

CAA Environmental Assessment and Statement

Title of airspace change proposal	Norfolk Vanguard and Norfolk Boreas Windfarm	
Change sponsor	Vattenfall Wind Power Ltd.	
Project no.	ACP-2018-03	
SARG project leader	[REDACTED]	
Instructions		
<p>In providing a response for each question, please ensure that the 'status' column is completed using one of the following options:</p> <ul style="list-style-type: none"> • Yes • No • Partially • N/A <p>Please highlight the 'status' cell for each question using one of the three colours to illustrate if it is:</p> <p>resolved Green not resolved Amber not compliant Red</p>		
1. Introduction		
	<p>Vattenfall Wind Power Ltd. is developing two neighbouring offshore wind farms in the North Sea, 47 km from the Norfolk coastline. The proposed developments are for approximately 360 wind turbine generators (WTG), which, will cover an area of 1,300 km² and have a total generating capacity of 3.6 GW. The two windfarms, known as Norfolk Boreas Offshore and Norfolk Vanguard are both being developed under Development Consent Orders (DCOs). Currently within the area of the proposed developments, helicopters operate at lower levels and at higher levels there are several airways.</p> <p>The DCO Environmental Statement Aviation and Radar Chapter describes the key aspects of the developments as they relate to aviation, followed by an assessment of the effects on baseline conditions. This DCO assessment identifies that the developments are likely to cause interference on civil and military radar by creating radar clutter and false radar returns, specifically on the Cromer Primary Surveillance Radar (PSR). As a result of this impact on the PSR, NATS lodged objections against the proposed developments until an appropriate form of mitigation is agreed.</p> <p>Therefore, to mitigate the risk of false radar returns, Vattenfall proposed to deploy Range Azimuth Gating (RAG) onto a portion of the Cromer PSR. However, in addition to removing false radar returns from wind turbine generators, the RAG would also remove genuine radar returns from aircraft flying within the area.</p>	

	<p>Therefore, to mitigate the risk of removing genuine aircraft operations from radar, a Transponder Mandatory Zone (TMZ) is required to ensure that aircraft are detectable to air traffic control (ATC). This TMZ would ensure aircraft equipped with a transponder are visible to ATC via Secondary Surveillance Radar (SSR), however, non-transponder equipped aircraft would not be able to fly within the area and hence would be required to fly around the area, unless they are granted prior approval to fly within the TMZ.</p> <p>Following a process of Options Appraisal, the design options were refined to one option. This preferred option is known as <i>“RAG Blanking with a simplified polygon TMZ “rubber banded” around the proposed wind farm locations extended to include a 2NM buffer”</i>.</p>	
2. Nature of the Proposed Change		Status
2.1	Is it clear how the proposed change will operate, and therefore what the likely environmental impacts will be?	Yes
	<p>This ACP, intended to establish a TMZ over the Norfolk Boreas Offshore and Norfolk Vanguard offshore wind farms, would only effect aircraft over the sea and is therefore assigned as a Level 2B. For Level 2B ACPs where the anticipated impact is negative, an assessment of fuel and CO2 impacts of the proposed change using WebTAG is required, including longer-term CO2 emissions (based on a 10-year traffic forecast) and annual totals for each and on a per flight basis. If the anticipated impact is positive, a qualitative assessment and explanation is adequate.</p> <p>The sponsor has identified that the establishment of the TMZ would have no impact on the flight behaviour of those aircraft passing through the area that are already transponder equipped, however, it would result in non-transponder equipped aircraft, typically general aviation aircraft, rerouting around the TMZ and resulting in an increase in fuel burn and CO2. However, the sponsor estimates that less than two non-transponder equipped aircraft operate within the area per week and therefore concludes the impact would be negligible and to further mitigate the impact to non-transponder equipped aircraft, they can still gain access to fly within the TMZ subject to prior notification. In addition, the sponsor identified that there would be no impact on commercial airlines using the airways that overfly the area as all of these are already transponder equipped. Therefore, on the basis that CO2 impacts are negligible and can be mitigated with prior notification, the sponsor has scaled the environmental assessment equivalent to a Level 2B change with a positive impact (or neutral impact) and therefore undertaken a qualitative assessment of CO2 impact.</p>	
3. Secretary of State Call-in Noise Criterion		Status

3.1	<p>Is the proposal likely to meet the Secretary of State’s criterion for call-in on noise impacts? If yes, has the additional assessment on that criterion been undertaken and what are the results? If no, what is the rationale for that conclusion?</p> <p>The criterion, as set out in the DfT’s Air Navigation Guidance (2017)¹ is that the proposed airspace change could lead to a change in noise distribution resulting in a 10,000 net increase in the number of people subjected to a noise level of at least 54 dB² <u>as well as</u> having an identified adverse impact on health and quality of life.³</p>	No
	<p>This Airspace Change Proposal (ACP) would only affect aircraft over the sea and therefore it is unlikely that there will be an identified adverse impact on health and quality of life and therefore it is considered that the proposal would not meet the noise criterion for call-in.</p>	
4. Statement of Need		Status
4.1	Does the Statement of Need include any environmental factors?	No
	<p>The Statement of Need does not include any environmental factors.</p>	
5. Design Principles		Status
5.1	Does the final set of Design Principles include any environmental objectives?	Yes
	<p>The sponsor developed a set of 14 design principles, two of which are considered to represent environmental objectives. The design principles with environmental objectives are:</p> <ul style="list-style-type: none"> • DP6 – Minimise impact on CO2 emissions; and • DP7 – Minimise environmental impacts to stakeholders on the ground, including the impact of noise below 7,000ft. <p>It should be noted that the ACP is assigned as Level 2B due to it being a change that effects controlled airspace over the sea and therefore by its definition it is not possible to impact stakeholders on the ground.</p>	

¹ The DfT’s call-in criteria are set out in The Civil Aviation Authority (Air Navigation) Directions 2017, Section 6, paragraph (5). These Directions are replicated in Annex D of the DfT’s Air Navigation Guidance 2017.

² L_{Aeq,16h} noise exposure.

³ The assessment of the numbers of people affected and the associated adverse impacts on health and quality of life of the airspace change proposal should be carried out by the sponsor in accordance with the requirements set out in the DfT’s Navigation Guidance 2017.

5.2	<p>Does the proposal explain how and to what extent the final airspace design achieves any environmental Design Principles?</p>	Yes
	<p>With regards to Design Principle 6, the proposal describes that <i>“there is no expected change to fuel burn for commercial airlines as flight plannable routes will remain Unchanged”</i> and that <i>“GA users may theoretically incur increased fuel burn if they are not equipped with a transponder and are required to route around the TMZ”</i>. This increase in fuel burn for GA traffic is assessed as being negligible by the Sponsor, however, the final submission does not provide a rationale for this conclusion. However, <i>Document 2A(i): Airspace Change Design Options</i> evidences that over a two week period, only 15 aircraft (0.16%) operating in the area were not equipped with a transponder (average of c.1 aircraft movement per day) and therefore the conclusion of negligible impacts is considered reasonable. In addition the impact on non-transponder equipped aircraft can be further mitigated if they provide notification of intending to fly within the TMZ.</p> <p>With regards to DP7, the proposal states that <i>“As the proposal is offshore (25.4 NM [47 km] from the Norfolk coast) and a Level 2B change, there are no local environmental impacts such as noise, visual intrusion, tranquillity or local air quality”</i> therefore implying that because the change is over sea there are no stakeholders on the ground to be impacted. This conclusion is considered reasonable due to it being a Level 2B change.</p>	
5.3	<p>Were there any proposed environmental Design Principles that were rejected from the final set? If so, is the rationale for rejecting those Principles reasonable?</p>	No
	<p>The draft Design Principles DP2, DP4, DP10 and DP14 were adjusted in response to stakeholder feedback, however, the draft environmental design principles (DP6 and DP7) were taken through to the final set of design principles unchanged. It should be noted that in response to the design principle engagement Aberdeen ATC requested that <i>“if the proposal affects the routings (lateral or vertical) of low-level helicopter operations, the environmental aspects (increased fuel burn/ greater CO2 emissions) need to be captured”</i>. The sponsor concluded that this response from Aberdeen ATC did not affect the development of the design principle and therefore the design principle was unchanged.</p>	
5.4	<p>Were there any design options during the airspace change process that might have better met the environmental Design Principles than the final proposal as submitted to the CAA? If so, is the rationale for rejecting those options set out?</p>	Yes

	<p>In total, four design options were assessed at Stage 2 and all were a variation on the same technical solution i.e. a TMZ with RAG. Options A and C were for TMZ with no buffer and Options B and D included a 2 NM buffer around the area. The buffer is intended to provide ATC with a warning that a non-transponder equipped aircraft are infringing the TMZ.</p> <p>It is considered that Options A and C would have better met DP6 as they reduce the distance required for non-transponder equipped aircraft to track around the area. However, the rationale for requiring a buffer is clearly set-out as it allows ATC sufficient reaction time to identify when an infringement of the TMZ has occurred.</p> <p>However, it should be noted that in Para 5.2 of the Stage 2 Initial Options Appraisal the Sponsor discounts 3 of the 4 options and says that <i>“only Option D fully met all the design principles. Option D is preferred due to its simpler TMZ shape. As such, Option D is the only option which will be carried forward to consultation”</i>, however, it is not apparent that Option B did not also meet all of the design principles.</p>	
6. Options Appraisal		Status
6.1	Have environmental impacts been adequately reflected and assessed in the Options Appraisal?	Yes
	<p>The Airspace Change Proposal (ACP) is assigned as a Level 2B and therefore the reduction of CO2 impacts is the environmental priority. For a Level 2B change where the impacts are negative, the fuel and CO2 impacts should be assessed quantitatively, and if the impacts are positive a qualitative assessment and explanation is adequate. For this ACP the CO2 impacts have been assessed by the sponsor to be ‘negligible’ on the basis that although, there is a minor increase in fuel burn for non-transponder equipped aircraft, less than 1% of traffic are affected.</p> <p>The Full Options Appraisal, completed at Stage 3 appraised one option, the preferred option (Options D). The assessment qualitatively considered the greenhouse gas impacts and also provided high-level statements with regards to the air quality, noise, tranquillity and biodiversity impacts.</p> <p>With regards to CO2 the assessment of aircraft emissions has been undertaken qualitatively. However it should be noted that the Full Options Appraisal states that the level of analysis undertaken is <i>“monetise and quantify”</i>, however, this level of assessment is not actually presented for the assessment of aircraft and instead is based on the renewable energy generated by the wind farms and the sponsor trades-off the emissions reduction as a result of the energy produced by the wind turbines against the increase in track mileage for non-transponder equipped aircraft avoiding the TMZ. The energy generated by the Proposed Wind Farm Developments is outside of the scope of this ACP and is therefore not considered within this CAA Environmental Assessment and Statement.</p> <p>With regards to the other environmental factors, the sponsor provides a high-level statement which says <i>“As the proposal is offshore (25.4 NM from the Norfolk coast) and a Level 2B change, there are no local environmental impacts such as noise, visual intrusion, tranquillity or local air quality”</i> and <i>“...equally, there will be no discernible change in impact on....biodiversity”</i>. This level of assessment is considered</p>	

	acceptable on the basis that it is a Level 2B ACP and therefore there is no requirement for the sponsor to assess these environmental aspects.	
6.2	Is the final proposal as submitted to the CAA the airspace design option that also produced the best environmental impacts as assessed by the Options Appraisal? If not, does the rationale for selecting the preferred option adequately explain this choice?	Yes
	In total, four airspace design options were evaluated for the purposes of the Initial Options Appraisal at Stage 2 (Develop and Assess). However, it should be noted that essentially all design options were a variation on the same technical solution i.e. a TMZ with RAG. With regards the environmental impacts, Options A and C would have likely produced the best environmental impact outcome as they provided a reduced distance for non-transponder equipped aircraft to track around the area, however the rationale for requiring a buffer is clearly set out and the level of environmental benefit between the options with and without a buffer is considered minimal due to the low volume of impacted traffic.	
7. Noise [for Level 1 and Level M1 airspace change proposals]		Status
7.1	Has the noise impact been adequately assessed and presented in both the consultation material and the final submission to the CAA, taking account of scalability and proportionality?	N/A
	This Airspace Change Proposal (ACP) would only affect aircraft over the sea and it is therefore assigned as a Level 2B and there is no requirement to assess noise.	
7.2	If a noise assessment has not been undertaken by the sponsor, has this decision been adequately explained and evidenced in both the consultation material and the final submission to the CAA, and is the rationale reasonable?	N/A
	This Airspace Change Proposal (ACP) would only affect aircraft over the sea and it is therefore assigned as a Level 2B and there is no requirement to assess noise.	
7.3	Summary of anticipated noise impacts from the final proposed airspace change.	
	All noise impacts would occur over sea and therefore there is unlikely to be an impact on noise and unlikely to be an identified adverse	

	impact on health and quality of life.	
8. CO₂ Emissions		Status
8.1	Has the impact on CO₂ emissions been adequately assessed and presented in both the consultation material and the final submission to the CAA, taking account of scalability and proportionality?	Yes
	The sponsor has scaled the environmental assessment equivalent to a Level 2B change with a positive impact and therefore undertaken a qualitative assessment of CO ₂ impact. It should be noted that the ACP would impact non-transponder equipped aircraft and these would be required to re-route around the TMZ. However, the majority of aircraft operating within the area will not be impacted by this change as they are equipped with appropriate transponder technology. The volume of traffic unable to transit the TMZ due to the lack of an appropriate transponder is approximately 0.15% of all traffic in the area and therefore any potential impact on CO ₂ emissions is considered negligible. In addition, the impact on non-transponder equipped aircraft can be further mitigated if they provide notification of intending to fly within the TMZ.	
8.2	If an assessment of the impact on CO₂ emissions has not been undertaken by the sponsor, has this decision been adequately explained and evidenced in both the consultation material and the final submission to the CAA, and is the rationale reasonable?	Yes
	The sponsor has undertaken a qualitative assessment of CO ₂ impacts and concludes that the impact is negligible and therefore a qualitative assessment is considered appropriate.	
8.3	Summary of anticipated impact on CO₂ emissions from the final proposed airspace change.	
	The ACP is likely to impact less than 1% of traffic and can be further mitigated if prior notification is given and therefore the CO ₂ impact is considered negligible.	
9. Local Air Quality [for Level 1 and Level M1 airspace change proposals]		Status
9.1	Has the impact on Local Air Quality been adequately assessed and presented in both the consultation material and the final submission to the CAA, taking account of scalability and proportionality?	N/A

	This ACP does not change aircraft trajectories below 1,000 ft and all changes occur over sea and therefore there is no requirement to assess local air quality.	
9.2	If an assessment of the impact on Local Air Quality has not been undertaken by the sponsor, has this decision been adequately explained and evidenced in both the consultation material and the final submission to the CAA, and is the rationale reasonable?	N/A
	The Airspace Change Proposal (ACP) to establish a TMZ in the area would only affect aircraft over the sea and it is therefore assigned as a Level 2B and there is no requirement to assess local air quality.	
9.3	Summary of anticipated impact on Local Air Quality from the final proposed airspace change.	
	The proposed change does not change aircraft trajectories below 1,000 ft and all changes occur over sea, therefore, there is not expected be any impact on local air quality. Due to the effects of mixing and dispersion, emissions from aircraft above 1,000 feet are unlikely to have a significant impact on local air quality.	
10. Tranquillity [for Level 1 and Level M1 airspace change proposals]		Status
10.1	With specific reference to Areas of Outstanding Natural Beauty and National Parks - Has the impact on tranquillity been adequately considered and presented in both the consultation material and the final submission to the CAA, taking account of scalability and proportionality?	N/A
	This Airspace Change Proposal (ACP) would only affect aircraft over the sea and it is therefore assigned as a Level 2B and there is no requirement to assess tranquillity.	
10.2	If consideration of the impact on tranquillity has not been undertaken by the sponsor, has this decision been adequately explained and evidenced in both the consultation material and the final submission to the CAA, and is the rationale reasonable?	N/A
	This Airspace Change Proposal (ACP) would only affect aircraft over the sea and it is therefore assigned as a Level 2B and there is no requirement to assess tranquillity.	
10.3	Summary of anticipated impact on tranquillity from the final proposed airspace change.	

	The ACP would have no impact on tranquillity as the proposal does not change routes or traffic patterns over an Area of Outstanding Natural Beauty (AONB) or a National Park. The sponsor concludes that this ACP will have <i>“no discernible change in impact on tranquillity.”</i>	
11. Biodiversity [for Level 1 and Level M1 airspace change proposals]		Status
11.1	Has the impact on biodiversity been adequately assessed and presented in both the consultation material and the final submission to the CAA, taking account of scalability and proportionality?	N/A
	The sponsor concludes that this ACP will have <i>“no discernible change in impact on tranquillity or biodiversity.”</i> As per CAP1616, most airspace change proposals are unlikely to have an effect upon biodiversity and therefore the inclusion within the design principles is expected to be the full extent of any consideration in most instances. This proposal seeks to introduce a TMZ above a proposed wind farm in the North Sea, 47 km from the Norfolk coastline. As this change will impact over the sea and a considerable distance away from land, the acknowledgement in the Final Submission document that there will be no impact on biodiversity is both logical and proportionate given the nature of this change.	
11.2	If assessment of the impact on biodiversity has not been undertaken by the sponsor, has this decision been adequately explained and evidenced in both the consultation material and the final submission to the CAA, and is the rationale reasonable?	N/A
	This Airspace Change Proposal (ACP) would only affect aircraft over the sea and it is therefore assigned as a Level 2B and there is no requirement to assess biodiversity. As per CAP1616 [pg. 122] <i>‘Most airspace change proposals are unlikely to have an effect upon biodiversity and therefore the inclusion within the design principles is expected to be the full extent of any consideration in most instances’.</i>	
11.3	Summary of anticipated impact on biodiversity from the final proposed airspace change.	
	The ACP is unlikely to have an impact on biodiversity. The sponsor concludes that this ACP will have <i>“no discernible change in impact on biodiversity.”</i>	
12. Traffic Forecasts		Status
12.1	Have traffic forecasts been provided, are they reasonable, and have these been used to reflect the anticipated environmental impacts of the proposal?	N/A



	The aim of the proposal is to provide mitigation against potential radar issues as result of an offshore windfarm and there is no intention to change traffic volumes and therefore no traffic forecasts were provided by the Sponsor.	
13. Consultation		Status
13.1	Has the sponsor taken account of any environmental factors (noise, CO₂ emissions, Local Air Quality, tranquillity, or biodiversity) raised by consultees or has evidence been provided to indicate why this has not been possible?	Yes
	During Stage 2, Aberdeen ATC requested that “ <i>if the proposal affects the routings (lateral or vertical) of low-level helicopter operations, the environmental aspects (increased fuel burn/ greater CO₂ emissions) need to be captured</i> ’. The sponsor concluded that this response from Aberdeen ATC did not affect the development of the design principle and therefore the design principle was unchanged. No further response regarding CO ₂ emissions was provided by Aberdeen ATC at later stages of the ACP. In addition, the sponsor has assessed the impacts of CO ₂ in accordance with the requirements for a Level 2B ACP with a positive impact and provided a rationale for scoping the assessment accordingly, even though a small number of low level non-transponder equipped aircraft are impacted.	
13.2	Has the sponsor taken account of any consultation response submitted by ICCAN? If so, what are the outcomes?	N/A
	ICCAN did not provide a consultation response to this ACP.	
14. Public Evidence Session (if held)		Status
14.1	If a Public Evidence Session has been held, was any <u>new</u> evidence on potential environmental impacts presented?	N/A
	A public evidence session was not held for this airspace change proposal.	
14.2	If so, was the new evidence relevant and material to the CAA’s consideration of the environmental impacts of the submitted airspace change proposal?	N/A
	A public evidence session was not held for this airspace change proposal.	

15. Compliance with policy and guidance from Government, ICCAN or the CAA		Status
15.1	Has the sponsor satisfied all relevant policy and/or guidance from either the Government, ICCAN or the CAA, with regards to environmental impacts of the proposed airspace change?	Yes
	The sponsor has satisfied all relevant policy and guidance for an ACP of this nature.	
15.2	Has the sponsor adequately considered the DfT's Altitude-Based Priorities ⁴ ?	Yes
	The sponsor has adequately considered the DfT's Altitude-Based Priorities. It should be noted that although this ACP is assigned as Level 2B, it has the potential to impact airspace below 7,000ft, it occurs entirely over sea and therefore the environmental priority is the reduction of CO2 as per Altitude-based Priority C. The sponsor has adequately considered the impact on CO2 emissions caused by the introduction of the TMZ, and through the use of qualitative assessment concluded that the impact is negligible.	
16. Other aspects		Status
16.1	Are there any other aspects of the airspace change proposal that have not already been addressed in this report but that may have a bearing on the environmental impact?	No
	There are no other aspects of the airspace change proposal that have not already been addressed but that may have a bearing on the environmental impact.	
17. Recommendations/Conditions/PIR Data Requirements		Status
17.1	Are there any Recommendations which the change sponsor <u>should try</u> to address either before or after implementation (if approved)? If yes, please list them below.	No
	There are no recommendations which the sponsor should try to address either before or after implementation (if approved).	

⁴ Paragraph 3.3, DfT's Air Navigation Guidance 2017

17.2	Are there any Condition(s) which the change sponsor <u>must fulfil</u> either before or after implementation (if approved)? If yes, please list them below.	No
	There are no environmental conditions that the change sponsor must fulfil either before or after implementation (if approved).	
17.3	Are there any specific requirements in terms of the data to be collected by the change sponsor for the Post Implementation Review (if approved)? If yes, please list them below.	Yes
	<p>For this ACP it is recommended that the sponsor starts to collect the following information from the date of implementation for the Post Implementation Review:</p> <ul style="list-style-type: none"> To monitor the volume and increase track mileage of aircraft unable to transit the TMZ and therefore required to route around to ensure there are no unforeseen increases to CO2 emissions. 	

18. Summary of Assessment of Environmental Impacts & Conclusions		
	<p>This ACP seeks to implement a TMZ in the North Sea over the Norfolk Vanguard and Norfolk Boreas Windfarms North Sea, 47km from the Norfolk coastline. The chosen option is for a Range Azimuth Gating (RAG) 'radar blanking' covering the area of windfarms, which, has been simplified to a polygon with a 2NM buffer.</p> <p>This implementation is required to provide mitigation against potential radar issues, including 'radar clutter' and degradation of radar performance anticipated to be caused by the operation of wind turbine generators within the area encompassed by the proposed TMZ.</p> <p>Given that the TMZ is entirely over the sea and 47 km from the coastline, there are not likely to be any noise, local air quality, biodiversity, or tranquillity issues as result of this ACP. Furthermore, as this ACP has been designated as a Level 2B, there is no requirement to carry out an assessment of these environmental impacts.</p> <p>The environmental priority for this is CO2 emissions. The majority of aircraft operating within the area will not be impacted by this change as they are equipped with appropriate transponder technology. The volume of traffic unable to transit the TMZ due to the lack of an appropriate transponder is approximately 0.15% of all traffic in the area and therefore any potential impact on CO2 emissions is considered negligible.</p>	

Environmental assessment and statement sign-off and approval	Name	Signature	Date
Environmental assessment and statement completed by:	<i>Airspace Regulator (Environment)</i>		28/04/2021
Environmental assessment and statement approved by:	<i>Manager Airspace Regulation</i>		18 June 2021
Manager Airspace Regulation– Environment comments: I agree with the assessment and conclusions of the Environment Regulator and have no further comments to make.			