manston Airport and have consulted on the proposal. The Manston Airport DCO was received by the Planning Inspectorate on 10th April 2018 and was subsequently withdrawn; it is considered that an application will be resubmitted although timescales are unknown. A reopened Manston Airport would have the potential to interact with Thanet Extension in two ways. First operational WTGs have the potential to impact any new CNS equipment and secondly the obstruction created by Thanet Extension may impact any IFPs used to approach, and depart any runways at Manston Airport. The operating flight paths and types and number of radar and CNS systems to be commissioned and operated at a reopened Manston Airport are unknown and therefore it is difficult to assess accurately any cumulative impact.

11.11.12 To the extent that Manston Airport is reopened it is expected that it must be capable of being operated safely with the existing environment including the operational wind farms in close proximity to it, particularly TOWF, Kentish Flats Offshore Wind Farm and Kentish Flats Extension (KFE). Given that proposals for Thanet Extension are within the public domain, and the close proximity of these proposed WTGs to the operational TOWF, it is similarly expected that Manston Airport safe operations would also be considered in relation to the proposed Thanet Extension.

11.11.13 VWPL and RiverOak have engaged with regard to these issues and it has been discussed that any redevelopment of Manston Airport, including the addition of a PSR system, the development of airport IFPs and safeguarded areas would take into account the TOWF and the Thanet Extension.

11.11.14 The proximity of Thanet Extension, together with consented OWF included in Table 11.8 below, indicates there is potential for cumulative radar impact to the LSA PSR. Due to the consultation responses received with regard to radar systems, only the LSA radar has potential to be affected by Thanet Extension. The DOC of the LSA PSR is to a range of 40 NM radius from the location of the radar (Southend Airport); therefore it follows that other developments outside of the 40 NM range would not be detectable and therefore unable to create a radar cumulative effect.

11.11.15 The specific projects scoped into this CIA, and the tiers into which they have been allocated are presented in Table 11.8 below. The operational projects included within the table are included due to their completion/ commission subsequent to the data collection process for Thanet Extension and as such not included within the baseline characterisation.

Table 11.8: Projects for cumulative assessment

Development type	Project	Status	Data confidence assessment/ phase	Tier
Offshore Wind Farm	Thanet (array only)	Round 2 - Built	High – Consented by applicant.	Tier 1
Offshore Wind Farm	Combined Kentish Flats and KFE	Round 2 -Built	High - Third party project details published in the public domain.	Tier 1
Offshore Wind Farm	London Array	Round 2 -Built	High - Third party project details published in the public domain.	Tier 1
Offshore Wind Farm	Gunfleet Sands I, II & Demo	Round 2 -Built	High - Third party project details published in the public domain.	Tier 1
Airport	Manston Airport	DCO Submitted and later withdrawn, although it is anticipated that an application will be resubmitted	Medium – Third party project details not yet made available	Tier 2??

11.11.16 By virtue of its distance from centres of aviation activity, Thanet Extension produces fewer direct adverse effects on aviation operators than do onshore developments in close proximity. In the case of Thanet Extension cumulative aviation impacts are confined to potential impact to a reopened Manston Airport, the effect of WTG detection on the LSA PSR and the introduction of a remote obstacle environment. LSA have considered the possibility that their PSR would be affected as a result of detectable WTGs within the coverage of their radar system. It is assumed that those wind farms, that have been consented, or are operational, have (or will have) technical mitigation in place (if required), which will mitigate effects to any relevant radar systems. Currently, for any other radar systems for which impacts are not mitigated it is assumed that any effects are deemed acceptable; however, the addition of unmitigated clutter created by the Thanet Extension could create a cumulative effect where existing detectable WTGs are currently considered manageable. Table 11.9 below provides a description of aviation cumulative impacts specific to Thanet Extension.

Table 11.9: Potential Cumulative Impacts

Impact	Scenario	Justification
Cumulative impact of multiple WTG’s impacting any new CNS equipment and IFPs established at a reopened Manston Airport.	Operational WTGs have the potential to impact any new CNS equipment and the obstruction created by the WTGs of Thanet Extension may impact any IFPs used to approach, and depart runways at Manston Airport.	It is expected that Manston Airport infrastructure including any new CNS equipment and the establishment of IFPs would be capable of being operated safely within the existing environment. It is similarly expected that in establishing a safe airport operating environment at a reopened airport, TOWF and Thanet Extension would be similarly considered and could be secured by a protective provision contract or agreement that both projects could co-exist therefore no cumulative effect would be apparent.
Cumulative impact of multiple WTG’s detectable by the LSA PSR system.	Additional WTGs detectable by the LSA PSR would present additional false targets and is likely to create a reduction in system sensitivity and possible saturation of the radar systems receiver.	‘False’ targets might potentially conceal real aircraft targets under control and also those targets that might be conflicting to aircraft under the provision of an ATS by LSA ATC, leading to potential reduction of safety margins. Other unmitigated radar detectable developments within the operational range of the LSA PSR may create adverse technical impact; the appearance of multiple ‘false’ targets created by WTGs in close proximity can lead to degradation of radar tracking ability leading to a significant cumulative effect. The LSA PSR has a DOC of 40 NM. Therefore, the potential for cumulative effect is limited to those developments, within 40 NM of the PSR, which unmitigated could create a cumulative impact.
Cumulative number of WTG presenting a physical obstruction impact.	Additional cumulative WTGs considered as physical obstructions to NPAS and SAR flight operations.	WTG can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk. Aircraft captains have the responsibility for the safety of their aircraft and are required to avoid any obstacle by legislated minimum distances. There would be no cumulative physical obstruction effects from the establishment of Thanet Extension.

11.12 Inter-relationships

11.12.1 Inter-relationships are considered to be the impacts and associated effects of different aspects of the proposal on the same receptor. These are considered to be:

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the project (construction, operation and decommissioning) to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three key project stages; and
- Receptor led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects might be short-term, temporary or transient effects, or incorporate longer term effects.

11.12.2 The assessment of potential effects upon Aviation and Radar receptors has been made for Thanet Extension. No inter-related effects were identified.

11.13 Mitigation

LSA

11.13.1 The results of the radar line of sight analysis confirm that the LSA PSR would detect the WTGs of the Thanet Extension similar to the existing TOWF. LSA have stated that the Thanet Extension can be mitigated through the use of a NAIZ software function

11.13.2 A NAIZ prevents the radar from automatically creating tracks from any (false) targets that originate within a NAIZ. In creating a NAIZ around WTGs, none of the WTG generated target returns are processed, thereby significantly reducing the possibility of false tracks. Tracks that have been formed from returns originating outside the NAIZ would still be tracked if it enters the defined NAIZ (e.g. an aircraft transiting over the NAIZ area).

11.13.3 LSA currently use a NAIZ function to technically mitigate onshore WTGs that affect their provision of ATS to flight operations. Consultation with LSA is ongoing; to confirm the details of the mitigation and the provision of commercial contracts, in order to establish the NAIZ technology to mitigate the Thanet Extension. LSA are completing an internal evaluation based on individual WTG coordinates, the evaluation will confirm the most efficient use of NAIZ mitigation technology to remove the impact created by the Thanet Extension.

11.13.4 The implementation of a NAIZ software function to the LSA PSR system is considered an appropriate mitigation strategy by LSA and is agreed by VWPL, with the mitigation in place the impact is assessed as Negligible.

NPAS

11.13.5 Embedded mitigation as discussed in section 11.8 relating to the documenting/ charting and lighting of Thanet Extension would provide appropriate mitigation for NPAS flight operations.

SAR (Aviation)

11.13.6 An ERCoP or alternative document would be compiled in conjunction with the MCA and would be in place for the construction, operation and decommissioning phases of the project. The ERCoP would detail specific marking and lighting of the WTGs. The SAR helicopter bases would be supplied with an accurate Project GPS position and Development parameters.

11.13.7 Embedded mitigation as discussed in section 11.8 relating to the documenting/ charting and lighting of Thanet Extension would provide appropriate mitigation for SAR flight operations.

11.14 Transboundary statement

11.14.1 There are no operational non-UK airports within close proximity of the extension site and the location of Thanet Extension. Consultation with Belgian, French and Dutch authorities has been completed with no response; therefore, the site is expected to result in a Negligible impact.

11.15 Summary of effects

Table 11.10: Summary of predicted impacts of Thanet Extension

Description of impact	Impact	Impact Significance	Additional mitigation measures	Residual impact
Construction				
WTG and the infrastructure required in the construction of the Site may present a physical obstruction and effect helicopter SAR and NPAS operations	Obstructions can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk	Minor adverse	Not Required	Minor adverse
Operation				
The presence of WTGs has the potential to interfere with the LSA PSR system.	WTG clutter appearing on a radar display can affect the safe provision of ATS by LSA as it can mask unidentified aircraft from the air traffic controller and/ or prevent accurate identification of aircraft under control or the identification/ tracking of conflicting aircraft.	Moderate adverse	The implementation of a NAIZ software function to the LSA PSR system is considered an appropriate mitigation strategy by LSA and is agreed by VWPL. Consultation with LSA has been undertaken, details are at Table 11.2	Negligible
WTG considered as physical obstructions to flight operations.	WTG can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk for NPAS and SAR flight operations.	Minor adverse	Not Required.	Minor adverse
Decommissioning				
WTG and the infrastructure required in the decommissioning of the Site may present a physical obstruction and effect helicopter SAR and NPAS operations	Obstructions can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased collision risk	Minor adverse	Not Required	Negligible
The presence of WTGs has the potential to interfere with the LSA PSR system.	WTG clutter appearing on a radar display can affect the safe provision of ATS by LSA as it can mask unidentified aircraft from the air traffic controller and/ or prevent accurate identification of aircraft under control or the identification/ tracking of conflicting aircraft.	Moderate adverse	Technical mitigation for the impacts of WTG detectability by the LSA PSR system will remain operational until the last WTG is decommissioned and incapable of rotation.	Negligible
Cumulative effects				
All other WTG developments (offshore and onshore) that are unmitigated and within operational range and within radar line of sight to the LSA PSR may lead to a cumulative effect on the system.	All WTG that do not benefit from any operational or technical mitigation to resolve effects would combine to cumulatively affect the LSA PSR system.	Moderate adverse	The implementation of a NAIZ software function to the LSA PSR system is considered an appropriate mitigation strategy. The residual impact of the cumulative impact is reduced to negligible once mitigation has been put in place.	Negligible

11.16 References

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