

Norfolk Vanguard and Boreas Wind Farms

Vanguard and Boreas Wind Farms

Gateway documentation:

Stage 3 Consult

3A: Consultation Document V1.0

23rd November 2020 to 31st January 2021 (10 weeks)



Authorship

Action	Role	Date
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Reviewed Approved	Manager, Airspace Change Compliance and Delivery NATS	September 2020
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References

Ref No	Description	Hyperlinks
1	Norfolk Vanguard and Norfolk Boreas Wind Farms CAA web page –progress through CAP1616	link
2	Stage 1 Assessment Meeting Presentation	link
3	Stage 1 Assessment Meeting Minutes	link
4	Stage 1 Design Principles	link
5	Stage 2 Design Options	link
6	Stage 2 Design Principle Evaluation	link
7	Stage 2 Options Appraisal (Initial) & Safety Assessment	link
8	Stage 3 Full Options Appraisal	Link
9	Stage 3 Consultation Strategy	Link

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1. Introduction

- 1.1 This document forms part of the document set required in accordance with the requirements of the CAP1616 airspace change process.
- 1.2 For previous stages of the airspace change process, including the statement of need, design principles and design options, please see the [CAA Webpage](#) detailing the progress of this proposal, and the reference table above.
- 1.3 Our stakeholder audience are considered to be aviation experts; therefore, we will use aviation technical language in this consultation document, in English only.

2. Overview: Scope and Purpose of this Consultation

- 2.1 This Airspace Change Proposal (ACP) is sponsored by us, Vattenfall Wind Power Limited, referred to in this consultation document as the Developer or the Sponsor.
- 2.2 We intend to develop two offshore wind farms, 47 kilometres (km) (25.4 Nautical Miles (NM)) off the Norfolk coast (Figure 1). These wind farms will each contain up to 180 Wind turbine Generators (WTGs), covering a combined area of approximately 1300 km².

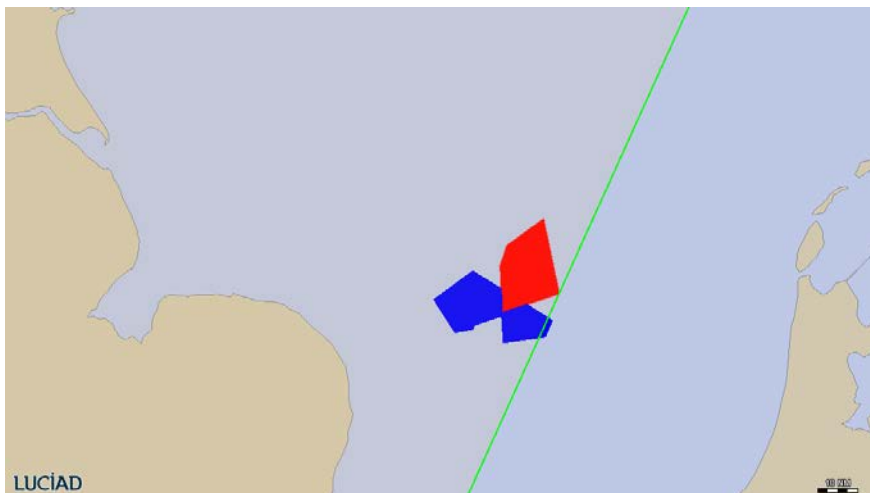


Figure 1: Location of Norfolk Vanguard (Blue), Norfolk Boreas (Red) wind farm developments and FIR boundary (Green line).

- 2.3 WTGs are known to interfere with Air Traffic Control (ATC) radars. This development has been identified as having the potential to impact the Cromer Primary Surveillance Radar (PSR). As such, a Primary Radar Mitigation Scheme (PRMS) is required to be in place prior to commencing construction of the wind farms.
- 2.4 Previous offshore wind farm developments have explored a variety of options to mitigate the risk, with Range Azimuth Gating (RAG) (known commonly as radar blanking) implemented in previous developments, alongside a Transponder Mandatory Zone (TMZ).
- 2.5 A TMZ is defined: "...airspace of defined dimensions wherein the carriage and operation of pressure-altitude reporting transponders is mandatory."¹
- 2.6 The PRMS which is proposed to be implemented is Cromer PSR RAG blanking of the entire area covered by the Norfolk Vanguard and Boreas developments, more commonly known as radar

¹ SARG Policy for Radio Mandatory Zones and Transponder Mandatory Zones. August 2015

blanking, with a complementary TMZ which will incorporate a 2 NM buffer zone around the RAG blanked region.

- 2.7 We are consulting in relation to the establishment of the new TMZ, within Class G airspace.
- 2.8 The purpose of this consultation document is to provide information to you, our stakeholders, to allow you to respond effectively. This document can be read in conjunction with the Full Options Appraisal (Ref 8) and Consultation Strategy (Ref 9) which outlines the consultation approach.
- 2.9 We are seeking feedback from stakeholders who may be affected by the proposal. Primarily this is likely to be users of the airspace and other aviation stakeholders. Nonetheless we welcome feedback from any interested parties.
- 2.10 You have the opportunity to provide relevant feedback, which may conflict with that of other stakeholders. After the consultation has ended, we will consider all the feedback received and then produce the final proposed design, which may differ from that described in this document.
- 2.11 You have a crucial role in providing relevant and timely feedback to us, the Sponsor, in the form of your views and opinions on the impact this proposal might have on your operation, and any mitigations you might suggest, supported by evidence where possible.
- 2.12 We contend that the 10- week duration of this consultation is proportionate for this project. This is due to the keenly targeted list of stakeholders, the limited number of aviation stakeholders affected by the proposed change, the geographical location of the proposed wind farms and the proposed mitigation solution as well as the lack of potential impact on non-aviation local stakeholders. This is further justified by the pre-consultation engagement activities we have undertaken with our stakeholders and the relative simplicity of the proposal itself.

3. Background – Why do we need a TMZ?

- 3.1 In July 2020, the Secretary of State for Business, Energy and Industrial Strategy (BEIS) granted planning consent to Vattenfall for the construction and operation of the Norfolk Vanguard Wind farm. A consent decision for the Norfolk Boreas development is expected to be reached in 2021.
- 3.2 Up to 360 WTGs are planned for the two adjacent developments. Construction of the wind farms is programmed to start in 2024/25, with commissioning soon after.
- 3.3 NERL (NATS En Route Ltd) initially objected to the Vattenfall developments, on the basis that the WTGs contained within these developments would be detected by the ATC PSR at Cromer. This would cause unacceptable interference through the desensitization of the radar and the creation of 'false' radar returns (known as radar 'clutter'). This could affect an Air Traffic Control Officers (ATCOs) ability to identify primary radar aircraft returns and increases the risk of the ATCO not detecting a conflict between aircraft. Large numbers of turbines could also lead to saturation of the radar processing systems.
- 3.4 Planning was granted, subject to Planning Consent Condition 34 (see below), due to the impact of this development on the Cromer PSR.

Condition 34	Cromer Primary Surveillance Radar	No erection of any wind turbine generator forming part of the authorised development may commence until the Secretary of State having consulted with NATS has confirmed satisfaction in writing that appropriate mitigation will be implemented and maintained for the lifetime of the authorised development and that arrangements have been put in place with NATS to ensure that the approved mitigation is implemented and in operation prior to erection of the wind turbine generators.
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- 3.5 The proposed PRMS is to deploy RAG on the Cromer PSR to remove all primary radar returns from the WTGs from the wind farms. However, RAG will also remove primary radar returns from aircraft within the blanked area. To mitigate this removal of primary radar coverage, it will be necessary to establish a TMZ over the wind farms so that only aircraft equipped with a transponder, and hence detectable to ATC via secondary radar, will be permitted to overfly the wind farms (RAG blanked area) after obtaining a clearance from ATC.
- 3.6 A TMZ is an airspace structure which must progress through the CAA's airspace change process known as [CAP1616](#).

4. Stakeholders

- 4.1 Stakeholders are third-party groups or individuals interested in an ACP.
- 4.2 We do not plan to target organisations whose primary interest is environmental, such as noise or local air quality – there would be no change in aviation impact as the proposed changes are all at least 43.3 km/23.4 NM offshore.
- 4.3 The Consultation Strategy document (Ref 9) details all the stakeholders we have targeted. See Annex B.
- 4.4 For details on how to respond to this consultation see Section 10 on page 9.

5. Justification and Objectives

- 5.1 The justification for this airspace change is to enable the construction of these wind farms.
- 5.2 The wind farms are expected to provide an environmental benefit by saving c.6.3 million tonnes (MT) CO₂ emissions per annum, which will only be realised if the airspace change is implemented and the wind farms are constructed and operated.
- 5.3 The objectives of this ACP are to:
- Ensure aviation safety, with no increased risk to an ATCOs ability to detect aircraft conflicts; and
 - Meet the planning consent condition for these wind farms development to enable their construction and realise significant environmental benefits by the generation of renewable energy (see para 3.4).

6. Options for Consultation

- 6.1 After the previous development stage of the airspace change process (Stage 2, Refs 5 and 6), two formal options remained for progression:

- Do nothing (Section 7) – we do not prefer this option because the planning consent condition would not be met, construction could not start, and the benefits of renewable energy would not be realised.
- TMZ Option D, **Simplified polygon TMZ “rubber banded”² around the proposed wind farm locations extended to include a 2 NM buffer** (Section 8) – we prefer this option because it would allow construction of the wind farms, enabling the subsequent environmental benefits.

7. Current Airspace – The “do nothing” Option

7.1 The current airspace/ do nothing option is shown in Figure 2.

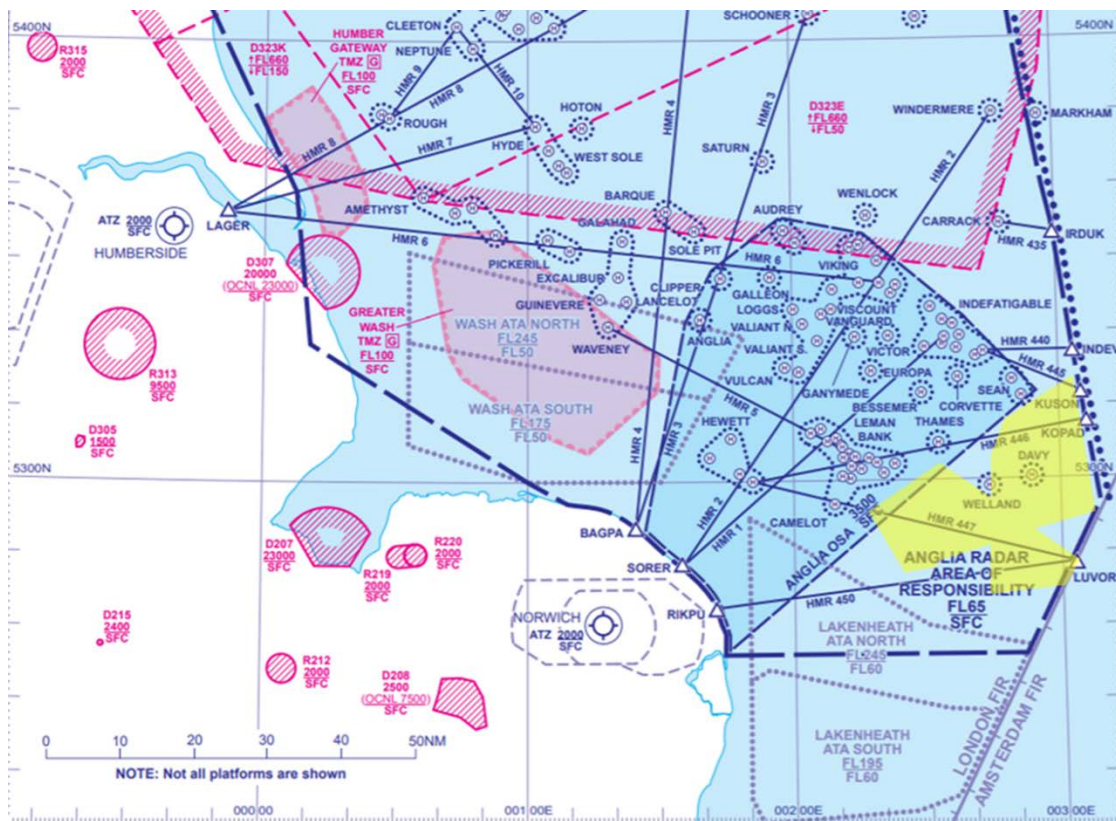


Figure 2: Current airspace within the North Sea (UK AIP ENR 6.25), Norfolk Vanguard and Boreas developments are shown in yellow.

7.2 This option does not meet the planning consent condition and as such the Norfolk Vanguard and Norfolk Boreas developments would not be constructed and the subsequent environmental benefits will not be realised. It is included for comparison purposes only.

8. Proposed Airspace – TMZ Option D

8.1 The proposed airspace, TMZ Option D, is shown in Figure 3 and is our preferred option. The RAG blanked region is the same as the wind farms (yellow shape) and the proposed TMZ, Surface to FL100, is shown as a red outline.

² Rubber banded- Shortest perimeter fully enclosing the wind farm developments. It is used to smooth an irregular perimeter.

- 8.2 The coordinates for the proposed TMZ perimeter are listed in Annex C.
- 8.3 The proposed wind farms are located within UK and Dutch airspace in the North Sea. At their closest the wind farms will be 47 km from the Norfolk coastline. UK Air Traffic Service (ATS) routes L17 (Base FL175), L60 (Base FL175), L602 (Base FL175) and L603 (Base FL175) transit the wind farms location but will not be affected by this change as the vertical extent of the TMZ will reach FL100.
- 8.4 It is expected that the TMZ will extend into Dutch airspace. The Dutch Air Navigation Service Provider (ANSP) have indicated that they will accept a TMZ solution.



Figure 3: Proposed Vattenfall TMZ (Red Outline). Norfolk Vanguard and Boreas Developments (RAG blanked area) are shown in yellow.

- 8.5 This area is serviced by the Cromer PSR. NERL has assessed that the WTGs within the Norfolk Vanguard and Norfolk Boreas developments would be detected by the Cromer PSR causing unacceptable interference and clutter on the ATCOs radar. Following this objection, planning consent has been granted for the Norfolk Vanguard wind farm, subject to Planning Consent Condition 34, stating that a PRMS for the Cromer PSR is required prior to construction of the wind farm.
- 8.6 A consent decision for the Norfolk Boreas development is expected to be reached in 2021.
- 8.7 The Vertical extent of the TMZ will be from the surface to FL100. Above FL100 all civilian aircraft must operate a transponder (UK AIP ENR 1.6, para 2.2.2.1).
- 8.8 The proposed TMZ shape is simpler than the inner RAG blanked region. It has been created by rubber banding the RAG blanked region and incorporating a 2 NM buffer zone. The buffer is intended to give ATC warning (and hence time to react) should an infringement of the TMZ occur:
 - An example non-transponding infringing aircraft travelling at 200 knots will take c.36 seconds from crossing the proposed TMZ perpendicular to the boundary, until it enters the blanked region (and disappears). An ATCO monitoring the radar would have that time to notice the aircraft has infringed the TMZ and take appropriate action.

- 8.9 The simplified TMZ boundary shape is advantageous for the simplicity of display to pilots on in-cockpit electronic flight information system (EFIS) displays and ATCOs on radar displays. A simple shape is preferable from a Human Factors perspective. This reasoning has been used in previous wind farm TMZ mitigations to design the outer TMZ boundary and found to be effective.
- 8.10 In line with the SARG policy on TMZs, *"a pilot wishing to operate in a TMZ without serviceable transponder equipment may be granted access subject to specific arrangements agreed with the TMZ Controlling Authority."*¹

9. Predicted Scale of Impacts and Benefits of TMZ Option D

9.1 For full details see Stage 3 Full Options Appraisal (Ref 8).

Subject	Scale of Impact/Benefit	Evidence
Noise	None	No change to flightpaths over inhabited area at low altitudes
Visual Intrusion	None	No change to flightpaths over inhabited area at low altitudes
Local Air Quality	None	No change to flightpaths over inhabited area at low altitudes
Aviation fuel/CO ₂ emissions	Negligible	Evidence presented in the Full Options Appraisal (Ref 8) contends that <1% of GA flights might theoretically be affected, and thus may need to reroute to avoid the TMZ if unable to comply with conditions.
Air Traffic Control airspace capacity	None	No expected change to Air Traffic Control Sector Workload
Aviation Safety	Enhanced	Experience from previous wind farm developments has demonstrated that the implementation of radar blanking coupled with an associated TMZ provides effective and safe mitigation against radar issues associated with wind farms. The risk of infringements is reduced due to the simpler TMZ perimeter design.

Table 1: Summary of impacts and benefits of TMZ Option D.

10. How to Respond to this Consultation

- 10.1 The period for this consultation is 23rd November 2020 to 31st January 2021, a period of 10 weeks.
- 10.2 This consultation is being conducted by the developer. The Civil Aviation Authority's (CAAs) Safety and Airspace Regulation Group (SARG) will oversee the consultation and ensure that it adheres to the CAP1616 process and government guidelines.
- 10.3 As most people have internet access, this consultation is primarily being conducted via the CAA online Consultation Portal which can be accessed through the [airspace change portal](#). All stakeholders previously engaged, listed in Annex B, have been emailed a link to the [airspace change portal](#).

- 10.4 The consultation is not limited to the stakeholders listed in Annex B – anyone may respond via the [airspace change portal](#).
- 10.5 We will not pre-print copies of the consultation document. However, requests for a paper copy received by post will be accommodated. We will supply a paper copy of the consultation document under the following conditions:
- Requests are to be sent in writing to:
 - NATS Airspace Consultation
 - Ref: Vattenfall
 - Mailbox 11
 - 4000 Parkway
 - Whitely
 - Fareham
 - Hampshire
 - PO15 7FL.
 - Requests must be received at least fourteen days before the consultation closes and include a stamped (Large Letter) self-addressed envelope.
 - We cannot accept responsibility for errors in the postal service where requests do not reach us, or our return post does not reach the recipient.
 - Due to the ongoing Covid-19 pandemic and in line with government guidance staff are currently working from home and there is disruption to company mail deliveries. As such forwarding of any postal responses to the appropriate staff cannot be guaranteed. Hence it is strongly recommended for submissions to be made online.
- 10.6 Written responses are to be received by 31st January 2021. Should the stakeholder require acknowledgment of receipt, we encourage the use of a recorded delivery service, or to enclose a self-addressed envelope stamped with adequate postage for a receipt slip – proof of postage is not proof of delivery and we will be otherwise unable to acknowledge receipt of responses.
- 10.7 We will input all paper responses manually into the CAA online consultation portal.
- 10.8 When submitting your feedback, you will be asked to provide the following:
- Your name and your role if you are responding on behalf of an organisation
 - Your contact details (email, and/ or postal address)
 - A feedback category: SUPPORT NO COMMENT AMBIVALENT OBJECT
 - Additional information including your reasons for choosing the category above, your feedback on the impacts of the PRMS on your operation, how often those impacts might occur, any suggested mitigations or design changes you think should be considered, and any unintended consequences of the PRMS.
- 10.9 We have provided a feedback form suitable for handwritten postal responses – see Annex D on page 16. This asks the same questions as the online survey. Online responses will have the option to upload a supporting document – if you wish to supply more information on paper by post, please attach it to your completed feedback form.

- 10.10 All responses will be analysed, with any common themes extracted and summarised. We will actively monitor the consultation portal and will formally respond back to any queries³, uploading a Frequently Asked Questions (FAQs) document if necessary.
- 10.11 Please respond even if this proposal does not affect your operation. This is still useful information.

11. Reversion Statement

- 11.1 Vattenfall considers the proposed option to be the ‘do minimum’ option. A ‘Do nothing’ option would not provide mitigation against radar clutter. Should the proposal be approved and implemented, it would not be possible to revert to the pre-implementation state without affecting NATS ATC operations. The proposed changes would be considered permanent unless a cost-effective alternative mitigation scheme is developed and proposed.
- 11.2 In the unlikely event that there are unexpected issues caused by this proposal, then short notice changes could be made via NOTAM. For a permanent reversion, the changes would have to be reversed by incorporating this into an appropriate future AIRAC date to align with NATS’ engineering updates; of which there are only four a year.

12. Compliance with the Airspace Change Process

- 12.1 This proposal is confirmed by the CAA as Level 2B.
- 12.2 If you have questions or comments regarding the **conduct** of the airspace change process (such as adherence to the CAP1616 process), please contact the CAA:

Airspace Regulation
 Ref: Vattenfall Wind Power Ltd. ACP 2018-03
 Safety and Airspace Regulation Group
 Aviation House
 South Area
 Gatwick Airport
 RH6 0YR

Form [FCS 1521](#) can be used for this purpose

Note: **These contact details must not be used for your response** to this consultation. If you do so, your response may be delayed or missed out, reducing its effectiveness.

13. What Happens Next?

- 13.1 After the consultation period closes, we will analyse the feedback received and publish a report on the CAA Airspace Change Portal (Ref 1) summarising the findings and how each item might affect the airspace design.
- 13.2 We will consider those findings, determine if the airspace design needs to change in light of the feedback, and, if needed, publish a second report detailing the amended design.
- 13.3 Finally, we will submit an Airspace Change Proposal to the CAA based on this consultation document and the feedback reports.

³ The portal will not be monitored during the 2-week Christmas break (21st December 2020 to 3rd January 2021).

13.4 The CAA will then study the proposal to decide if it has merit and will publish a decision on its website.

13.5 If the CAA approves this proposal, we plan to implement the changes by December 2021.

14. Annex A: Glossary

ACP	Airspace Change Proposal
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
ATS	Air Traffic Service
BEIS	Business, Energy and Industrial Strategy
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
DAATM	Defence Airspace Air Traffic Management
DD	Decimal Degrees
DMS	Degrees Minutes Seconds
HIAL	Highlands and Islands Airports Limited
km	kilometre
MoD	Ministry of Defence
NATMAC	National Air Traffic Management Advisory Committee
NATS	National Air Traffic Service
NERL	NATS En-Route Limited
NM	Nautical Mile
PRMS	Primary Radar Mitigation Scheme
PSR	Primary Surveillance Radar
RAG	Range Azimuth Gating (Radar Blanking)
SSR	Secondary Surveillance Radar
TMZ	Transponder Mandatory Zone
WTG	Wind Turbine Generator

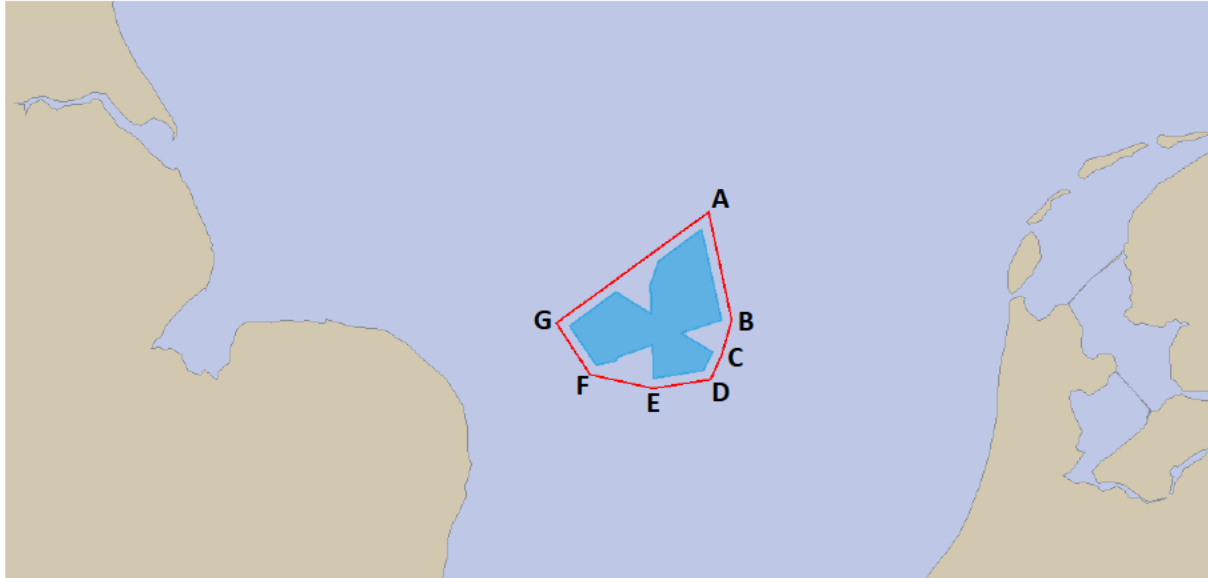
15. Annex B: List of Targeted Stakeholders

15.1

Type	Stakeholder
NATMAC	Aircraft Owners and Pilots Association (AOPA)
	Airfields Operators Group (AOG)
	Airlines UK
	Airport Operators Association (AOA)
	ARPAS - Association of Remotely Piloted Aircraft Systems
	Aviation Environment Federation (AEF)
	B Ae Systems
	BBAC - British Balloon & Airship Club
	BHPA - British Hang gliding & Paragliding Association
	BMAA - British Microlight Aircraft Association
	BMFA - British Model Flying Association
	British Sky Diving (formally BPA)
	British Airline Pilots Association (BALPA)
	British Airways (BA)
	British Business and General Aviation Association (BBGA)
	British Helicopter Association (BHA)
	BGA- British Gliding Association
	GAA- General Aviation Alliance
	General Aviation Safety Council (GASCo)
	Guild of Air Traffic Control Officers (GATCO)
	Heavy Airlines
	Helicopter Club of Great Britain (HCGB)
	Light Aircraft Association (LAA)
	Light Airlines
	Low Fare Airlines
	MOD DAATM
PPL/IR (Europe)	
British Airways (BA)	
Helicopter Operators	Babcock Helicopters <small>Error! Bookmark not defined.</small>
	Bristow Helicopters
	CHC Scotia
	Heli Holland
	NHV Helicopters
	Maritime and Coastguard Agency (MCA)
ATC	Aberdeen ATC
	NATS En Route Limited (NERL)
	LVNL
	Maastricht UAC
Airports	Humberside Airport
	Norwich Airport

16. Annex C: Coordinates of Proposed Option D (preferred) Outer Boundary

These coordinates are WGS84 presented in decimal degrees (DD) and degrees minutes seconds (DMS). Each row corresponds to the same location. The coordinates below include the TMZ in both UK and Dutch airspace.



Point	Decimal Degrees		Degrees° Minutes' Seconds.dec°	
	Latitude (DD)	Longitude (DD)	Latitude (DMS)	Longitude (DMS)
A	53.29759851	003.09908850	53° 17' 51.35" N	003° 05' 56.72" E
B	52.93513787	003.20137563	52° 56' 06.50" N	003° 12' 04.95" E
C	52.81884801	003.14072329	52° 49' 07.85" N	003° 08' 26.60" E
D	52.74083449	003.07310544	52° 44' 27.00" N	003° 04' 23.18" E
E	52.71918836	002.75570865	52° 43' 09.08" N	002° 45' 20.55" E
F	52.77190552	002.40831542	52° 46' 18.46" N	002° 24' 29.94" E
G	52.94552018	002.23506887	52° 56' 43.87" N	002° 14' 06.25" E

17. Annex D: Feedback Form for Postal Responses

Your name:			
Your address:			
Postcode:			
Your email address:			
Delete one of the following boxes, as applicable:			
<i>I am responding as a private individual</i>		<i>I am responding on behalf of an organisation</i> <i>My organisation is:</i>	
		<i>My position in that organisation is:</i>	
<i>In accordance with the UK Civil Aviation Authority’s CAP 1616 airspace change process, consultation responses will be published on Citizen Space via the Airspace Change Portal. Responses will be subject to moderation by the Civil Aviation Authority. If you wish your response to be published anonymously your personal details (Name, Address & Position) will be redacted.</i>			
<i>Yes - I want my response to be published with my details.</i>		<i>No - I want my response to be published anonymously.</i>	
Do you support the changes in this proposal? Please select option:			
SUPPORT	NO OBJECTION	AMBIVALENT	OBJECT
<p>What are your reasons for providing this response? Please consider:</p> <ul style="list-style-type: none"> • What do you believe will be the impact of the TMZ on your operation? • How often do you think these impacts will occur? • Do you have any suggested mitigations or design changes you think should be considered? • Do you think there may be any unintended consequences of the TMZ? <p>Please provide evidence.</p> <p>If you wish to supply more documentary evidence than would fit on these pages, enclose it with this form.</p>			
Continues overleaf...			

Reasons/evidence (continued)

Do you have any comments on the consultation content?