Moray Offshore Wind Farm (West) Ltd

Moray West

Options Appraisal (Phase 2 – Full)

Including Safety Assessment

Authorship

Action	Role	Date
Produced	[redacted] - **Airspace Change Specialist** NATS	September 2020
Reviewed Approved	[redacted] - **Manager, Airspace Change Compliance and Delivery** NATS	October 2020
Reviewed Approved	[redacted] - **Development Manager** Moray Offshore Wind Farm (West) Ltd	October 2020
Reviewed Approved	[redacted] - **Aviation Consultant** [redacted]	October 2020

References

Ref No	Description	Hyperlinks
1	Moray Offshore Wind Farm (West) Ltd Phase 1 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

Publication history

Issue	Month Year	Change Requests in this issue
Issue 1.0	October 2020	First issue released to CAA.
Issue 2.0	October 2020	The following section has been updated, following review by the CAA: *Section 3.3.1* – Table 1 –Monetary value of CO_2e benefit removed *Section 3.4.1* – Table 2 –Monetary value of CO_2e benefit removed
Issue 2.1	May 2021	Para 3.5 updated to clarify that we are unable to quantify the number PSR-only flights using the region

Contents

1. Introduction 3
2. Change Level 3
3. Options Appraisal 3
4. Safety Assessment 6
5. Conclusion and Next Steps 8

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 This document aims to provide adequate evidence to satisfy Stage 3 Consult Gateway, Step 3A Options Appraisal (Phase 2 Full), including Safety Assessment.

2. Change Level

2.1 This proposal is confirmed by the CAA as Level 2B.

2.2 In line with the requirements for a Level 2B change the environmental impact assessment has been conducted on the basis of aviation-related CO_2 emissions.

3. Options Appraisal

3.1 This document is an update of the equivalent Stage 2 document.

3.2 This ACP originally considered the baseline do-nothing option and three alternatives which could be used to provide appropriate mitigation against the impacts of Wind Turbine Generators (WTGs) associated with the Moray Offshore Wind Farm (West) Ltd. development (MOWWL). Under Stage 2, two of the three options were discounted, progressing only the preferred Option C, described as a Transponder Mandatory Zone (TMZ) with 2 NM buffer extended to align with Existing and Planned TMZs.

3.3 Base line (Do nothing) Option

3.3.1 The do-nothing option assumes that the wind farm is constructed and the changes proposed in the Airspace Change Proposal (ACP) are not implemented. Table 1 indicates the effects on communities and stakeholders should this be the case.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health and quality of life	Qualitative	There are no proposed changes to air traffic patterns so there will be no impact for noise. The designated area is approx. 22.5 km from the Caithness coast.
Communities	Air quality	Qualitative	No changes to aircraft trajectories below 1,000ft.
Wider society	Greenhouse gas impact	Monetise and quantify	With no mitigation scheme there will be no change in aviation greenhouse gas emissions due to trajectory changes. However, the wind farm is anticipated to provide CO_2e benefits of c. 1 million tonnes per annum[1]. This benefit will only be realised if the airspace change is implemented. *(Note: with no mitigation solution, under Condition 23[2] the wind farm would be unable to progress. As such the expected CO_2e benefits of c. 1.0 million tonnes per annum would **not** be realised.)*
Wider society	Capacity/ resilience	Qualitative	Radar clutter could increase ATC workload and impact ATC capacity, leading to a reduction in ATC resilience.
General Aviation	Access	Qualitative	No change from today.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Qualitative	There would be no increase in effective capacity.
General Aviation / commercial airlines	Fuel burn	Qualitative	No change from today.
Commercial airlines	Training cost	Qualitative	N/A – There would be no associated airline training costs.
Commercial airlines	Other costs	Qualitative	N/A – There would be no associated airline costs.
Airport/ Air navigation service provider	Infrastructure costs	Qualitative	N/A – There would be no associated infrastructure costs.
Airport/ Air navigation service provider	Operational costs	Qualitative	N/A – There would be no associated changes in operational costs.
Airport/ Air navigation service provider	Deployment costs	Qualitative	N/A – There would be no associated deployment costs.

Table 1: Options Appraisal (CAP1616 E2) – Do Nothing Option

[1] Calculated using https://www.renewableuk.com/page/UKWEDhome and https://www.moraywest.com/

[2] Condition 23 is a Suspensive condition that prohibits the construction of the windfarm without first putting in place a suitable PRMS.

3.4 Design Option C, preferred option

3.4.1 Table 2 indicates the effect on communities and stakeholders should Option C be implemented.

Group	Impact	Level of Analysis	Evidence
Communities	Noise impact on health and quality of life	Qualitative	There are no proposed changes to air traffic patterns so there will be no impact for noise. The designated area is approx. 22.5 km from the Caithness coast and 24 km from the Aberdeenshire coast.
Communities	Air quality	Qualitative	No changes to aircraft trajectories below 1,000ft.
Wider society	Greenhouse gas impact	Monetise and quantify	The introduction of the wind farm is anticipated to provide CO_2e benefits of c. 1 million tonnes per annum[1], which is a wider benefit enabled by, but not directly attributable to this proposal. This will only be realised if the airspace change is implemented. Only aircraft without an operational transponder may have to route around the TMZ. In summer, this is <2 flights per week and can be considered negligible (see para 3.5 below).
Wider society	Capacity/ resilience	Qualitative	This option will have no anticipated impact.
General Aviation	Access	Qualitative	For GA aircraft equipped with an operating transponder there would be no change in access due to the proposed TMZ. Aircraft without an operational transponder would be restricted from entering the TMZ without first being granted access to the TMZ from TMZ controlling Authority. Without this clearance they would be required to fly a route avoiding the TMZ. GA users without an operating transponder wanting to access the TMZ without obtaining access from the controlling authority will have a one-off cost implication (approx. £2,000) to purchase a transponder. Given the offshore location (22.5 km from Caithness coastline), the demand for GA aircraft without a transponder wanting to fly over this area is minimal. The vast majority of GA aircraft, >99%, are transponder equipped and will not be impacted by this airspace change.
General Aviation/ commercial airlines	Economic impact from change in effective capacity	Qualitative	There would be no change in effective capacity.

General Aviation/ commercial airlines	Fuel burn	Monetise	No expected change to fuel burn for commercial airlines as flight plannable routes will remain unchanged and they will be able to route through the TMZ as currently. GA users may incur increased fuel burn if they are forced to reroute around the TMZ if they do not have the relevant equipage. However, the likely volume of non-transponder equipped aircraft which may pass through this area and any potential increase in fuel burn as a result would be negligible (estimate <2 per week, see para 3.5 below).
Commercial airlines	Training cost	Qualitative	N/A – there are not expected to be any airline training cost associated with this development.
Commercial airlines	Other costs	Qualitative	Updates to FMS and flight planning systems will by the routine AIRAC updates. There are no other known costs which would be imposed on commercial aviation.
Airport/ Air navigation service provider	Infrastructure costs	Qualitative and quantitative	There would be no associated infrastructure costs. The developer has agreed to cover all engineering costs for implementation of the Radar RAG Blanking.
Airport/ Air navigation service provider	Operational costs	Qualitative	N/A – this proposal would not lead to changes in operational costs.
Airport/ Air navigation service provider	Deployment costs	Qualitative	N/A – no costs for the ANSP anticipated for the deployment of the TMZ.

Table 2: Options Appraisal (CAP1616 E2) –Options C

3.5 The region's PSR and SSR returns were analysed for August 2019. There was a total of 962 tracks within this period. This was comprised of 955 SSR tracks and 7 PSR-only tracks passing through the region. This equates to 0.7% or <2 PSR-only tracks per week. It should be noted that there is no aircraft ID available from PSR-only information and therefore we cannot quantify the number of airframes which constitute the PSR-only flights (i.e. whether one or two aircraft flying weekly, or multiple aircraft), but nonetheless the number of flights is not expected to exceed more than 2 per week on average.

3.6 PSR-only tracks tend to be historic/ vintage aircraft. Summer months are typically busier than winter months for general aviation and therefore we believe this to represent a higher than average proportion of PSR-only tracks. We therefore contend that any impact on CO_2 emissions as a result of this airspace change would be negligible.

3.7 The implementation of a TMZ will have no effect on commercial traffic growth as they are all transponder equipped and unaffected by this change. GA traffic is difficult to forecast as there is no requirement to file a flight plan or talk to ATC in uncontrolled airspace. Owing to the negligible numbers of aircraft that may be affected by the implementation of a TMZ, <2 flights per week, it will not be proportional to attempt a WebTAG greenhouse gas monetisation workbook for this proposal, given the negligible aviation impact on CO_2 emissions.

4. Safety Assessment

4.1 Note: the assessment below is unchanged from the equivalent Stage 2 document.

4.2 Options Appraisal Safety Assessment – Do nothing

4.2.1 If the wind farm was constructed with no mitigation scheme against radar clutter/ interference being implemented this would have the following impacts:

- WTGs will cause clutter on radar displays (up to 85 WTGs in this development).
- The clutter will make ATC tracking and identification of non-transponder equipped aircraft in the cluttered area impossible.
- The clutter will make ATC tracking and identification of transponder equipped aircraft in the cluttered area difficult due to obscuration.
- Interference & saturation of radar processing due to excessive radar returns can degrade radar performance across the whole operating area of the radar.

4.2.2 Due to the above impacts resulting in the suspensive condition 23 which requires that an appropriate PRMS is put in place before the MOWWL development can be constructed, "Do nothing" is not a viable option.

4.3 Options Appraisal Safety Assessment – Option C (preferred)

4.3.1 The Option C "WTG locations RAG blanked, with a TMZ plus a minimum 2 NM buffer to align with existing and planned TMZs" is proposed as the optimum solution to mitigate the impact of the MOWWL WTGs on the Allanshill PSR system.

4.3.2 This option will provide:

- RAG blanking will provide effective suppression of all primary radar clutter associated with the WTGs.
- The promulgation of a TMZ over the RAG blanked area will ensure that aircraft within the RAG blanked area must be transponder equipped and hence will remain visible to ATC via secondary surveillance radar.
- The dimensions of the TMZ include a 2 NM buffer which is adequate to ensure that ATC have sufficient time to identify when an infringement of the TMZ is taking place and take appropriate action.

4.3.3 Experience from previous wind farm developments has demonstrated that the implementation of radar RAG blanking coupled with an associated TMZ provides safe and effective mitigation against radar issues associated with WTGs.

4.3.4 Initial qualitative assessment from NATS Safeguarding has confirmed that the proposed Option C design would provide adequate mitigation to fulfil the requirements required of the NERL Allanshill: PSR Mitigation Scheme.

4.4 Safety Assessment Conclusion

4.4.1 The proposed Option C TMZs coupled with RAG blanking provides safe and effective mitigation against the radar issues associated with WTGs.

4.4.2 Detailed safety analysis will be undertaken in due course by NATS based on the outcome of this consultation.

5. Conclusion and Next Steps

5.1 Option C, **RAG blanking of the WTG locations and associated TMZ with 2 NM buffer extended to align with Existing and Planned TMZs,** will provide a suitable PRMS for the impact of WTGs on the Allanshill PSR.

5.2 It is MOWWL's preferred solution and the only option which will be consulted on under stage 3 of this proposal.

5.3 The overall aviation impacts resulting from the implementation of this ACP are likely to be minimal/ negligible.

End of Document

