

Welsh Government
Cathays Park
Cardiff
CF10 3NQ
FOA Giulia Bazzoni

7th January 2025

Dear Ms. Bazzoni,

RE: Mynydd Maen Wind Farm

1. The Nature and Extent of the Identified Interference

Using the RES in-house aviation expertise, and in consultation with Cardiff Airport and NATS, agreement has been reached between those parties that simple line of sight exists between Cardiff Airport and the proposed turbines which is sufficient to raise a possibility that interference could impact the airport's primary surveillance radar. This is relatively "standard" interference that could occur based on the following general principles.

Wind turbines are large reflective objects that can have an impact on air traffic control (ATC) radars if located within the coverage range of an airport's surveillance systems. Radars transmit pulses of energy that are reflected back to the radar receiver by an object that is in the radar line of sight, that can include wind turbines. The severity and significance of the impact depends on the size of the turbine, its orientation, cumulative impacts with other wind farms, terrain, radar receiver sensitivity and the weather.

In this case, the proposed Mynydd Maen Wind Farm is approximately 35 km from, and in line of sight to, the primary surveillance radar (PSR) at Cardiff Airport and approximately 40 km from the Bristol Airport primary radar. There are several operational wind farms that are also within radar line of sight to the Cardiff Airport and the airport has, until now, managed the impact. However, it is our understanding that the air navigation service provider (ANSP) at Cardiff now maintains that any further wind farm development in the area will require mitigation due to cumulative impacts.

Beyond this "in principle" acceptance of the possibility of impact, further modelling has not been undertaken as to the likely extent of the impact as this would ordinarily form part of the design of any mitigation scheme.

Energy reflected back to the radar receiver from the wind farm can create false returns to the radar, commonly known as "clutter". This issue can be made worse when there are many wind farms in close proximity that create a cumulative impact and, thus, larger areas and densities of clutter. With wind farms, the effect of clutter can be exacerbated by the fact that, as the radar antenna rotates, different blades from different turbines may be "illuminated" on each rotation, giving the appearance on the radar screen of a moving object, returns which can be similar to small

aircraft. Ultimately, this can result in the loss of small targets and reduction in the maximum range of which targets can be detected. “Shadow” regions can also be created above and beyond the wind farm, hiding any aircraft flying within this area.

It should be noted from the above analysis that these impacts would be the result of multiple wind farms anticipated by Cardiff Airport, in addition to Mynydd Maen. Consequently, a suspensive planning condition requiring this issue to be addressed in the future will provide more certainty to emerge on the future potential wind farms that would need to be allowed for in any mitigation solution. Conversely, if that radar solution was required to be defined now, it would likely involve substantial, potentially abortive, work on behalf both the applicant and the airport that would then potentially need to be significantly revised to allow for further wind farm proposals.

2. Likely Proposed Mitigation Measures and the Impact of that Mitigation on the Proposed Mynydd Maen Wind Farm

There are several different categories of mitigation available to manage the impact of wind turbines on radars.

Blanking solutions

One of the simplest forms of mitigation is blanking. In some situations, and dependent on the operational significance of the airspace above the wind farm, cells of the radar display can be blanked so they show no radar response.

Similar to blanking, but more sophisticated, non-auto initiation zones (NAIZs) can be defined around areas of turbine clutter to prevent tracks initialising in the vicinity of the site within the area of interest.

In-fill radars

A number of radar manufacturers have developed in-fill solutions specifically designed to mitigate the impact of wind farms on ATC radars. These can be traditional, two dimensional radars that measure only range and bearing of the target or three dimensional radars that can also measure the target altitude. There are also radars that utilise high-pulse repetition frequency (PRF), which can discriminate between aircraft and wind turbines by analysing their specific returns, thereby removing the turbine clutter from the display. In general terms, infill radars integrate “clean” data with the impacted radar data so that a complete air situation picture can be produced by combining the two results. An example is:

- Terma SCANTER 4002 which is designed for detection and separation of small air targets and large surface targets like wind turbines. To achieve simultaneous good performance for air and surface detection, the radar system is designed as a two dimensional coherent X-band radar with pulse compression and advanced moving target processing, which provides enhanced detection of small air targets.

Spectrum filters

Some existing primary radars can be adapted to incorporate software to discriminate between turbines and aircraft radar returns. The Thales Star NG radar has advanced processing capability and an option to utilise a Wind Farm Filter (WFF), which although have yet to be fully proven to

mitigate the effects of wind farms (offshore trials commenced in November 2024), could well prove a cost effective solution.

The critical factors to be aware of in relation to the above are that:

- the technology being referred to is in most cases proven, effective and in present operation in very similar situations to that proposed at Mynydd Maen Wind Farm. Whilst the Thales Star NG equipment mentioned above is an example of developing technology, it is one that would be an additional solution to those presently available.
- the technology involved has the potential to be located within the airfield perimeter, rather than in any remote location; this will be subject to airport agreement/approval. It is possible that this equipment might comprise development of itself requiring planning permission but is equally possible that it would be equipment either not requiring planning permission at all or benefitting from permitted development rights, being located within the operational land controlled by the airport itself.
- this also means that the potential mitigation being suggested will not involve any change to the Mynydd Maen Wind Farm proposal itself. Accordingly, any mitigation works contemplated by the condition being proposed are not intended to be authorised by the planning condition as additional elements of the Mynydd Maen Wind Farm or change the nature of the proposal in its site area in any way.

3. Compliance of the Draft Condition

As is included within paragraphs 13.2.19 - 13.2.21 in Chapter 13: Aviation and Electromagnetic Interference within the ES, a planning condition has been agreed with Cardiff Airport, as below:

No turbines shall be erected until a scheme for the mitigation of impact of the wind turbines on the operation of Cardiff Airport primary surveillance radar (the “radar mitigation scheme”) has been submitted to and approved in writing by the Local Planning Authority. The development shall thereafter be operated fully in accordance with the approved radar mitigation scheme throughout the operational life of the development.

A planning condition has also been agreed with Bristol Airport, as below:

No turbines shall be erected until a scheme for the mitigation of impact of the wind turbines on the operation of Bristol Airport primary surveillance radar (the “radar mitigation scheme”) has been submitted to and approved in writing by the Local Planning Authority. The development shall thereafter be operated fully in accordance with the approved radar mitigation scheme throughout the operational life of the development.

Our assumption is that there could be two potential areas of concern here. The first is whether sufficient detail is being given as to the content of the potential mitigation and second, the extent of development being permitted prior to the radar mitigation being agreed. Both concerns are dealt with below.

The condition as proposed does not describe the content of the mitigation required. Whilst it might appear to offer greater security to have the content of that radar mitigation approved now, imposing a condition requiring the radar mitigation to be approved after the grant of planning

permission is likely to result in a better overall solution for the airport as it can integrate that radar mitigation with further wind farm proposals that are being brought forward. Accordingly, the condition is sufficiently precise to be effective, without being unnecessarily over prescriptive.

The nature of mitigation that may be required is well established (as described above) and so there should be no concern that a position could emerge where no suitable radar mitigation is available. Accordingly the condition ensures that the developer can reasonably be expected to fulfil its requirements.

The condition as proposed is not intended to authorise specific work, but to secure the design, agreement and delivery of works that may or may not require planning permission. No attempt is being made to grant planning permission via the condition at the Mynydd Maen site, at the Airport or anywhere else, so it complies with the guidance that the planning permission (and conditions) should be clear on what development has been authorised.

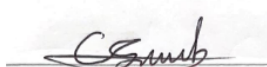
The final issue relates to how much, if any, of the development should be allowed to take place before the radar mitigation has to be agreed. The condition as drafted provides for development to proceed with the exception of attachment of the blades unless and until a scheme for the mitigation has been agreed.

You will have noted that these other examples provide a range of implementation thresholds prior to approval of the radar mitigation, from turbines being erected but used only for testing, to no development commencing prior to the radar mitigation being agreed. There is no need in the present case to restrict commencement of development beyond what has been suggested in the draft condition. Whilst it would be within the Welsh Ministers' powers to do so, it would be unduly restrictive and serve no reasonable planning purpose to do so as Mynydd Maen is a situation where the condition only needs to prevent operation that could cause interference with the airport, until a solution is agreed from within a number of proven remedies that exist to deal with such interference.

To unnecessarily delay implementation of the development until the optimum point for agreement of the radar mitigation would not secure that mitigation any more effectively but it would create in the region of 12 months delay to the final completion of the project. This delay to a development of national significance is quite avoidable without risk to any material considerations of acknowledged importance in the planning system.

Any formulation of planning condition that prohibits development or aspects of development until works not specified in the planning permission are known as Grampian Conditions. Such Grampian style prohibition can be to occupation of the development, equivalent in the Mynydd Maen case to attaching the turbine blades. Therefore, reasonable prospects that the condition can be discharged have been fully demonstrated as being possible from a range of existing, effective solutions.

Sincerely,



Elliot Smith

Development Project Manager