

Dear Steven,

Thank you for your response of 25.04.16 and the attachments.

Re: comments in the ATS attachment, it is notable that:-

“In respect of it being essential that the related NATS perspective is also established, the NTS does not appear to detail any consultation with the aforementioned aviation stakeholders nor the mitigation of any potential concerns that might be anticipated.”

And...

“Additionally, from a more generic perspective, all parties should be aware that:

Points 4 & 5.

- There is a requirement in the UK for all structures over 300 feet high to be charted on civil aviation maps (the military use, I believe, a lesser threshold). Should this proposed wind turbine development progress, to achieve any charting requirement, developers will need to provide details of the development to the Defence Geographic Centre.
- Due to the unique nature of associated operations in respect of operating altitudes and potentially unusual landing sites, it would also be sensible to establish the related viewpoint of local emergency services air support units.”

Of relevance to the above is the 28.4.16 posting of windfarmaction:

Aviation v. Wind Farms

“Often referred to in these pages Aviation and wind farms don't mix. Recently the family of an agricultural spray pilot in the US was awarded \$6.7 million after he flew into a hastily erected unmarked, unlighted and un-notified met mast. It is by the grace of God that no similar accidents have yet happened in the UK. Back in the dark days where all the politicians thought that the world would stop on its axis if we didn't cover the earth with wind farms the RAF was effectively gagged by the introduction of the MOD Safeguarding organisation. Effectively an arm of Chris Huhne DECC, mitigation was the order of the day and that meant the RAF re-directing, flying away from wind farms. Now as training of military aircraft is inherently risky and therefore performed over high, open, wild, unoccupied terrain, that caused a dichotomy. Wind farm developers want to build them on high, open, wild and unoccupied terrain. In Wales in a major training area a wind farm was built after the MOD Safeguarding forgot to oppose the planning application until the last minute and then decided unilaterally it would upset the developer as he had done all the application preparation. It leads one to question whether the 'Safeguarding' unit was to safeguard military pilots or the wind developer's profits. Before the creation of the MOD's

Safeguarding most wind farms were opposed by the local military airbases. After the civil servants took over, opposition died. Of recent years and post the loss of two crews in the Moray Firth, opposition based on the impact to radar has regularly surfaced often dealt with by a Section 75 planning obligation stating that a wind farm cannot be constructed until the radar issue is addressed to the satisfaction of the MOD. Interestingly two of the recent wind farms referred to by the Lords in their defence of subsidy, Sorbie Hill and Twenty Shilling Hill are both frozen on this basis. Their Noble Lords are either indifferent to pilot safety or misled by the lobbyists from the Developers. Profits before pilots?”

²There is a CAA perceived requirement for a co-ordinated regional wind turbine development plan, aimed at meeting renewable energy priorities, whilst addressing aviation concerns and minimising such proliferation issues.

With reference to points 1 – 5. (My emphasis) **The NTS does not appear to acknowledge or, where applicable, address the issues highlighted immediately above.**

In view of the above, of particular relevance is the extraordinary decision of the Scottish Government in respect of a met mast on the site of the Irish company ESB’s proposed 140 MW Glendye wind farm in Aberdeenshire. They are reported to have disagreed with the local assessment relating to this met mast’s adverse impact on landscape, tourism and inexplicably, **the local flying club**. With events and air accidents involving these masts now well known, how officials could find ‘no material considerations’ to justify refusal is beyond understanding or condoning.

Question 1. I should be interested to know, please, whether these officials sought or received any guidance from the CAA or NTS? If so, copies of all related correspondence are requested under FoI regulations.

Where the often sudden appearance of met masts are concerned, private plane owners are responsible for updating their charts etc., when they receive notices. It is known that this is not always done, so they are a particularly at risk from new developments.

The CAA response is disappointing as it remains the case that there is as yet, no operational, failsafe radar system, despite there being a new guidance document as of last February. For the dangers still in existence, there appears to be ongoing efforts to assess these and ‘plug the holes.’ This is exacerbated by there being far too many “official” organisations involved in air traffic safety, **not one of which** would appear to have overall responsibility – a clear recipe for confusion and potential disaster. In order to extract facts which are certainly in the public interest for matters involving issues we have been discussing, a further FoI has been lodged with the Scottish Government and DECC. These should produce the missing dialogues which the CAA has been unable to provide.

Re. *‘The following is a list of current operational wind farm mitigation technologies:*

Aveillant . Recently approved for operational use at East Midlands Airport

Raytheon. Approved for use at Great Dun Fell radar station last September, soon to be introduced at Lowther Hill.

Terma SCANTER 4002 radar is now in use at Chester Hawarden and Liverpool John Lennon airports to mitigate Frodsham Wind Farm and at Edinburgh airport to mitigate Tormywheel Wind Farm.

In respect of the above, it is important to establish:

Question 2. Do any of the above technology providers guarantee their products in the event of litigation following an accident or incident?

Question 3. What independent testing and approval took place prior to installation?

It is of further importance to note April's web reports (Texan Senate to Curb Wind Farms Threatening America's Naval Aviators) involving the Texan Senate and wind power developments threatening Naval aviators .

Included was the observation (my emphasis) that:

“the effects of hundreds of wind turbines in the vicinity of the base are not known. The Navy is developing a software to model those effects, but that's not expected to be ready until the fall at the earliest, officials said on Thursday.

‘We've got to develop that modeling and we're not there yet,’ Misner said. ‘That's why there's so many different stances on wind farms.’

The large turbines can make tracking planes difficult or impossible, because the arms can spin at speeds faster than some aircraft fly — a fact that makes maintaining mission safety impossible, according to a presentation the committee heard from Wichita Falls' Sheppard Air Force Base.

Kingsville Mayor Sam Fugate emphasized the state will need to intervene in some cases to ensure bases' mission capabilities are not compromised.

‘Our (extraterritorial jurisdiction) only goes out 2 miles. We've done everything we can do,’ he said. ‘What we really need is a moratorium on constructing wind farms within 25 miles of our base until they can come up with technology to remedy the problem.’

Thursday's meeting was focused on fact-gathering, but Sen. Donna Campbell, R-New Braunfels and the committee's chair, indicated she'd consider intervening if a development threatened student pilots' training.

‘We're actually making our military installations more vulnerable to closing when our military bases are situated surrounded by wind turbines,’ Campbell said. ‘We don't want that....If we don't have enough pilots, then anything that affects pilot training ... is a threat

to our defense,' she added."

It is becoming clear that all over the world, the installation of wind turbines in the vicinity of airports – whether civil or military – has become an unwarranted and present danger. For example another recent U.S. alert:

A clear path: Wind turbines could impede Fort Drum's aviation exercises

www.watertowndailytimes.com

Extract (my emphasis)

The Watertown Daily Times submitted questions last week to officials at Fort Drum to determine what concerns they had about the proposed Horse Creek wind project. If approved, the project would be built in Clayton and is expected to incorporate the towns of Orleans, Lyme and Brownville.

Julie A. Halpin, the post's director of public affairs, wrote the responses to our questions. When asked about Fort Drum's stance on the proposed wind project, she replied: "We remain very interested in the development and location of large-scale wind turbines and wind turbine farms in the vicinity of Wheeler-Sack Army Airfield instrument patterns, near Wheeler-Sack Army Airfield in general, the Fort Drum Radar Approach Control airspace area and the Military Operations Areas surrounding the restricted areas, which serve a high density of rotary and fixed-wing aircraft. We look forward to the results of the upcoming Development Authority of the North Country-led Joint Land Use Study as a key tool in identifying ways for the coexistence of our training and future wind turbine development in the north country."

She further wrote that wind turbines, "have the ability to negatively affect instrument approaches by encroaching on the traffic patterns aircraft are vectored via use of air traffic radar for extended final approach courses. There are also impacts to our radar for Air Traffic Control services; minimum vectoring altitudes may have to be raised over wind turbine locations. In some locations, a higher MVA makes it more difficult to conduct an approach procedure."

Question 4. Why should the U.K. be any different in its findings and why are we being put at risk in the absence of a failsafe system?

Presupposing for a moment that the claim holds true that systems in existence remove wind-turbine clutter from primary radar, and that clutter is less obvious and damaging with Secondary Surveillance Radar, and that finally, a failsafe system providing complete protection is actually found. **The issues of wake-fields, turbulence and the spectral responses caused by the mechanism of the turbine and its power extraction, undeniably remain. This is reasonably measurable with equipment that is publically available, and can be correlated with effects on wind, aircraft, and possibly people.**

Where wind farms near airports are concerned, there is reported to be a lack of fully qualified wake effects on flight in the approach and circuit areas. It is well known that wakes exist – that has never been disputed to the knowledge of those contacted. It is also known that Universities and LLN are studying the deleterious effect of wake on the efficiency of

power extraction. So by deductive reasoning, it seems not only logical, but imperative that aviation authorities consider and measure how much the wake turbulence and wind-deficits behind wind farms are a threat to flight. Again, to the best of current knowledge, no aviation authority has commissioned a report into the study of Wind Farm Wake – instead they have concentrated on physical obstruction only. Whether this was due to this effect being outside the terms of reference for the aviation consultants and/or completely outside their expertise, is unknown.

Analysis of past research when this was brought up with CASA (Australia) has been proved correct in that extrapolation to 16 blade-diameters was not unreasonable. Measurements since taken to 15 blade-diameters downstream clearly show that the wake extends further.

Thus now having set a 16D precedent in the environment court, a requirement for a further setback from around aerodromes is now justified on the basis of the Texas Tech University publication. It is appropriate to observe that both CASA and CAA were unwise to ignore Wind Turbine Wake field in favour of overly concentrating on the obstruction basis – which is visual – rather than that which is invisible, albeit measurable.

Evidence which is relevant relates to the impact of turbulent winds on wind turbine drive trains and the impact on closely packed wind turbines on the energy/wind speed available to ones in the lee. All output is reduced because of this. On this subject, as engineers know and are reporting, the real importance of the Doppler Radar study into wind speed decrease from these larger wind turbines is the **significant increase** in separation distance needed. See: http://energy.sandia.gov/energy/renewable-energy/wind-power/wind_plant_opt/ttu-advanced-doppler-radar/ This backs up the other studies such as those of the Johns Hopkins / Louvain Study and Max Planck Et Al study. It is clear that if these observations were implemented, the separation distances required would increase three fold, also increasing costs three to four fold. As would the spatial requirements.

The Texas Tech. University Doppler Radar clearly shows how wind turbines create wind turbulence. The full report has still not been published but there is enough information to show that wind farms create **significant** wind turbulence. A lot of these issues of wind farms creating significant turbulence is made worse by stacking wind turbines too close to one another in wind farms. If proper separation distances were observed this could be reduced, but the problem then arising is that large wind turbines with 90 meter hub diameter **should be 15 times** the hub diameter apart. This subsequently causes the running out of space for all the capacity they say they need. In addition there is the issue of the hilly nature of the environment making the situation worse. It is clear that in this instance providing specialized radar will not solve the problem. It is the **turbulence caused by the wind farms** that is the problem. The only way to stop this - is to remove the wind farm.

In addition the attached report on Separation Distances for Wind Turbines by Peter R Mitchell, AM BChE, should be of relevance.

As a point of interest relating to reliability, engineers advise that a high Wind Over Power Ratio (WOPR) increases the risk of reverse torque - which wrecks turbine transmissions causing these to fail/ break up within 3 to 5 years, the recommended WOPR is 4.6. So for turbines such as the Nordex N117 with a WOPR of 8, there is a high probability of premature collapse. They and others of similar design will prove to be both highly unreliable and prone to need high levels of maintenance.

In respect of both existing developments and future applications which may also seek to site turbines close to airports, it is crucial for the Scottish Government and authorities charged with licensing or the safe operation of airports, to accept that even if the wind industry thinks that by ignoring these discoveries they will go away – those with responsibility for imposing the technology, are not seen to also engage in such wilful blindness.

Prestwick Airport now hosts holographic radar which is apparently dependent upon the mobile phone system. As a matter of extreme importance to current and future security matters, please will the CAA or the competent authority responsible answer:

Question 5. *Can you confirm that no drones of any kind can fly through this system undetected? If able to confirm please provide evidence of why this is so.*

Question 6. The Scottish Government ran an advertisement for a new radar system for Prestwick last year:

http://www.publiccontractsscotland.gov.uk/search/show/search_view.aspx?ID=JAN196696
09/01/2015

Title: Windfarm Radar Mitigation System
Glasgow Prestwick Airport.

- a. Is this because deals made with Aveillant and Infratil prior to the purchase of the airport are no longer valid?
- b. Has a new system been purchased and if so what is it?
- c. If not, which system is currently providing cover for Prestwick?
- d. If this is provided by Edinburgh to an extent, please can you explain why this coverage is deemed to be safe when DECC admit that no system is adequate either for MOD requirements or civil needs?

Multilateration is now widely practiced in order to get more aircraft into the air - thereby packing more aircraft into flight paths. Therefore for turbines situated on ridges and hills, the question of turbulence from turbine wakes being also directed upwards when caught by high winds travelling from lower ground, becomes an issue for approaches to airports. Although there may well be re-routing of flights to avoid direct landing approaches over Whitelee wind farm - thereby clearly adding to costs etc., **the subject of emergency landings which could force this remains.** It provides another serious additional reason for

removal of hazardous turbines where they currently exist, likely to exacerbate such an event. Radar coverage is of course not relevant in such circumstances.

Question 7. Has the aspect of emergency landings involving Whitelee turbines been considered then discussed? If so please provide evidence.

Attached is a document PNAS -2015-Miller-11169-74pdf which may be of general interest for those studying both turbulence and other issues of limits to large scale wind power generation.

In conclusion, all of the above brings us back to why the Whitelee wind farm turbines can be seen to be a danger to air traffic safety for Glasgow (& Prestwick) International Airports, and any other aerodromes both here and globally, which have turbines in close proximity.

It may be important to repeat that where matters of air traffic and public safety, both in the air and on the ground are concerned, it is in the public interest not to have business interests quoted as reasons for avoidance for supplying information requested. It remains the case that the legal arguments being tested out in the Communication below, as summarised in the documentation of 02.01.2016:

<http://www.unece.org/environmental-policy/conventions/public-participation/aarhus-convention/tfwg/envppcc/envppcccom/acccc2014112-ireland.html>

That all options have to be open, including the 'zero option' is highlighted in :

<http://curia.europa.eu/jcms/upload/docs/application/pdf/2013-01/cp130001en.pdf>

N.B. Extract.

'The public must have access to an urban planning decision concerning the establishment of an installation having significant effects on the environment. *Protection of trade secrets cannot be invoked to refuse that access.*'

To avoid confusion, these are the questions posed on the subjects concerned still requiring answers under Fol regulations.

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Page 6. Question 6.

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- c. If not, which system is currently providing cover for Prestwick?
- d. If this is provided by Edinburgh to an extent, please can you explain why this coverage or that of any new system which may have been purchased, is deemed to be safe when DECC admit that no system is adequate either for MOD requirements or civil needs?

Page 7. Question 7. ***Has the aspect of emergency landings involving Whitelee turbines been considered then discussed? If so please provide evidence.***

In view of the answers from Fergus Ewing to related Parliamentary Questions S4W 30535, 30534 and 30533 on 23/03/16, this letter is being copied to Scottish Ministers, and Ian Mathias of the M.O.D for his consideration. Mr Ewing referred to Research work undertaken in 2015 by the University of Liverpool. The contents of this letter will highlight information such as The Texas Tech . University Doppler Radar research, where more relevant information on larger wind turbines is available. Wake from the tower alone was detected at 1.5 kilometers. As indicated the Sandia Labs Site has a good outline of the research. The Liverpool research is therefore considered to be irrelevant.

Yours sincerely,

Mrs. V.C.K. Metcalfe.

Attachments.

Separation Distances for Wind Turbines by Peter R Mitchell, AM BChE.

PNAS -2015-Miller-11169-74pdf.