

## Safety and Airspace Regulation Group

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Airspace Change Proposal - Operational Assessment

Version 1.0/ 2016

<b>Title of Airspace Change Proposal</b>	<b>Neart Na Gaoithe and Inch Cape Transponder Mandatory Zone (TMZ)</b>
<b>Change Sponsor</b>	<b>Neart Na Gaoithe Offshore Windfarm Limited (NNGOWL) &amp; Inch Cape Offshore Limited (ICOL) - assisted by Osprey Consulting Services Limited (OCSL)</b>
<b>AR Project Leader</b>	<b>[REDACTED]</b>
<b>Case Study commencement date</b>	<b>Planned: 12 Oct 15 (Doc Check 5 - 12 Oct 15)</b>
<b>Case Study report as at</b>	<b>1 April 2016</b>

### Instructions

In providing a response for each question, please ensure that the 'Status' column is completed using the following options:

- Yes
- No
- Partially
- N/A

To aid the AR Project Leader's efficient Project Management it may be useful that each question is also highlighted accordingly to illustrate what is: resolved Green not resolved Amber or not compliant Red as part of the AR Project Leader's efficient project management.

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1.	Justification for change and “Option Analysis”	Status
1.1	<b>Is the explanation of the proposed change clear and understood?</b>	<b>Yes</b>
	<p>The explanation of the change is clear and a comprehensive proposal document has been submitted to support the stated requirement for a TMZ and radar blanking over the geographic area of two offshore windfarm developments. The first development is designated Neart Na Gaoithe (NNG) and lies to the south of the area. The second development Inch Cape (IC), lies to the north. The proposed TMZ and associated PSR blanking will negate the effects of clutter on the RAF Leuchars Primary Surveillance Radar (PSR), allowing Leuchars to provide SSR-only control, unhindered by radar clutter in the affected airspace. The TMZ will be active during the stated operation times of the Leuchars Lower Airspace Radar Service (LARS) times (24 hours).</p>	
1.2	<b>Are the reasons for the change stated and acceptable?</b>	<b>Yes</b>
	<p>The Wind Turbine Generators (WTGs) at the two offshore sites will rise to 197m (646 ft) amsl. A theoretical analysis described within the proposal indicates the WTGs will create clutter on the RAF Leuchars PSR. Within the proposal, the stated effects of these windfarms are false targets, clutter, saturation of the radar processor, obscuration, loss of track position and track identity.</p> <p>CAP 764 (Policy and Guidelines on Wind Turbines) identifies that WTGs may induce the following effects on the displayed radar picture: clutter masking returns and SSR labels, false targets, loss of target information for small RCS aircraft, obscuration of returns, loss of detection due to shadowing, tracking degradation and processing delays and range and azimuth errors. Significantly, in this case, errors with SSR returns are unlikely because of the distance of the windfarms from the radar head.</p> <p>These recognised effects may mask valid SSR returns where radar clutter is present. CAP 764 further discusses how orientation and wind direction may change the cross-sectional turbine blade area presented to the radar. Specifically, it states that:</p> <p style="text-align: center;">“given aviation safety issues are involved, a worst case approach should be adopted.”</p> <p>The proposal states that a TMZ/ radar blanking combination is the most suitable solution from those considered (see below for more detail). The proposal states that without a solution a controllers’ ability to detect a conflict between aircraft would be diminished and the provision of an appropriate Air Traffic Service (ATS) within a 5nm boundary of the clutter would therefore be degraded. On occasion, controller workload could also increase because of a requirement to maintain 5nm radar separation between aircraft when providing a Deconfliction Service.</p>	

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RAF Leuchars is no longer home to operational squadrons. There are a number of Tutor aircraft and flying club aircraft that operate from Leuchars on a full-time basis. The proposal states the flying activity that currently takes place at Leuchars, but it failed to quantify levels of activity in support of these claims. It was therefore necessary to seek additional clarification of activity levels at RAF Leuchars. The following answers were received to the bulleted questions below:

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Number of QRA diversions handled by Leuchars in the last year (split by runway).</li> </ul>   | Nil  |
| <ul style="list-style-type: none"> <li>• Number of Major NATO exercises hosted at Leuchars in the last year and planned for the next year, including numbers of aircraft involved in each.</li> </ul>  | Nil  |
| <ul style="list-style-type: none"> <li>• Dates of the CQWI hosted at Leuchars in the last year and planned for the next year, including the numbers of aircraft involved in each.</li> </ul>   | Nil and Nil planned  |
| <ul style="list-style-type: none"> <li>• Number of diversions handled by Leuchars in the last year (split by runway).</li> </ul>   | 24 actual, 493 practice approaches or 986 movements. (Estimated 33% on RW 08 and 67% on RW 26) |
| <ul style="list-style-type: none"> <li>• The proportion of the 1,100 Leuchars movements that operated in the proposed development areas in the last year.</li> </ul>   | 5-10%  |
| <ul style="list-style-type: none"> <li>• The number of different aircraft that received a LARS from Leuchars in the proposed development areas in the last year.</li> </ul>  | Estimate 200   |
| <ul style="list-style-type: none"> <li>• Split by Traffic Service/ Deconfliction Service.</li> </ul>   | 80% / 20% Estimate   |
| <ul style="list-style-type: none"> <li>• Numbers of departures in the last year (by separate aircraft) that utilised each of the following routes: Rwy 08 SID 1, Rwy 08 SID 2 and Rwy 26 SID 2</li> </ul>  | Estimate 120   |
| <ul style="list-style-type: none"> <li>• The typical normal range from the proposed development areas that traffic operating on Rwy 08 SID 1 and SID 2, Rwy 26 SID 2 switch from Leuchars to their subsequent operating frequency.</li> </ul>      | 20 nm  |
| <ul style="list-style-type: none"> <li>• Numbers of arrivals in the last year (by separate aircraft) that utilised each of the following approaches: Hi Tac to PAR 08, Hi Tac to 08, Tac or Rdar to ILS/DME 26, Hi Tac to 26, Tac to 26</li> </ul> | 85 total (no stats on different TAC approaches)  |

It is understood that responses to the requested additional clarification are not based on accurate data capture and true levels of activity may vary from that provided. However, the detail helps to quantify the fact that overall activity levels in the development areas appears to

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	be low.	
<b>1.3</b>	<p><b>Have all appropriate alternative options been considered, including the 'do nothing' option?</b></p> <p>The following 6 options have been considered in the proposal document:</p> <ul style="list-style-type: none"> <li>Option 0. Do Nothing.</li> <li>Option 1. Temporary shutdown of the WTGs.</li> <li>Option 2. Conduct SSR only operations.</li> <li>Option 3. Implement a Radio Mandatory Zone (RMZ).</li> <li>Option 4. Implement a TMZ only.</li> <li>Option 4a. Implement a TMZ with radar blanking.</li> <li>Option 4b. Implement a TMZ with radar blanking including a lateral buffer zone around the radar blanking area.</li> </ul> <p>The merits of each option above are considered in the proposal at Chapter 3, and a statement identifies Option 4b as the most suitable. For ease of reference, the proposed suitability for each option is discussed below, along with any CAA comment (<i>red italics</i>) on the justification of each option:</p> <ul style="list-style-type: none"> <li>Option 0: This option is not considered to be viable because there is no mitigation for the effects of the wind farms (albeit, those effects cannot at this stage be quantified).</li> <li>Option 1: This option is not considered to be viable as it is impractical to coordinate tactical stoppage of the turbines. This also partially negates the reason for the windfarms in the first place.</li> <li>Option 2: This option is not considered viable by MOD because it does not solve the problem of being able to distinguish between primary radar returns created by the WTGs and those created by non-transponding aircraft. Additionally, although military ATC terminal radar controllers may provide an ATS using SSR only if defined in unit orders, they are encouraged to hand over control to other adjacent units. <i>Notably, the traffic surveys conducted in support of this proposal show that non-transponding aircraft do not operate or transit in the vicinity of the development areas, but remain closer to the coast. On this basis, this option may be a viable alternative in the future, should the effects of clutter on the Leuchars PSR prove to be less than anticipated.</i></li> <li>Option 3: Not a viable option on its own because there is no mitigation for the effects of the wind farm generated radar clutter.</li> </ul>	<b>Yes</b>

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- Option 4: The TMZ alone option was considered unviable because there is no mitigation for the display of WTG clutter. This clutter might reduce radar performance and increase controller workload. *Additionally, non-transponding aircraft do not operate or transit far from the coast in the vicinity of the development areas (traffic survey). Based on the requested statistical information shown at 1.2, this option is unlikely to significantly increase controller workload and might also be a viable option if the levels of radar clutter prove to be lower than anticipated.*
  
- Option 4a: Not a viable option because of the lack of a buffer zone. *The argument for a 2nm buffer zone around the windfarm area cannot be justified as it would apply only to tracks that pop-up exactly on that 2nm boundary line, flying on a track perpendicular to the blanked radar area. This option may still be a viable alternative.*
  
- Option 4b: This option is proposed as the most suitable option. *This option includes the lateral radar buffer zone discussed at Option 4a. It is accepted that a TMZ and radar blanking is the best alternative, however there appears to be little justification for the large buffer zones, or for implementing a single large TMZ around both windfarms.*

<b>1.4</b>	<b>Is the justification for the selection of the proposed option sound and acceptable?</b>	<b>Yes</b>
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As described above, the most suitable option to mitigate the known effects of radar clutter is a TMZ with associated radar blanking. However, the reassignment of a large volume of airspace as described in Option 4b appears to be excessive and warrants closer inspection.

There are three main issues that should be considered to test whether or not the proposed option is proportionate and appropriately targeted, in line with CAA strategic objectives:

**Firstly**, evidence to support the reassignment of such a volume of airspace appears to be weak when balanced against the amount of traffic that operates under Leuchars control in this area. The proposal discusses general traffic patterns, but does not indicate in any detail the volume of traffic that Leuchars control in the affected areas. The proposal also states that:

*‘ ..... two individual surveys of one week duration were conducted and eight months of statistics provided by Leuchars confirmed that the large majority of transit GA (Sports and Recreation included) in the Firth of Forth and the River Tay estuary area remain close (within 1.9 km (1 NM)) to the coastlines. Furthermore, observed traffic farther offshore was transponder equipped and in two-way radio contact with Leuchars, Aberdeen or the Scottish Area Control Centre. Therefore, it is anticipated that there will be very little, if any, traffic displacement due to the proposed NNG and IC TMZ inhibiting GA flight operations.’*

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As described above, more statistical information was requested by the ACP case officer regarding traffic volumes. This indicates low levels of activity in the development areas. The levels of activity do not appear to justify the reassignment of such a large volume of airspace.

**Secondly**, the justification for a 2nm buffer zone around each windfarm appears to be based on a stated requirement to mitigate navigation errors and WTG shadow effects. The traffic surveys conducted in support of this proposal indicate that traffic in the area would be in radar contact with RAF Leuchars and that GA aircraft and non-transponder equipped aircraft are not likely to operate in the area:

*'The first of the two data collection exercises was completed during the week beginning the 16th March 2015. During the weeklong collection of data, no general aviation (GA) aircraft were seen to transit the proposed area of the TMZ. A further air traffic study took place during the first week of July 2015 over a five-day period; the results from this second study mirrored those of the first in that no GA aircraft were seen to transit the areas with the results supporting the assumptions presented to the CAA at the Framework Briefing. Feedback gained from the controlling staff at Leuchars indicated that the incidence of non-SSR equipped aircraft operating in the location of the proposed TMZ is extremely remote.'*

Based on this, any occasional requirement to mitigate navigation errors appears not to justify the imposition of such a large buffer zone around each windfarm. However, it is accepted that radar diffraction at the WTGs can generate a radar shadow (blind spot) for a few hundred metres (CAP 764, p28, para 2.21) that might hide very small objects. It is therefore appropriate to accept that a 1nm buffer zone on the eastern (shadow) side of each development would be appropriate.

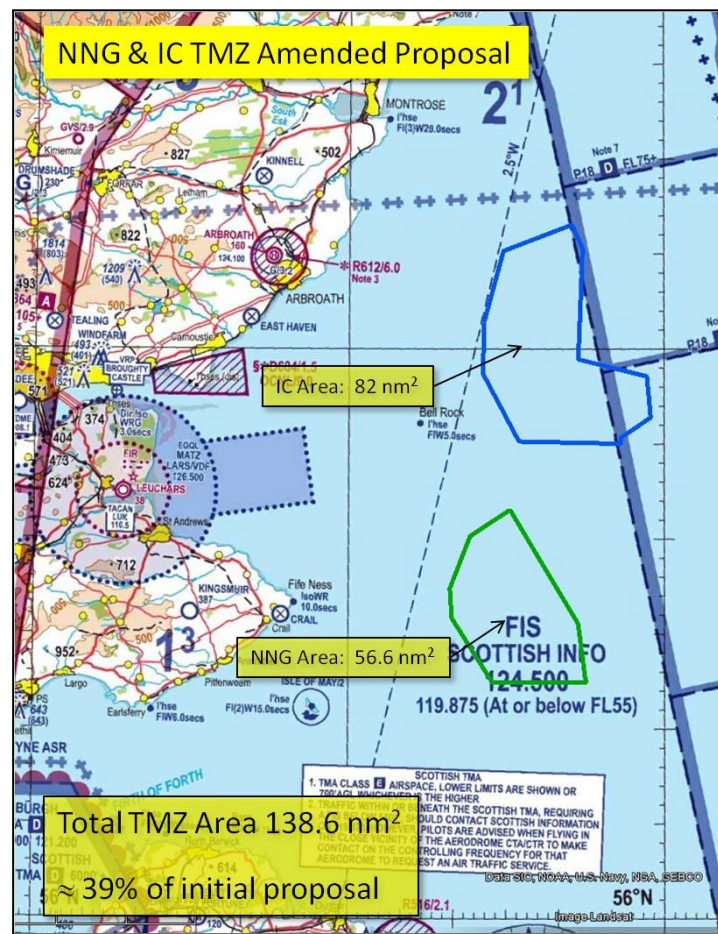
**Thirdly**, the proposal seeks to encompass both windfarms within a single TMZ. This has been justified on the basis that single windfarms (including individual buffer zones) would be so close together they would be difficult to resolve visually on a radar screen. The proposed argument also states that, from the air pilots would find it difficult to visually resolve the windfarms. However, the closest distance between WTGs at each site would be 6.1nm without extensive (2nm+) buffer zones around each development. This larger distance could be resolved by radar and the type of aircraft likely to operate in the area would be able to navigate to this level of accuracy, either visually or when IMC. Therefore, the proposal provides little evidence to justify encompassing both windfarms within a single TMZ.

**In summary, there is very little evidence to justify the introduction of the large (359 nm<sup>2</sup>) proposed TMZ and buffer zone described in the proposal as the most suitable option.**

Following discussions with the sponsor and MOD, it was agreed that a revised solution would still meet the MOD's requirement to mitigate the effects of the clutter. The revised and agreed solution would be two separate smaller TMZs around each windfarm. The TMZ boundaries will be dictated by the accuracy of the radar blanking. A 1nm buffer area will be included within the TMZ on the eastern

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boundary of each windfarm to cater for the known radar shadow effects. The footprint for this two windfarm solution would be a combined area of approximately 138.6 nm<sup>2</sup>; 39% of the original proposed solution. This revised solution represents a compromise between mitigating the well-documented impacts of the windfarms and minimising the volume of airspace to be reassigned. The original proposal and the revised proposal are shown below. It should be noted that the exact revised boundaries may need to be refined very slightly as the developers make detailed decisions on the location of each WTG.



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2.	Airspace Description and Operational Arrangements	Status
2.1	<p><b>Is the type of proposed airspace clearly stated and understood?</b></p> <p>The type of proposed airspace is clearly stated and understood. A TMZ is proposed as part of a two-element solution (geographic TMZ and radar blanking) to ensure that aircraft operating in the area are transponder equipped.</p>	Yes
2.2	<p><b>Are the hours of operation of the airspace and any seasonal variations stated and acceptable?</b></p> <p>The proposal to link service provision within the TMZ area to the Leuchars LARS hours of operation (24 hours) is reasonable. Following implementation a more detailed analysis of aircraft receiving a service in the area will need to be maintained to support the Post Implementation Review (PIR).</p>	Yes
2.3	<p><b>Is any interaction with adjacent domestic and international airspace structures stated and acceptable including an explanation of how connectivity is to be achieved? Has the agreement of adjacent States been secured in respect of High Seas airspace changes?</b></p> <p>No other airspace structures are affected by this change. The proposal top TMZ level is FL100; above this level transponders are already mandated.</p>	N/A
2.4	<p><b>Is the supporting statistical evidence relevant and acceptable?</b></p> <p>The supporting statistical evidence consists of an assessment of the impact of the 215 amsl WTGs on the Leuchars PSR and 2 surveys of aircraft operating in the development areas. Additionally, as stated above in Section 1.2, additional evidence was provided to further quantify the traffic levels in the development area. The former assessment is highly relevant and serves as the main basis for the selection of a TMZ as the preferred option to mitigate the effects of the windfarm developments. The assessment states that theoretically:</p> <p style="text-align: center;"><i>‘...all locations are highly likely to be detected by the Leuchars PSR at an altitude of 215 m amsl.’</i></p> <p>The proposal also states:</p> <p style="text-align: center;"><i>‘Range Azimuth Gating (RAG), commonly referred to as radar blanking, can be applied to radar systems when local clutter conditions are considered detrimental to Air Traffic operations.’</i></p>	Partially



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The times when radar blanking would actually be applied cannot truly be quantified until the WTGs are constructed and operational.

The aircraft surveys clearly demonstrate that non-transponder equipped aircraft have not been observed operating in the development areas and are far more likely to operate much closer to the coast.

**2.5 Is the analysis of the impact of the traffic mix on complexity and workload of operations complete and satisfactory?**

**Yes**

RAF Leuchars no longer operates fast-jet aircraft on a regular basis. The traffic mix is dictated by the following activities stated in the proposal document at para 2.2.1:

- To maintain a diversion airfield commitment for Quick Reaction Alert (QRA) aircraft from the UK and other NATO countries.
- To maintain a capability to host major NATO exercises.
- To maintain a capability to host the Qualified Weapons Instructors Course (CQWI).
- To maintain a diversion commitment for routine operations.

The vast majority of the 1,100 movements are Tutor and flying club aircraft operating in the local area and circuit. A breakdown of Leuchars traffic operating in the development area was not provided, but requested during this assessment (see above at 1.2). The original ACP statements in the proposal document, and reproduced at 1.4 above, indicate that routine operations in this area are extremely limited. Additionally, the proposal also states that:

*'In Class G airspace, the avoidance of other traffic is ultimately the pilot's responsibility.'*

The occasions when runway and weather might dictate a Deconfliction Service is required for aircraft operating in the development area is estimated to be low, approximately 40 per year (1.2 above). A significant increase in workload in this medium complexity airspace is unlikely to occur except on the very rare occasions where pop up non-transponding traffic also appeared within 5 nm of the Leuchars controlled traffic, and that traffic was unable to take its own separation. The likelihood of such a combination of events happening is low based on the statistics supplied, and a limited service could be provided in such a case.

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<b>2.6</b>	<b>Are any draft Letters of Agreement and/or Memoranda of Understanding included and, if so, do they contain the commitments to resolve ATS procedures (ATSD) and airspace management requirements?</b>	<b>Yes</b>
	Leuchars has a LOA with Dundee that defines the interactions between the respective units. Leuchars provides radar services to Dundee inbound and outbound traffic in accordance with the LARS protocol. However, Leuchars are not permitted to provide any kind of Radar Approach service for Dundee. This proposal has no affect on these arrangements.	
<b>2.7</b>	<b>Should there be any other aviation activity (low flying, gliding, parachuting, microlight site etc) in the vicinity of the new airspace structure and no suitable operating agreements or ATC Procedures can be devised, what action has the sponsor carried out to resolve any conflicting interests?</b>	<b>N/A</b>
	None identified and therefore no associated actions necessary by the Sponsor.	
<b>2.8</b>	<b>Is the evidence that the Airspace Design is compliant with ICAO SARPs, Airspace Design &amp; FUA regulations, and Eurocontrol Guidance satisfactory?</b>	<b>Yes</b>
	Yes. This design is similar to others operating in UK airspace and is compliant with the UK TMZ Policy Statement, Apr 2009.	
<b>2.9</b>	<b>Is the proposed airspace classification stated and justification for that classification acceptable?</b>	<b>Yes</b>
	The airspace is currently Class G, and this proposal does not seek to alter this classification.	
<b>2.10</b>	<b>Within the constraints of safety and efficiency, does the airspace classification permit access to as many classes of user as practicable?</b>	<b>Yes</b>
	<p>The new TMZ structure offers access in this area to all existing and future users of this airspace. The proposal states:</p> <p><i>'The overall aim of the NNG and IC Airspace Change Proposal is to maintain airspace efficiency and effectiveness for all users and mitigate the impacts of the NNG and IC Offshore Wind Farms on Leuchars flying and ATS operations.'</i></p> <p>The proposal seeks only to ensure that Leuchars can operate in, <i>'...an informed traffic environment where each aircraft can be identified and monitored for the purpose of providing separation and traffic information.'</i></p>	

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	<p>The traffic survey shows that Class G traffic without transponders rarely, if ever, operate so far out to sea in this area. If non-transponding GA aircraft wish to access the area they will be able to do so, either by prior arrangement with Leuchars ATC or by contacting Leuchars in accordance with normal ATC procedures. Access would not be refused unless it might jeopardise any other high priority activity being conducted at that time; in this area, this is again a remote possibility.</p>	
2.11	<p><b>Is there assurance, as far as practicable, against unauthorised incursions? (This is usually done through the classification and promulgation)</b></p>	Yes
	<p>The airspace is Class G. Aircraft would be able to freely operate in the area if equipped with SSR. All associated charts and documentation would be amended and advanced notice promulgated through a press Information Notice, in accordance with CAP 725 process.</p>	
2.12	<p><b>Is there a commitment to allow access to all airspace users seeking a transit through controlled airspace as per the classification, or in the event of such a request being denied, a service around the affected area?</b></p>	Yes
	<p>Any aircraft wishing to operate within the area during the service provision hours of operation can do so without a specific permission or other communication fitment, providing they are SSR equipped. Non-SSR equipped aircraft can seek approval to operate within the area as described in 2.10 above.</p>	
2.13	<p><b>Are appropriate arrangements for transiting aircraft in place in accordance with stated commitments?</b></p>	Yes
	<p>Any aircraft wishing to transit the area during the service provision hours of operation would be able to do so, providing they are SSR equipped. Non-SSR equipped aircraft can seek approval to operate within the area as described in 2.10 above.</p>	

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<b>2.14</b>	<b>Are any airspace user group's requirements not met?</b>	<b>No</b>
	<p>No. Additionally, no objection was raised to the preferred solution. An objection was raised to one of the non-preferred solutions, described in the top box on p24 of the proposal, although this was rescinded during the re-negotiation of the revised final solution. Although the BGA did not register a formal objection, they stated the organisation did not support restrictions where risks are 'un-assessed or based solely on prejudice or supposition'.</p>	
<b>2.15</b>	<b>Is any delegation of ATS justified and acceptable? (If yes, refer to Delegated ATS Procedure).</b>	<b>N/A</b>
	<p>N/A.</p>	
<b>2.16</b>	<b>Is the airspace structure of sufficient dimensions with regard to expected aircraft navigation performance and manoeuvrability to contain horizontal and vertical flight activity (including holding patterns) and associated protected areas in both radar and non-radar environments?</b>	<b>N/A</b>
	<p>Not applicable for this airspace structure. The dimensions agreed are the minimum necessary to match the PSR blanking area and include a buffer within the shadow side of the TMZ.</p>	
<b>2.17</b>	<b>Have all safety buffer requirements (or mitigation of these) been identified and described satisfactorily (to be in accordance with the agreed parameters or show acceptable mitigation)? (Refer to buffer policy letter).</b>	<b>Yes</b>
	<p>Current buffer policy for segregated airspace does not cover the situation described in this proposal. Very few aircraft, and no non-transponding aircraft, have been observed in this area. RAF Leuchars will continue to offer a full suite of ATC services which might only need limiting in some way on isolated occasions.</p>	
<b>2.18</b>	<b>Do ATC procedures ensure the maintenance of prescribed separation between traffic inside a new airspace structure and traffic within existing adjacent or other new airspace structures?</b>	<b>Yes</b>
	<p>The proposal describes a 2-element solution to mitigate the expected PSR clutter effects. PSR blanking and the introduction of a TMZ (geographic wind farm area and buffer) in Class G airspace, below FL100. RAF Leuchars would be responsible for the maintenance of standard separation criteria commensurate with the level of service provided.</p>	

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<b>2.19</b>	<b>Is the airspace structure designed to ensure that adequate and appropriate terrain clearance can be readily applied within and adjacent to the proposed airspace?</b>	<b>N/A</b>
	The proposed change only concerns an oversea airspace structure. There are no terrain clearance issues of concern.	
<b>2.20</b>	<b>If the new structure lies close to another airspace structure or overlaps an associated airspace structure, have appropriate operating arrangements been agreed?</b>	<b>N/A</b>
	The TMZ lies wholly within Class G airspace and its proposed vertical limits are sea-level to FL100. It lies beneath Airway P18 at FL115+ in this sector. No additional operating arrangements are required.	
<b>2.21</b>	<b>Where terminal and en-route structures adjoin, is the effective integration of departure and arrival routes achieved?</b>	<b>N/A</b>
	No such structures exist in this area.	

<b>3.</b>	<b>Supporting Resources and CNS Infrastructure</b>	<b>Status</b>
<b>3.1</b>	<b>Is the evidence of supporting CNS infrastructure together with availability and contingency procedures complete and acceptable? The following are to be satisfied:</b>	
	<ul style="list-style-type: none"> <li>▪ <b>Communication:</b> Is the evidence of communications infrastructure including RT coverage together with availability and contingency procedures complete and acceptable? Has this frequency been agreed with S&amp;S Section?</li> </ul>	<b>YES</b>
	No change to existing communication infrastructure is necessary as part of the proposed preferred solution.	
	<ul style="list-style-type: none"> <li>▪ <b>Navigation:</b> Is there sufficient accurate navigational guidance based on in-line VOR or NDB or by approved RNAV derived sources, to contain the aircraft within the route to the published RNP value in accordance with ICAO/ Eurocontrol Standards? eg. Nav aids – has coverage assessment been made eg. a DEMETER report, and if so, is it satisfactory?</li> </ul>	<b>N/A</b>
	Not applicable.	

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	<ul style="list-style-type: none"> <li>▪ <b>Surveillance:</b> Radar Provision – have radar diagrams been provided, and do they show that the ATS route/ airspace structure can be supported?</li> </ul>	<b>YES</b>
<p>Radar diagrams have not been provided but the completed surveys indicate that very few aircraft operate in this area and no aircraft without transponders were observed to operate in the area. The area is well covered by the RAF Leuchars Watchman PSR that is capable of providing a service to 40nm, some 10nm east of the eastern most boundary of the proposed TMZ.</p>		
<b>3.2</b>	<p><b>Where appropriate, are there any indications of the resources to be applied, or a commitment to provide them, in line with current forecast traffic growth acceptable?</b></p>	<b>YES</b>
<p>The current resourcing at RAF Leuchars permits the provision of a 24-hr LARS and the unit also operates on a 24-hr basis as a diversion airfield. The unit has the resource to provide the proposed service, as it does now, to aircraft operating in the TMZ areas.</p>		
<b>4.</b>	<b>Maps/Charts/Diagrams</b>	<b>Status</b>
<b>4.1</b>	<p><b>Is a diagram of the proposed airspace included in the proposal, clearly showing the dimensions and WGS84 coordinates? (We would expect sponsors to include clear maps and diagrams of the proposed airspace structure(s) – they do not have to accord with AC&amp;D aeronautical cartographical standards (see CAP725), rather they should be clear and unambiguous and reflect precisely the narrative descriptions of the proposals. AC&amp;D work would relate to regulatory consultation charts only).</b></p>	<b>YES</b>
<p>Yes. For the final designs, charts and coordinates will be provided and these will be sufficient to provide the required detail for cartographic purposes.</p>		

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<b>4.2</b>	<b>Do the charts clearly indicate the proposed airspace change?</b>	<b>YES</b>												
	<p>The proposed TMZ and geographic WTG boundaries are clearly indicated on the supplied charts. The exact data points will be provided when the developer finalises the exact WTG locations and determines the exact coordinates for the amended proposal positions (see 1.4 above). Additionally, vertical dimensions are clearly marked.</p>													
<b>4.3</b>	<b>Has the Change Sponsor identified AIP pages affected by the Change Proposal and provided a draft amendment?</b>	<b>ONGOING</b>												
	<p>This work is in progress at the time of this assessment and will be necessarily completed to meet the AIRAC implementation dates in line with the timescales below:</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 20%; text-align: center;">NNG</th> <th style="width: 20%; text-align: center;">IC</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">First WTG erected</td> <td style="text-align: center; padding: 2px;">1 Apr 17</td> <td style="text-align: center; padding: 2px;">1 Apr 19</td> </tr> <tr> <td style="padding: 2px;">Last WTG erected</td> <td style="text-align: center; padding: 2px;">1 Dec 19</td> <td style="text-align: center; padding: 2px;">1 Jun 21</td> </tr> <tr> <td style="padding: 2px;">First generation</td> <td style="text-align: center; padding: 2px;">1 Apr 19</td> <td style="text-align: center; padding: 2px;">1 Sep 21</td> </tr> </tbody> </table>			NNG	IC	First WTG erected	1 Apr 17	1 Apr 19	Last WTG erected	1 Dec 19	1 Jun 21	First generation	1 Apr 19	1 Sep 21
	NNG	IC												
First WTG erected	1 Apr 17	1 Apr 19												
Last WTG erected	1 Dec 19	1 Jun 21												
First generation	1 Apr 19	1 Sep 21												

5.	Operational Impact	Status
5.1	<p><b>Is the Change Sponsor’s analysis of the impact of the change on all airspace users, airfields and traffic levels, and evidence of mitigation of the effects of the change on any of these, complete and satisfactory?</b>  <b>Consideration should be given to:</b>  <b>a) Impact on IFR GAT, on OAT or on VFR general aviation traffic flow in or through the area.</b></p>	<b>YES</b>
	<p>There is no negative impact associated with the introduction of the proposed TMZ. Non-transponding traffic would not be denied access if under Leuchars control. The stated survey shows that no such traffic has been observed in the development areas.</p>	

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	<b>b) Impact on VFR Routes.</b>	<b>YES</b>
	There will be no impact on any VFR routes.	
	<b>c) Consequential effects on procedures and capacity, ie on SIDS, STARS, holds. Details of existing or planned routes and holds.</b>	<b>N/A</b>
	No change to any current procedures.	
	<b>d) Impact on Airfields and other specific activities within or adjacent to the proposed airspace.</b>	<b>YES</b>
	Other airfields that operate in the local area responded to the consultation stating they did not object to the proposal.	
	<b>e) Any flight planning restrictions and/ or route requirements.</b>	<b>N/A</b>
	Nil.	
<b>5.2</b>	<b>Does the Change Sponsor Consultation letter reflect the likely operational impact of the change?</b>	<b>YES</b>
	Yes. Following a review of the original document by the CAA, the language used and the technical explanation was tailored to ensure non-aviation audiences could understand the concept and associated issues.	
<b>6.</b>	<b>Economic Impact</b>	<b>Status</b>
<b>6.1</b>	<b>Is a provisional economic impact assessment to all categories of operations and users likely to be affected by the change included and acceptable? (This may include any forecast capacity gains and the cost of any resultant additional track mileage).</b>	<b>YES</b>



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	<p>The imposition of this TMZ is not assessed to be significant from an economic perspective. There will be little, if any, traffic displacement resulting from this change and as stated, no non-transponder aircraft were seen to operate in the area during the traffic survey. The change will have no impact on transponder equipped aircraft that normally operate or transit this area.</p>
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<b>Case Study Conclusions – To be completed by AR Project Leader</b>		<b>Yes/No</b>
<b>Has the Change Sponsor met the AR Airspace Change Proposal requirements and Airspace Regulatory requirements above?</b>		<b>Yes</b>
<p>The Change Sponsor has been fully compliant with the process. It was assessed that the original proposed solution represented a disproportionate re-designation of airspace when balanced against the level of aviation activity in the development area. The sponsor was subsequently able to broker an alternative solution that mitigates the stated MOD risks and has no effect on other airspace users or ANSPs routinely operating in this area.</p>		
<b>Outstanding Issues</b>		
<b>Serial</b>	<b>Issue</b>	<b>Action Required</b>
1		

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### Additional Compliance Requirements (to be satisfied by Change Sponsor)

Serial	Requirement
1	<p>RAF Leuchars will need to maintain the following records following implementation in preparation for the PIR:</p> <ul style="list-style-type: none"> <li>• Record full details of each occasion when known or unknown traffic operates in the TMZ geographic area.</li> <li>• Record full details of each occasion when traffic requests, and is given permission, to operate in the TMZ.</li> <li>• Record full details of all instances and associated reasoning when access to the TMZ is denied by a Leuchars controller.</li> <li>• Record full details of all unauthorised intrusions into the TMZ by non-transponder equipped aircraft.</li> </ul> <p>Record any effects on published or local procedures as a result of the TMZ introduction.</p>
2	<p>RAF Leuchars to demonstrate the extent of radar clutter present without RAG blanking by ensuring radar screen shots are captured during the WTG build phase.</p> <p>The implementation plan is to notify the TMZ at an AIRAC cycle coincident (as far as possible) with the erection of the first WTG. In order to minimise any work required at the PIR stage, the effect of clutter on the PSR will be monitored in a controlled fashion during the erection phases. At a suitable point as the radar clutter builds, the radar blanking will be introduced. This will avoid the requirement (at the PIR stage) to demonstrate clutter by removing the radar blanking; this could be expensive, time consuming and would introduce an unnecessary level of operational risk.</p>

### Recommendations

**Yes/No**

**Is the approval of the SoS for Transport required in respect of the Environmental Impact of the airspace change?**

**No**

The CAA Environmental Research assessment concludes that no overall environmental benefit is likely, and the sponsor has not set out to claim any such benefit. The key reasons for proposing this change do not include environmental ones. Acknowledging the scale, characteristics and current activity in the area of the TMZ, the Sponsors' case for a minimal (if any) environmental impact is reasonable and supported to the extent that is possible. If implemented, monitoring the occurrence of any refusals to access the TMZ will provide evidence at the PIR of the scale of any environmental impacts. Ministerial approval is not required.

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**Is the approval of the MoD required in respect of National Security issues surrounding the airspace change?**

**No**

There are no issues associated with National Security, but MoD supports the introduction of a TMZ to mitigate the effects of the wind turbines on the RAF Leuchars PSR.

### General Summary


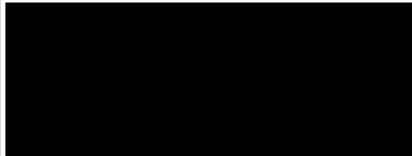

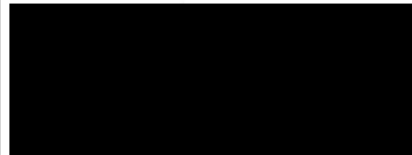
The proposed solution presented in this ACP has been designed to mitigate the issue of WTG induced radar clutter on the PSR at RAF Leuchars. This effect was cited by MOD as the objection to the NNG & IC windfarms as proposed by their respective developers. Leuchars controlled activity levels in the development areas are low, however the stated effects of clutter on the PSR are well documented in CAP 764 (CAA Policy and Guidance on Wind Turbines). It is therefore necessary to mitigate these effects by introducing a TMZ with associated RAG blanking.

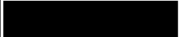

The original proposed TMZ was assessed to be larger than necessary to mitigate the known effects. An amended proposal was developed by MOD and the Sponsor that comprises 2 x TMZs, each with an associated radar buffer to mitigate the known radar shadow effect caused by diffraction of electromagnetic waves around the WTGs.

### Comments & Observations


If approved, the implementation and WTG build timescales will be fully described in the CAA Information Notice well ahead of planned implementation dates. Any TMZ established to mitigate clutter effects on a PSR should be regularly reviewed to determine when a technical solution might be available as a more appropriate solution.

## Safety and Airspace Regulation Group

Operational Assessment Sign-off/ Approvals	Name	Signature	Date
Operational Assessment completed by:	 AR Case Officer		8 Mar 16
Operational Assessment approved:	 Mgr AR		7 Apr 16
Mgr AR Comments: I think the cutting down of the original single large TMZ with a buffer around the RAG to two smaller ones with a buffer on the leeward side is a more proportionate solution.			

Hd AAA Comment/ Approvals	Name	Signature	Date
Operational Assessment Conclusions approved:	 Hd AAA		29 Apr 16
Hd AAA Comments: This proposal resolves a current operational problem in an area in which little operational activity takes place. A technical solution to the issue of clutter created by WTGs would be a better solution. This situation should be kept under review and the TMZ should only go ahead if a technical solution is not available.			

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<b>GD SARG Decision/ Approval</b>	<b>Name</b>	<b>Signature</b>	<b>Date</b>
GD SARG Decision:  Approved	Mark Swan GD SARG		6 May 16
GD SARG Comments: NIL			