

# RenewableUK Members' Briefing Note

Aviation Safeguarding and Radar Mitigation: Introductory Overview

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## Acknowledgements

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## Disclaimer

The contents of these guidelines are intended for information and general guidance only, do not constitute advice, are not exhaustive and do not indicate any specific course of action. Detailed professional advice should be obtained before taking or refraining from action in relation to any of the contents of this guide or the relevance or applicability of the information herein.

# Introduction

RenewableUK's Aviation Working Group (AWG) has prepared these notes, drawing on their experience which outline the key considerations for developers when dealing with aviation stakeholders.<sup>1</sup> This Briefing Note (BN) includes an introduction addressing the general issues of aviation safeguarding.

Issue 1 was released to RenewableUK members in October 2016 at its Wind & Aviation Workshop, Liverpool with stakeholders and members. Amendment 1 (v1.1) includes some very minor editorial corrections in preparation for being shared with delegates of the RenewableUK Wind & Aviation 2019 event in April 2019. The guidance has not been updated; **this may be done during 2019/20 following post-event feedback.**

Overall it notes specifically relations with civil airports and NATS En Route (NERL). In due course, it is envisaged a later version will include relations with the Ministry of Defence (MoD) in connection with both air traffic control (ATC) and air defence (AD) radar, and that it will extend to include en-route aviation lighting safeguarding and mitigation, and any changes from any updated regulations, policies and guidance since Issue 1.

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16 January 2019

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1. This Briefing Note has been developed by members of the Aviation Working Group and input from the CAA's Aviation Safety Initiative Windfarms Working Group members

## Aviation Safeguarding

These are complex issues – The aviation/wind turbine issue is technically and operationally complex, and mitigation solutions frequently involve detailed commercial considerations. Aviation objections are rarely resolved quickly; developers should be mindful of the costs and timescales involved in mitigation identification and delivery. While safeguarding aviation assets is central to the role of aviation stakeholders, devising mitigation strategies for the benefit of developers is not.

Developers should note that before being required to provide mitigation, aviation stakeholders' objections to turbine developments must be substantiated (evidence based, reflecting real-world safety, technical and operational considerations) in accordance with CAP 764: CAA Policy and Guidance on Wind Turbines.<sup>2</sup> Such assessments are often conducted by the aviation stakeholder's Air Navigation Service Provider (ANSP). It is incumbent upon the developer to liaise with the appropriate aviation stakeholder to discuss – and hopefully resolve or mitigate – aviation related concerns. However, if these discussions break down or an impasse is reached, the Civil Aviation Authority (CAA) can be asked to provide objective comment. It must be remembered that the CAA has no powers to either prevent wind turbine developments going ahead or to require that an aviation stakeholder remove their objection. The key point here is last resort, not an attempt to get leverage over an aviation stakeholder if things are proving difficult for the developer. Typically, in practice, the CAA would expect "impasse" to be called by the planning authority for this reason.

For example, just because a turbine is visible to an aviation stakeholder's radar does not automatically mean it will lead to an objection or require technical mitigation. If an objection is raised, the aviation stakeholder should have first established that the turbine would have a detrimental impact on the safety and/or efficiency of its air traffic service (ATS). If such a detrimental impact is reasonably predicted, the aviation stakeholder should consider operational mitigation, e.g. avoiding utilising the airspace in question, as well as technical mitigation, e.g. infill radar data; again this assessment maybe devolved to the ANSP.

## Aviation Stakeholders

The key aviation stakeholders who can object to wind turbines are:

- **NERL.** NERL provides the en-route ATS in the UK and North Atlantic through a regulated monopoly under license issued by Secretary of State for Transport<sup>3</sup> and regulated by the CAA. It maintains a network of communications, navigation and surveillance (CNS) infrastructure, most of which is officially safeguarded.
- **Civil Aerodromes.** These may be licensed or unlicensed (licence issued by the CAA), some of which are officially safeguarded. ATS may be provided with or without the assistance of radar. Some aerodromes subcontract provision of ATS to third parties, such as NATS (Services) Limited (NSL). Ultimate safety and planning accountability resides with the aerodrome.
- **MoD.** MoD operates an ATS for its bases using its own radar infrastructure; operates an "outside controlled airspace ATS" (ATSOCAS) using NERL radar infrastructure and facilities; provides AD surveillance and control using AD radar; provides range control radar services when ranges are operational; provides and oversees low flying training activities. Some of these functions are officially safeguarded.
- **Meteorological (Met) Office.** Met Office operates weather radar which can be impacted by turbines, most notably due to the weather radar confusing turbines with heavy rain.<sup>4</sup>

## Safeguarding

From a planning perspective, certain aerodromes and technical sites are "officially safeguarded".<sup>5</sup> Officially safeguarded sites tend to be civil aerodromes with passenger traffic, certain MoD airfields and certain key CNS infrastructure (including radar) used by NERL and the MoD. The significance of an aviation installation being officially safeguarded is that if the planning authority resolves to grant a planning application in the face of an objection by the aviation stakeholder, the application may be called in for consideration by the Government (either the Scottish Government or Department for Communities & Local Government (DCLG)). This could require the holding of a public inquiry to examine the issue and report to ministers. No such call-in right exists for unofficially safeguarded sites although the planning authority will weigh such objections when reaching its decision.

2. CAP764 6th edition Feb 2016

3. CAA NERL License Webpage

4. See Met Office Guidelines for further information on Met Office considerations

5. DfT/ODPM Circ 1/2003 – advice to local planning authorities on safeguarding aerodromes and military explosives storage areas and Planning Circ 2 2003 – Scottish Planning Series: Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosives Storage Areas) (Scotland) Direction 2003

## Why do Wind Turbines Attract Safeguarding Objections?

Wind turbines can have a safeguarding impact due to their physical impact or their technological impact. The 2002 Wind Energy and Aviation – Interim Guidelines<sup>6</sup> remain a useful introduction to this issue. The CAA has also produced CAP 764, which is a very useful key reference and is periodically updated.

Some aviation stakeholders do engage in pre-planning consultation (some for free, some for a fee), but any pre-planning advice is likely to be indicative only and non-binding. Safeguarding assessments should include consideration of the cumulative effects of surrounding developments and this assessment is by its nature dynamic.

## Physical Considerations

A wind turbine can be an aerodrome obstacle, if it is within reasonably close proximity to the aerodrome, e.g. within 15km, and infringes the Obstacle Limitation Surfaces (OLS)<sup>7</sup> of that aerodrome. Where the OLS is infringed, the aviation stakeholder may either object unconditionally to the obstacle or may accept the infringement provided the obstacle is lit. The OLS for civil and MoD aerodromes is essentially the same.

Obstacles, including wind turbines, close to a radar head may interfere with the beam formation of that radar and are likely to attract an objection from the aviation stakeholder, which may prove difficult to mitigate technically.

Wind turbines can also represent en-route obstacles onshore, particularly where the stakeholders conduct extensive low flying. Stakeholders usually request some form of obstacle lighting for turbines in areas in of low flying operations. Usually infra-red lights on the turbine nacelle will suffice.<sup>8</sup>

Under UK law it is mandatory to light all en-route obstacles of and over 150m above ground level (AGL) in accordance with Article 222 of the Air Navigation Order.<sup>9</sup> The CAA may also support applications by aviation stakeholders for en-route obstacles to be lit where they are less than 150m - where aviation safety requires it.

All structures over 300ft (approx. 91m) have to be charted and it is the responsibility of pilots to inform themselves of the obstacle context of the airspace

in which they fly. This is why developers are required to inform Defence Geographic Centre of the location and height of turbines (and met masts) when built. Developers should be aware that all aircraft should abide by the 500ft rule – that is, the aircraft needs to stay 500ft away from persons, vehicles, vessels and structures vertically and laterally (unless landing or taking off) and 500ft away from all obstacles. However, some operators are exempt from this rule during certain operations, specifically MoD and emergency services (including SAR).

## Technological Considerations

Radar objections to wind turbines have been the source of the most intractable safeguarding disputes for over a decade.

Wind turbines are most problematic to primary surveillance radar (PSR), which is either used for air traffic control or air defence – PSR detect non-co-operative, i.e. all, targets. The PSR is designed to detect moving targets and the turbine tips move at the speed of an aircraft and have a radar cross section not dissimilar to an aircraft. Put simply, the PSR reports a wind turbine as if it were an aircraft and this has the potential to confuse air traffic controllers/air defenders and, thus, may increase the risk and/or decrease the efficiency of the ATC/AD operations.

The other type of radar is secondary surveillance radar (SSR) – this is a co-operative system and relies on the aircraft's transponder responding to the SSR's interrogation signal. SSR is used extensively in ATC but in busy airspace it often has to be supplemented by PSR as not all aircraft must carry transponders or transponders may fail. Naturally, this does not help in an air defence context – the "bad guys" will not tell you they are coming! SSR can be affected by turbines but normally only where the turbines are within 10km of the SSR radar head.

In terms of a PSR objection, not only does the turbine have to be in radar line of sight (RLoS) and detected by the radar (it may be in RLoS but reflect insufficient power to be detected); but the resultant "clutter" generated by the turbine on the radar display must have an unacceptable safety and/or operational impact on the aviation stakeholder. Different aviation stakeholders have different operational requirements, e.g. airports are primarily concerned with aircraft landing and taking off; NERL is primarily concerned about higher level en-route airway traffic; the

6. 2002 Interim Guidelines

7. These are protected surfaces around the airfield to ensure safety of aviation

8. CAA ANO CAP 393

9. CAA ANO CAP 393

MoD's AD function focuses on identifying aircraft and controlling assets. This explains why different stakeholders respond differently to proposed wind farm developments.

Both civil and MoD aerodrome radar services tend to operate out to around 40nm, although as noted above, RLoS alone is not sufficient to support an objection – the turbine impact must also be operationally significant and the aviation stakeholder should be able to substantiate such representations, including to the CAA and planning authorities.

NERL and MoD AD radar operate at longer ranges so turbines may attract objections at distances over 40nm if they are in RLoS and the impact is operationally significant.

Weather radar currently have two safeguarding rings at 5km and 20km from the radar head. Turbine developments in RLoS within 5km of a Met Office radar are likely to attract absolute objections. Turbines in the 5-20km ring will be subject to further assessment and mitigation may be available.

Finally, other CNS equipment such as aerodrome's Instrument Landing Systems and/or Precision Approach Radar, radio navigation beacons such as Doppler VHF Omni Directional Radio Range (DVORs) and Air Ground Air communication links may be impacted by turbines. Like SSR impacts, these are rarer, but nonetheless if an objection on such grounds is substantiated by the aviation stakeholder, some form of mitigation will need to be implemented.

## Mitigation

The following parts of this BN focuses on the safeguarding process and radar mitigation options for the various stakeholder groups. Readers should seek professional advice for more detailed consideration of the issues raised in these notes.

## Abbreviations

<b>AD</b>	Air Defence
<b>AWG</b>	(RenewableUK's) Aviation Working Group
<b>ANSP</b>	Air Navigation Service Provider
<b>ATC</b>	Air Traffic Control
<b>ATS</b>	Air Traffic Service
<b>ATSOCAS</b>	Air Traffic Service Outside Controlled Airspace
<b>CAA</b>	Civil Aviation Authority
<b>CNS</b>	Communications Navigation and Surveillance
<b>NERL</b>	NATS (En Route) plc
<b>NSL</b>	NATS (Services) Limited
<b>MoD</b>	Ministry of Defence
<b>OLS</b>	Obstacle Limitation Surfaces
<b>PSR</b>	Primary Surveillance Radar
<b>RLoS</b>	Radar Line of Sight
<b>SSR</b>	Secondary Surveillance Radar

# Airports

Airport Safeguarding and Mitigation Process - Below, the AWG has put together what it believes reflects an example of an airport's processes, from pre-planning to mitigation agreement. It should be noted that each airport will have its own specific processes and will take into consideration its own master plan. Members are encouraged to have early engagement with airports, either directly, or through aviation experts who have an understanding and experience of engaging with airports.

## The Process

- **Site selection/feasibility study:** Review potential sites against safeguarding maps and tools.<sup>10</sup>
- **Pre-planning:** An option exists to commission NSL to provide a Technical and Operational Assessment (TOPA) (costing as per NATS website<sup>11</sup>) for airports supported by NSL, or contact the airport directly to see if they carry out this service (a charge may be incurred). Alternatively the developer may wish to commission a specialist to produce a report.
- **If a pre-planning report indicates a likely objection,** engage with the airport to determine the next steps, including for mitigation engagement.
- **If a pre-planning report indicates no-objection,** it is unlikely this will be a binding decision and may be reversed; this is particularly relevant if the subsequent planning applications are received in the vicinity of the pre-planning site – a new cumulative assessment will be undertaken by the aviation stakeholder which may result in a previous “no objection” becoming an “objection”.
- **Planning:** Airports will assess without charge under their (statutory) safeguarding processes. Airports should respond to planning authorities within the statutory timeframes set under planning law with a binding response of either “objection” or “no objection”. Optimally, objections should be accompanied by an assessment by the airport setting out the grounds of objection. If an “objection” is received, the developer can either:
  - Query the objection; or
  - Propose/seek to discuss mitigation options.
- **If the developer queries the objection,** the developer will need to provide evidence as to why it considers the objection to be unjustified, e.g. more detailed radar modelling, operational assessment. It is recommended that the developer should seek to meet with the airport to discuss evidence and better understand whether or not the objection is maintained.
- **If after discussion of the objection,** the parties remain in disagreement, the developer needs to consider what information it will put into public domain, i.e. in submission to planning authority, and whether it will seek to contest this objection at appeal. Inquiry session will allow for cross examination of both sides' positions to be fully tested but it is not without risk and cost.
- **Where a developer seeks to meet with the airport to discuss mitigation options,** the airport will propose deployment of existing mitigation if available, or a mitigation scheme process, if one is established. Joining mitigation schemes is likely to require completion of an NDA and incur a financial cost, sometimes involving more than one payment. Joining a mitigation scheme should lead to (suspensive) conditions being agreed.
- **If no existing mitigation is available,** usually it is up to the developer to propose new mitigation for the airport to review – this will require a case for the proposed mitigation for the airport to evaluate. This process can be very time consuming and expensive.
- **Where a mitigation option has been proposed by the airport,** the airport will probably require the developer to sign commercial contracts before it will lift its objection subject to the imposition of (suspensive) conditions.
- **An airport's (suspensive) conditions may follow the structure of:**
  - No development to commence or turbine to be erected (depends on size of development and developer's requirements) until radar mitigation scheme (RMS) agreed between airport and developer and approved by planning authority;
  - No turbine to operate or blade to be attached until RMS implemented; thereafter RMS to be maintained.
- **Process of identifying acceptable mitigation option and agreeing contracts can vary greatly from airport to airport,** taking from 3-12 months – or even longer if working on a new mitigation scheme.

10. The Archived RESTATS Aviation Webpage has been useful in the past to assist in identifying aerodrome zones, although does not provide radar line of sight (RLoS) indications for civil aerodromes. CAA Windfarms Webpage has some useful information and links to references, tools etc. Officially safeguarded aerodrome obstacle safeguarding maps are lodged with the relevant planning authorities.

11. NATS Windfarms Webpage



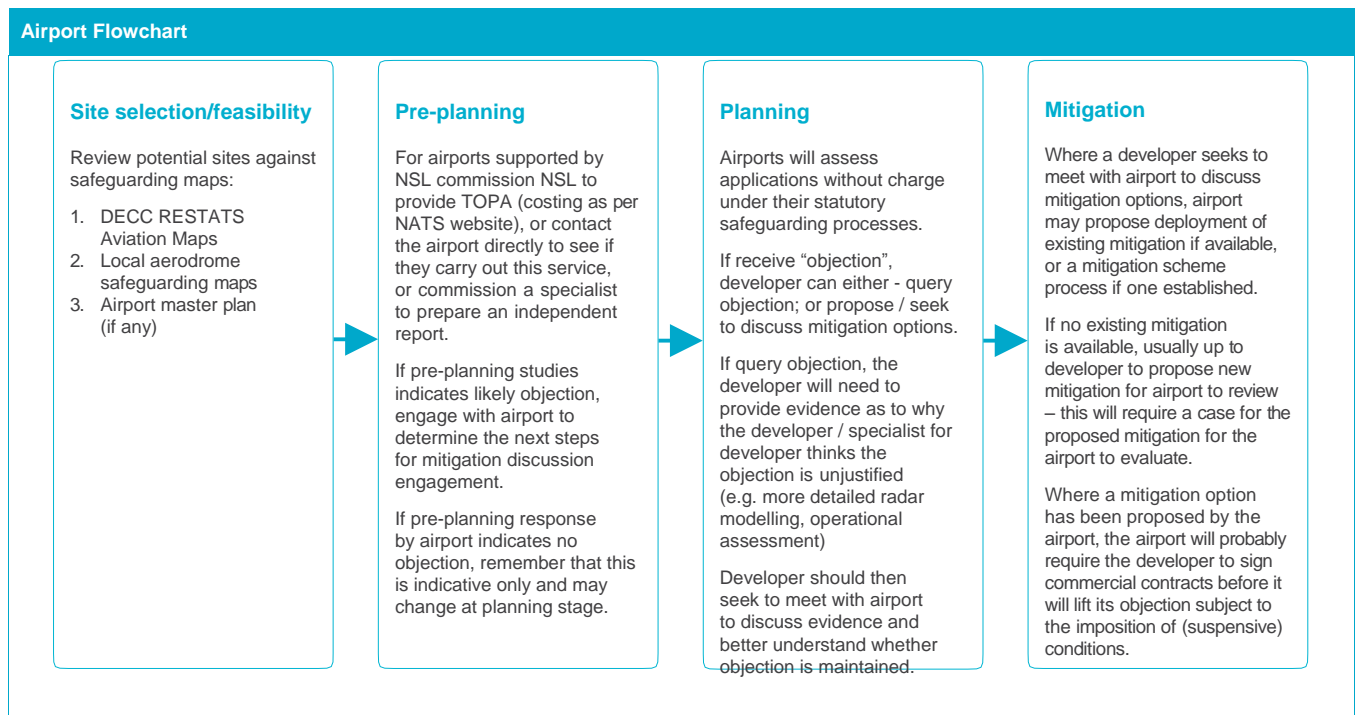
### Known Mitigation Options for Airports

A number of mitigation solutions have been successfully implemented at UK airports. Further, there are new technologies and approaches which are being considered by airports. What follows is a brief summary:

- **Single cell and small area blanking on the airport’s radar:** This option is understood to have been used at Glasgow, Edinburgh, Aberdeen and Newcastle airports. It should be noted this option depends on the inherent capabilities of the airport’s radar (i.e. not all radar can do it), is only available on a case by case basis and is generally used for small scale projects.
- **Terrain-shielded in-fill radar:** These are standard ATC radar which, as a result of terrain shielding, do not detect the turbines but do detect the airspace above. Their feed is then integrated into the host radar display. They have been installed at Kincardine for Glasgow and Edinburgh Airports (to mitigate Whitelee and Blacklaw wind farms initially) and Little John/Hibaldstow Radar for Robin Hood Airport Doncaster Sheffield (to mitigate Tween Bridge and Keadby wind farms initially).
- **Transponder Mandatory Zone (TMZ):** This option has been agreed on a case by case basis for offshore windfarms only. In addition to the TMZ, the turbine returns on the primary radar need to be blanked, suitable SSR coverage and CAA authorisation to provide radar services in the TMZ using SSR only. The first TMZs to mitigate windfarms were applied over London Array and Thanet Offshore Windfarm for Manston airport. Since Manston’s closure, the Thanet TMZ has been cancelled but the London Array TMZ continues to assist Southend airport.

- **“Wind farm tolerant” in-fill radar:** These radars rely on technology rather than terrain shielding to not detect the turbines. Current market leaders in this regard in the UK are the Terma Scanter 4002 and the Aveillant Theia series. They are being or have been installed at East Midlands,<sup>12</sup> Chester Hawarden/ Liverpool John Lennon, Edinburgh and Newcastle airports. Other airports, including Glasgow, Prestwick and Durham are considering this option.
- **“Next Generation” radar:** A number of radar manufacturers are developing what they term “next generation” radar which includes an element of “wind farm tolerance”, which either comes in the form of a bolt-on “wind farm filter” or are inherent to the radar design. No “wind farm tolerant” Next Generation radar has yet been installed in the UK and approved by a CAA safety case, but work continues on these radars and some airports have expressed an interest in such a holistic mitigation solution. Further, some existing radar have advanced processing capabilities which afford a degree of “wind farm tolerance” in particular circumstances – for example, Raytheon’s S and L band radar (as used by NERL at Lowther Hill and Great Dun Fell and, it is understood, Liverpool airport, as well as at military bases in the Netherlands).

It should be noted, that a mitigation tool agreed at a specific airport for a specific wind project will not necessarily be suitable for other projects at that airport, or other airports. Some airports may be able to host a number of mitigation tool strategies, while others may only wish to host one mitigation tool and other airports may not have reached a definitive mitigation strategy to date.



12. Terma announced in summer 2016 contracts with NATS to mitigate windfarms at 3 airports – and <https://www.terma.com/press/news-2016/terma-provides-wind-turbine-mitigation-radar-for-nats/> and Aveillant announced on 22 September 2016 the completion of the safety case and the CAA’s operational approval for its Theia 16A radar at East Midlands Airport in respect of the Spondon Reservoir Windfarm - <http://www.aveillant.com/news/aveillant-radar-receives-cao-operational-approval-east-midlands-airport/>



# NATS En Route

## NERL Safeguarding and Mitigation Process

Below, the AWG has put together what it believes reflects an example of NERL's processes, from pre-planning to mitigation agreement. It should be noted that developers are recommended to confirm the latest process and options with NATS' NERL and NSL. Members are encouraged to have early engagement with NERL, either directly, or through aviation experts who have an understanding and experience of engaging with NERL.

### The Process

- **Site selection/feasibility study:** Review potential sites against NERL safeguarding maps.<sup>13</sup>
  - **Pre-planning:** An option exists to commission NATS to provide a Technical and Operational Assessment (TOPA) (costing as per NATS website<sup>14</sup>). It is not mandatory to commission a TOPA, but is the only way to be assured of formal pre-planning engagement from NERL. Alternatively the developer may wish to commission an independent specialist to produce a report. A TOPA can include both NERL and airports where NATS either provides an air traffic service, or has a pre-planning agreement (please refer to NATS website). *Note that due to external factors (e.g. cumulative impact) pre-planning TOPA results are not binding on NERL (or the airport).*
  - **If a pre-planning report indicates NERL is likely to object,** developers may need to engage with NATS on a consultancy basis in order to have engagement from NERL. It should be noted that due to potential cumulative impact and other external factors, NERL cannot commit to mitigation under pre-planning.
  - **If a pre-planning report indicates no-objection,** while NATS endeavours to honour its position, other external factors may become present in the formal planning process which will mean the pre-planning report is not binding and a prior indication may be reversed. This is particularly relevant if subsequent planning applications are received in the vicinity of the pre-planning site – a new cumulative assessment will be undertaken by the aviation stakeholder which may result in a previous “no objection” becoming an “objection”.
  - **Planning:** NERL will assess (and produce a TOPA) without charge under its (statutory) safeguarding
- processes. NERL is good at responding to planning authorities within the statutory timeframes set under planning law with a binding response of either “objection” or “no objection”. Objections will be accompanied by the TOPA setting out the grounds on which NERL is objecting and the cumulative context applicable to that objection. If an “objection” is received, the developer can either:
- Query the objection; or
  - Propose/seek to discuss mitigation options.
- **Prior to querying the objection,** the developer should review the cumulative map NATS includes at the end of the TOPA report. This map details the applications NATS has considered in its cumulative assessment of the proposal. As NATS is not formally notified by Planning Authorities of planning decisions, its cumulative assessment may have included applications that are no longer in planning (refused or withdrawn). Should the developer identify applications no longer in planning, they should bring these to NATS's attention together with any evidence or planning references. This allows NATS to verify the status of the applications to re-run the cumulative assessment.
  - **If the developer queries the objection,** the developer will need to provide evidence as to why it considers the objection to be unjustified, e.g. more detailed radar modelling, operational assessment. It is recommended that the developer should seek to meet with NERL to discuss evidence and better understand whether or not the objection is maintained.
  - **If after discussion of the objection,** the parties remain in disagreement, the developer needs to consider what information it will put into public domain, i.e. in submission to planning authority, and whether it will seek to contest this objection at appeal. Inquiry session will allow for cross examination of both sides' positions to be fully tested but it is not without risk and cost.
  - **Where a developer seeks to meet with the NERL to discuss mitigation options,** NERL will propose deployment of an existing mitigation if available.
  - **If no existing mitigation is available,** usually it is up to developer to propose a new non-standard mitigation for NERL to review – this will require a case for the proposed mitigation for NERL to evaluate. This process can be very time consuming and expensive. While NERL will review proposals developers submit, it should be noted that NERL

13. Points to note: these maps are indicative only and use a 100m DTM (more refined results may be achieved by specialists using a more granular DTM). The maps are for NERL assets only, not for NSL airport assets - NATS Windfarms Webpage

14. NATS Windfarms Webpage

will normally have made a significant effort in identifying any mitigation. If NERL's position is that of "no mitigation" this normally indicates that all standard options, as well as any other potential or unlikely (yet tangible) options have been considered.

- **Where a mitigation option has been proposed by NERL**, NERL will require the developer to sign a mitigation and services (M&S) contract before it will lift its objection. The M&S contract will specify whether the objection is lifted absolutely or subject to the imposition of (suspensive) conditions. NSL is also a party to the M&S contract as NSL performs the mitigation implementation and maintenance services on NERL's infrastructure on behalf of the developer.
- **NERL's standard (suspensive) conditions follow the structure of:**
  - No development to commence or turbine to be erected (depends on size of development and developer's requirements) until radar mitigation scheme (RMS) agreed between NERL and developer and approved by planning authority;
  - No turbine to operate or blade to be attached until RMS implemented; thereafter RMS to be maintained.
- **Process of identifying acceptable mitigation option and agreeing contracts can vary greatly**, taking from 3-12 months – or even longer if variations to standard NERL contracts are required.

### Current Mitigation Options

NERL has a suite of mitigation tools currently available to deal with NERL radar objections. These include:

- **Project RM:** This involves a windfarm upgrade to NERL's long range Raytheon radars. To date, only two radars have been upgraded under Project RM, Lowther Hill and Great Dun Fell, reflecting where the areas of greatest developer mitigation need, and benefitting in the first instance Blackcraig and Ray wind farms. Project RM upgrades to other NERL Raytheon radar will be considered on a case by case basis (it will fall to the beneficiary developer to fund the upgrade, with the opportunity to recover contributions from later beneficiary developers). There are limitations to Project RM's application and each application is assessed on a case by case basis. As Project RM entails an increase in the height of radar cover, its acceptability will depend on what base of cover NERL requires in particular airspace to provide its services. For more detailed information, see the Project RM Brief and FAQ documents within the RenewableUK members' Aviation webpages.
- **Project RM update:** NERL announced on 23 June 2016 that while the Project RM upgrade

had been successfully deployed at Great Dun Fell and Lowther Hill PSR to mitigate the Ray and Blackcraig wind farms, NERL has failed to achieve the expected 1.2 degree sterile zone above turbine tips, but rather the deployment had only achieved a 2 degree sterile zone. This change significantly reduces the availability of the Project RM mitigation option and may render some previously Project RM mitigatable developments "unmitigatable" as no legacy mitigations (following) may be available. It is understood that work is continuing to ascertain whether the Project RM performance can be improved to achieve the expected outturn.

- **Single cell and small area blanking:** this option is usually limited to areas of less than 1nm<sup>2</sup>, i.e. a circle with a radius of 1045m.
- **Blanking and infill:** This mitigation option was extensively explored and explained in the Scottish Government's 2010 South West Scotland Radar Report<sup>15</sup> – this report remains highly informative and articulates the NERL rationale for multiple infill radar cover in certain circumstances. Blanking and infill mitigations require the developer, in addition to agreeing the M&S contract, to agree a contract for radar data where that radar data is not provided from within NERL infrastructure base – e.g. an ORRD (onward routed radar data) contract with NSL for feeds from Glasgow, Edinburgh,<sup>16</sup> Cumbernauld or a contribution contract with ScottishPower Renewables in respect of Kincardine data. The Cumbernauld radar was built as a terrain shielded infill radar to mitigate the impact of the Clyde wind farm on Lowther Hill.
- **Transponder Mandatory Zone (TMZ):** This option has been agreed on a case by case basis for offshore windfarms only. In addition to the TMZ, the turbine returns on the primary radar need to be blanked, suitable SSR coverage and CAA authorisation to provide radar services in the TMZ using SSR only. NERL is utilising TMZs to mitigate the impact of the Humber Gateway and Greater Wash offshore windfarms on its services.

For more detail on NERL's general principles for mitigation and services contracts, see slides 9 of the Project RM Brief on the RenewableUK members' webpages.

In respect of Project RM and blanking and infill mitigations, it takes a minimum of one year to implement – i.e. turbines cannot operate until one year after the implementation notice under the M&S contract between NERL, NSL and the developer as NERL is the statutory (objecting) party while NSL is normally the mechanism to implement the mitigation.

15. [www.gov.scot/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Guidance/Radar-Report](http://www.gov.scot/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Guidance/Radar-Report)

16. The position of ORRD feeds from Edinburgh Airport to NERL may be subject to change, given that a new ANSP will be in place at Edinburgh Airport from 1 April 2018

## Future Mitigation Options

NERL will consider alternative mitigations, but all R&D will need to be funded by the developer and any suggested infrastructure will need to sit harmoniously in NERL's overall system. NERL may also consider integrating other terrain shielded and/or "wind farm tolerant in-fill" radars into its Multi-Radar Tracking (MRT) infrastructure if there is capacity. NERL is also reviewing emerging technologies in light of the UK's future surveillance strategy and its need to replace its current Raytheon infrastructure in the 2020s.

## NATS Contacts

For any pre-planning, commercial or contractual query, developers should refer to the NATS Windfarms team via [natswindfarms@nats.co.uk](mailto:natswindfarms@nats.co.uk) or 01489 444 321.

For any statutory consultation, planning or technical (non-mitigation) query, developers should refer to the NATS Safeguarding team via [natssafeguarding@nats.co.uk](mailto:natssafeguarding@nats.co.uk) or 01489 444 687.

### NATS En Route Flowchart

#### Site selection/feasibility

Review potential sites against safeguarding maps:

1. DECC RESTATS Aviation Maps
2. NATS Windfarms safeguarding maps

#### Pre-planning

Commission a TOPA (costing as per NATS website), or commission a specialist to prepare an independent report.

If pre-planning studies indicate likely objection, NERL encourages developers to engage with NATS Windfarms Team (NSL) to discuss mitigation options.

If pre-planning response by NERL indicates no objection, remember that this is indicative only and may change at the planning stage.

#### Planning

NERL will assess applications without charge under its statutory safeguarding processes.

If receive "objection", developer can either – query objection; or propose / seek to discuss mitigation options.

If query objection, developer should review cumulative map in TOPA report, the developer will need to provide evidence as to why the developer / specialist for developer thinks the objection is unjustified (e.g. more detailed radar modelling, operational assessment)

Developer should then seek to engage with NERL to discuss evidence and better understand whether objection is maintained.

#### Mitigation

Ascertain whether an existing mitigation is available

If no existing mitigation is available, usually up to developer to propose new mitigation for NERL to review – this will require a case for the proposed mitigation for NERL to evaluate, taking into account the full context of NERL's infrastructure.

Once mitigation agreed (existing or new), NERL will require the developer to conclude the Mitigation and Services contract before it will lift its objection, whether absolutely or subject to the imposition of (suspensive) conditions.



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We bring them together to deliver that future faster; a future which is better for industry, billpayers, and the environment. We support over 400 member companies to ensure increasing amounts of renewable electricity are deployed across the UK and access markets to export all over the world. Our members are business leaders, technology innovators, and expert thinkers from right across industry.

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