

ACP-2018-003

Vattenfall Norfolk Vanguard and Norfolk Boreas Wind Farms

CAP 2190

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Civil Aviation Authority
Aviation House
Beehive Ring Road
Crawley
West Sussex
RH6 0YR

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Enquiries regarding the content of this publication should be addressed to:

Airspace ATMs & Aerodromes, Safety and Airspace Regulation Group, Aviation House, Gatwick Airport
South, West Sussex RH6 0YR

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Chapter 1

Executive Summary

Objective of the Proposal

- 1.1. Vattenfall Wind Power Ltd has permission to develop 2 offshore wind farms, known as Norfolk Vanguard and Norfolk Boreas Wind Farms, which will be located approximately 47km from the Norfolk to the East of Norwich. The proposed site covers an area of approximately 1300km² and will contain up to 360 wind turbine generators (WTGs), each just under 350m tall (to maximum blade tip height). The project is defined as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008 and will have significant environmental benefits (~6MT per annum CO2 benefits) from each of the farms generating 1.8 Giga Watts (GW) of power.
- 1.2. It is a well understood consequence of the construction of WTGs that significant interference can be caused to Primary Surveillance Radar (PSR) displays, with the creation and display of 'false' radar returns known as clutter. Where large wind farms are built containing a large number of WTGs, the quantity of clutter can also lead to saturation of the processing capability of the PSR. NATS (NERL) initially objected to the Vattenfall Wind Farm proposal based upon the impact it would have on the Cromer PSR. As a result, conditions were applied to the planning consent granted¹, these conditions direct that no WTGs may be erected until a PSR mitigation strategy is agreed and that no blades may be fitted to WTGs until the agreed mitigation strategy has been implemented and in operation.
- 1.3. In this Airspace Change Proposal (ACP), Vattenfall propose the application of Radar Range Azimuth Gating (RAG), more commonly known as radar blanking, to the Cromer PSR covering the area that will be affected by the WTGs. This will prevent the display of potentially erroneous radar returns, or clutter, caused by the WTGs. However, the blanking will also remove the display of radar returns from aircraft within the same area and this ACP seeks to introduce a Transponder Mandatory Zone (TMZ) covering the blanked area from SFC to FL100. This will allow aircraft to be displayed to Air Traffic Control (ATC) using Secondary Surveillance Radar (SSR) returns.
- 1.4. A map illustrating the proposed blanked area and TMZ is at Appendix A.

¹ Annex 8 Para 3.4 of the [Stage 3 Consultation Strategy](#)

Summary of the Decision Made

- 1.5. As a result of the Vattenfall Norfolk Vanguard and Norfolk Boreas Wind Farm developments the CAA recognises the requirement to introduce radar blanking to the Cromer PSR and **approves the proposed implementation of a TMZ** to enable traffic in the area to remain displayed to ATC through the use of SSR returns. The design of the proposed TMZ is to be as described and illustrated in the document 'Vattenfall Airspace Change Proposal v1.1' published to the CAA Airspace Change Portal on 4 March 2021.
- 1.6. The CAA has set 3 conditions against its approval of this proposal. The first requires that, prior to implementation of this proposal, Vattenfall must provide an Aeronautical Information Publication (AIP) draft update for approval before submission for the relevant Aeronautical Information Regulation and Control (AIRAC) update cycle. The second and third conditions require Vattenfall to have reviewed the current LOAs (between Anglia Radar/Swanwick Mil and Swanwick Mil/Amsterdam ATC) to ensure they are up to date (including details of this TMZ) and to have the required International Civil Aviation Organisation (ICAO) High Seas Coordination Letter approved and implemented before the TMZ is implemented.

Next Steps

- 1.7. Implementation of the proposed airspace will be notified through a single AIRAC cycle (target is AIRAC 13/2021) and will become effective on 30 December 2021.
- 1.8. However, the AIRAC cycle and effective date is subject to change and will be reviewed against the build schedule. This review will ensure that the TMZ is implemented at a suitable point in time, rather than be implemented several years before the construction of the windfarms is due to commence (expected to begin 2024/25).
- 1.9. The CAA's Post-Implementation Review (PIR)² of the changes approved by the CAA in this decision will commence at least one year after the implementation date. It is a condition of the CAA's approval that the Sponsor captures and collates data throughout the year following implementation of the airspace change, which will be used to inform the PIR. In due course, the Sponsor will be advised of the specific data sets to be captured, the analysis that will be required and the dates by which this information must be provided.

² PIR is the 7th Stage of the CAA's airspace change proposal process as described in [CAP1616](#).

Chapter 2

Decision Process and Analysis

Chronology of the Proposal Process

Statement of Need and Assessment Meeting (Stage 1, Step 1A)

- 2.1 Vattenfall submitted a DAP1916 Statement of Need (SoN) in August 2018. An Assessment Meeting (AM) was then held on 4 October 2018 at which Vattenfall outlined the Current Situation, the Issue that had been identified and the Action that had been taken. The Sponsor provided a draft timeline for the ACP with evidence to support the proposed scaling and shortened timeline to decision. The timeline presented was subsequently reviewed in November 2019 and a new timeline published on CAA ACP Portal (the Portal) in December 2019.
- 2.2 The CAA determined that the proposal was in scope of the CAP1616 ACP process and stated the provisional level of airspace change attributable to the proposal as Level 2B. Minutes of the AM, together with a copy of the slide presentation that was used in the meeting, were published to the Portal.

Development of the Design Principles (Stage 1, Step 1B)

- 2.3 Vattenfall used a set of appropriate Design Principles (DPs), inspired by those used for similar ACPs under the CAP1616 process, to begin their targeted engagement and development conversation with the stakeholder group. The stakeholder group included key aviation stakeholders, identified as NATS, Luchtverkeersleiding Nederland (LVNV), the Ministry of Defence (MoD) and Norwich Airport, and a number of representative groups including offshore helicopter operators, members of the National Air Traffic Management Advisor Committee (NATMAC) and General Aviation (GA) bodies. The original DPs were amended in line with stakeholder feedback and a finalised submission was presented to the CAA and uploaded to the Portal.

Define Gateway – 24 April 2019

- 2.4 The Define Gateway was held on 24 April 2020. The CAA were content that the DPs had been developed through appropriate and effective engagement with stakeholders and that the DPs reflected the requirements of CAP1616.

Options Development and Appraisal (Stage 2, Step 2A & 2B)

- 2.5 Vattenfall contended that, in order to mitigate the effect of WTGs on the Cromer PSR, radar blanking and the subsequent introduction of a TMZ was the only viable airspace option. To this end, they developed 4 Options, each of which was a

variation of the TMZ design. A 'Do Nothing' Option was also included and all 5 were considered and assessed against the DPs. Options B & D were shown to meet the DPs, but Option D: 'TMZ Aligned to a Smoothed/Rounded-off Boundary Plus 2nm Buffer' was chosen as the preferred Option as its simpler geometric shape was seen as advantageous for reasons of utility by the aviation community (Human Factors).

Develop & Assess Gateway – 28 August 2020

- 2.6 The Develop & Assess Gateway was held on 28 August 2020. The CAA accepted that Vattenfall had adhered to the guidance provided in CAP1616 and followed the required process in order to develop suitable Options through engagement with stakeholders. The CAA also agreed the rationale used to identify the preferred Option to be taken forward in isolation to Stage 3.

Consult Gateway (Stage 3, Step 3B) – 30 October 2020

- 2.7 During the Consult Gateway held on 30 October 2020, the CAA accepted the rationale presented by Vattenfall that the consultation period be shortened from 12 weeks to 10 weeks. The justification provided by Vattenfall highlighted the Level 2B scaling of the ACP, the location of the proposed TMZ approximately 47kms offshore which considerably limited interested parties and stakeholders, and the work that had been undertaken with stakeholders to prepare them for a shortened consultation period.

CAA Assessment and Decision in Respect of Consultation

- 2.8 The CAA is satisfied that Vattenfall applied the fundamental principles of effective consultation before, during and after the consultation period, as follows: targeting the right audience; communicating in a way that suits them; giving them the tools to make informed, valuable contributions to the development of the proposals. In addition, the CAA considers that Vattenfall conducted its consultation in accordance with the requirements of CAP1616 and having taken into account the Government's Consultation Principles: Guidance, and the Secretary of State's Air Navigation Guidance.

Proposal Update and Submission (Stage 4, Step 4A & 4B) – 12 February 2021

- 2.9 Vattenfall submitted Step 4A (Update Design) and Step 4B (Submit Airspace Change Proposal) documentation to the CAA on 12 February 2021; these documents were also uploaded to the Portal.
- 2.10 The Step 4A Update Design submission considered the elements of Consultation feedback that had the potential to impact the proposed Option and discounted the requirement for any change to its design.

- 2.11 The formal Step 4B Airspace Change Proposal submission presented the design proposal known as Option D, 'TMZ Aligned to a Smoothed/Rounded-off Boundary Plus 2nm Buffer', to be considered for implementation as an appropriate mitigation for the impact of the proposed Vattenfall Norfolk Vanguard and Norfolk Boreas Wind Farms WTGs on the Cromer PSR. Revised submissions of the ACP were presented to the CAA and published to the Portal on 26 February 2021 and 4 March 2021 as v1.0 and v1.1 respectively. These amendments addressed some minor reference mistakes that were identified during the CAA document check procedure. The amendments also incorporated evidence from key stakeholders following requests from the CAA for clarification on the effect of the proposed TMZ on traffic operating along Helicopter Main Routes (HMRs) 445, 446, 447 and 450 and evidence from the MoD and LVNL on who will act as the Controlling Authority for the TMZ (particularly the small segment of the TMZ that is in the Amsterdam Flight Information Region (FIR)).

CAA Analysis of the Material Provided

- 2.12 As a record of the analysis of the Step 4B Airspace Change Proposal formal submission provided by, or on behalf of, Vattenfall and relating to this ACP, the CAA has produced the following documentation which will be uploaded to the Portal:
- i) 20210623-Consultation Assessment
 - ii) 20210623-Final Options Appraisal Assessment
 - iii) 20210623-Environmental Assessment
 - iv) 20210623-Operational Assessment

Chapter 3

CAA Consideration of Factors Material to the Decision

Explanation of the CAA's Statutory Duties

- 3.1 The CAA's statutory duties are laid down in Section 70 of the Transport Act 2000. In addition, Commission Implementing Regulation (EU) No 923/2012 dated 26 September 2012 (Standardised European Rules of the Air (SERA)) as retained (and amended in UK domestic law) under the European Union (withdrawal) Act 2018 and the CAA Policy for Radio Mandatory Zones & Transponder Mandatory Zones dated 14 August 2015 are applicable to this proposal.

Conclusions in Respect of Safety

- 3.2 The CAA's primary duty is to maintain a high standard of safety in the provision of air traffic services and this takes priority over all other duties.³ In its consideration of this proposal, the CAA is satisfied that the implementation of the proposed TMZ maintains a high standard of safety:
- i) The proposed TMZ does not alter the classification of the airspace.
 - ii) The proposed blanking of the Cromer PSR will introduce effective suppression of all primary radar clutter associated with the WTGs.
 - iii) The proposed TMZ will ensure that all air traffic operating within the area affected by the blanking applied to the Cromer PSR will remain displayed to Air Traffic Control Operators (ATCOs) through the use of SSR returns.
 - iv) The addition of a 2nm buffer surrounding the blanked area provides ATCOs sufficient time to assimilate and react to an infringement of the TMZ by an aircraft not appropriately equipped with a transponder.

Conclusions in Respect of Efficient Use of Airspace

- 3.3 The CAA is required to secure the most efficient use of the airspace consistent with the safe operation of aircraft and the expeditious flow of air traffic.⁴ In its consideration of this proposal, the CAA is satisfied that the implementation of the proposed TMZ will have a minimal impact on the efficient use of this airspace while maintaining the safe operation of this airspace:

³ Transport Act 2000, Section 70(1).

⁴ Transport Act 2000, Section 70 (2) (a).

- i) The proposed TMZ will not impact or alter the current operation of the vast majority of users of the airspace within the TMZ.
- ii) Analysis of operations conducted within the vicinity of the proposed TMZ indicate that far less than 1% (0.15%) of air movements are completed by aircraft not appropriately equipped to operate within the proposed TMZ.
- iii) The CAA considers the impact to users not equipped to enter the TMZ is proportionate and acceptable in order to maintain the safe operation of the airspace following the construction of the WTGs.
- iv) The CAA considers the access arrangements for aircraft not transponder equipped to be acceptable to allow those aircraft to enter and transit the TMZ with prior permission from the Controlling Authority.

Conclusions in Respect of Environmental Objectives

3.4 The CAA is required to take into account the 2014 Guidance to the CAA on Environmental Objectives provided by the Secretary of State. In addition, Vattenfall Norfolk Vanguard and Norfolk Boreas Wind Farms was scaled as a Level 2B ACP and CAP1616 provides additional guidance regarding the specific environmental considerations⁵. However, CAP1616⁶ allows a change sponsor to propose a departure from the process for reasons of proportionality. In this case, Vattenfall contested that the extremely small numbers of aircraft not appropriately equipped to transit the TMZ, and therefore required to fly additional track miles to deviate around the TMZ, were insufficient to provide meaningful output from the WebTAG system. In addition, Vattenfall contested that the extremely small numbers of air movements potentially impacted made the additional effort and expenditure required to provide more detailed analysis disproportionate as the impact would be negligible. This was accepted by the CAA at the Consult Gateway in consideration of the Full Options Appraisal.

Conclusions in Respect of Aircraft Operators and Owners

3.5 The CAA is required to take account of the requirements of operators and owners of all classes of aircraft⁷. In its consideration of this proposal the CAA accepts that the vast majority of air traffic will be unaffected by the introduction of the proposed TMZ but also recognises that a small element of the aviation community operates aircraft that are not fitted with transponders. However, the CAA accepts that, as suggested by Vattenfall, only a very small proportion of that community would wish to operate in the area covered by the proposed TMZ; such aircraft are more

⁵ CAP1616 Appendix B, page 163: Summary of environmental assessment requirements for Level 2 proposals.

⁶ CAP1616 page 25, para 77.

⁷ Transport Act 2000, Section 70 (2) (b).

usually operated within gliding distance of the shore for safety reasons, which would locate them well away from the TMZ. However, provision has been made to allow access to non-transponder equipped aircraft to enter and transit the TMZ with prior permission from the Controlling Authority.

Conclusions in Respect of the Interests of Any Other Person

- 3.6 The CAA is required to take account of the interests of any person, other than an aircraft operator or owner, in relation to the use of any particular piece of airspace or the use of airspace in general. Regarding this proposal, which will be implemented approximately 47kms offshore, the CAA considers that its impact will not be discernible to other persons.

Conclusions in Respect of the Integrated Operation of ATS

- 3.7 The CAA is required to facilitate the integrated operation of air traffic services provided by, or on behalf of, the Armed Forces of the Crown and other air traffic services⁸. In this respect, the CAA is satisfied that the implementation of the proposed TMZ will have no effect on the integrated operation of ATS.

Conclusions in Respect of the Interests of National Security

- 3.8 The CAA is required to take account of the impact that any airspace change proposal may have upon matters of National Security⁹. In this respect, the CAA is satisfied that the implementation of the proposed TMZ will have no effect on National Security.

Conclusions in Respect of International Obligations

- 3.9 The CAA is required to take account of any international obligations entered into by the UK and notified by the Secretary of State. The CAA is satisfied that the proposed implementation of this TMZ has no impact on international obligations.

⁸ Transport Act 2000, Section 70 (2) (e).

⁹ Transport Act 2000, Section 70 (2) (f).

Chapter 4

CAA's Regulatory Decision

General Summary

- 4.1 The Vattenfall Norfolk Vanguard and Norfolk Boreas Wind Farms development is considered a NSIP by the UK Government's Business, Energy and Industrial Strategy Department and its construction will lead to significant, strategic environmental benefit for the UK. This ACP seeks to implement a considered and well-designed airspace solution to satisfy the conditions of the planning consent, which will allow the wind farm development to progress, and to enable continued safe air operations in the affected area.
- 4.2 The proposed use of radar blanking on the Cromer PSR, along with the implementation of an associated TMZ, is entirely appropriate and accords with similar solutions at other wind farms in the UK. The proposed TMZ design is considered the optimum size and shape to meet the safety and operational requirements of the associated Cromer PSR blanking, whilst having minimal impact on other airspace users.

Decision

- 4.3 In considering the formal submission by Vattenfall with respect to ACP-2018-003: Vattenfall Norfolk Vanguard and Norfolk Boreas Wind Farms the CAA recognises the requirement to mitigate the negative impact of the planned WTGs through the use of radar blanking to the Cromer PSR and **APPROVES the implementation of a TMZ** to enable traffic operating in the area to remain displayed to ATC through the use of SSR returns.
- 4.4 The design of the proposed TMZ is to be as described and illustrated in the document 'Vattenfall Airspace Change Proposal v1.1' published to the CAA Airspace Change Portal on 4 March 2021.

Conditions and Recommendations

- 4.5 The planning consent granted to the Vattenfall Norfolk Vanguard and Norfolk Boreas Wind Farm developments requires a PSR mitigation strategy to be agreed prior to construction of WTGs and stipulates that the mitigation is to be implemented and in operation prior to erection of the WTGs. Vattenfall indicate that construction is due to commence in 2024/25.
- i) **Condition 1:** Prior to the implementation of the TMZ described, considered and approved within this proposal, Vattenfall must confirm the target AIRAC and provide the up-to-date Draft AIP amendment to the CAA

for approval. The TMZ must be implemented and operational before the erection of any WTGs.

- 4.6 It is noted that the Cromer PSR mitigation and implementation of the TMZ sought by Vattenfall is subject to several LOAs and there is a requirement for these to be updated and for a High Seas Coordination Letter to be in place.
- i) **Condition 2:** Prior to the implementation of the TMZ described, considered and approved within this proposal, Vattenfall must ensure all relevant LOAs are updated and approved by the CAA.
 - ii) **Condition 3:** Prior to the implementation of the TMZ described, considered and approved within this proposal, Vattenfall must ensure that a High Seas Coordination Letter is submitted to and approved by ICAO.

Implementation

- 4.7 The proposed TMZ is approved for implementation through the AIRAC. However, the implementation is subject to Condition 1 in section 4.5 of this document. Therefore, the exact AIRAC date is still to be confirmed.

Post Implementation Review

- 4.8 In accordance with current CAA standard practice, as detailed in CAP1616, a minimum of 12 months after implementation the airspace change will be reviewed to evaluate whether the anticipated impacts and benefits stated are as expected. To enable a thorough and rigorous review, the Sponsor will be required to gather relevant data during the post-implementation period.
- i) **Requirement 1:** Vattenfall must make suitable arrangements for collection of the following data for use during the Post-Implementation Review:
 - (1) Details of occasions that requests for access to, or transit of, the TMZ by non-transponder equipped aircraft is denied.
 - (2) Details of occasions a non-transponder equipped aircraft infringes the TMZ, remaining within the 2nm buffer area (PSR return remains displayed).
 - (a) Details regarding the efficacy of any attempted controller intervention.
 - (3) Details of occasions a non-transponder equipped aircraft infringes the TMZ and buffer, resulting in it entering the blanked area (PSR return no longer displayed to a controller).
 - (a) Details regarding the efficacy of any attempted controller intervention.

- ii) **Requirement 2:** Vattenfall must make suitable arrangements to ensure that related stakeholder and consultee observations (enquiry/complaint data) are collated and available for presentation to the CAA on request and/or during the Post-Implementation Review.

APPENDIX A

Map Showing Proposed TMZ

