

**ELECTRICITY ACT 1989 (SECTION 36 AND SCHEDULE 8)  
TOWN AND COUNTRY PLANNING ACT 1990 (SECTION 90)  
THE ELECTRICITY GENERATING STATIONS AND OVERHEAD LINES  
(INQUIRIES PROCEDURE) (ENGLAND AND WALES) RULES 2007**

**PUBLIC INQUIRY TO CONSIDER SECTION 36 ELECTRICITY ACT 1989  
APPLICATION BY STEADINGS WIND FARM LIMITED FOR CONSENT AND  
DEEMED PLANNING PERMISSION TO CONSTRUCT AND OPERATE A WIND  
FARM AT KIRKWHELPINGTON, NORTHUMBERLAND (KNOWN AS  
STEADINGS)**

## **REBUTTAL PROOF OF EVIDENCE**

**MALCOLM SPAVEN, M.A., M.Sc**

**ON BEHALF OF STEADINGS WIND FARM LIMITED**

**BERR REFERENCE: GDBC/001/00278C**

**TYNEDALE COUNCIL REFERENCE: 20060540**

**NORTHUMBERLAND COUNCIL REFERENCE: 06/00023/CPC**

## **1. Introduction**

- 1.1 I have read all the proofs of evidence submitted by the Ministry of Defence, NATS En Route Ltd and Newcastle International Airport. My comments on their evidence are set out in Sections 2, 3 and 4 respectively, cross-referenced to the paragraph numbers used by each witness. My silence on a point made in any proof or the fact that I have not addressed it in this rebuttal should not be taken as my agreement with that point.

## **2. Evidence of the Ministry of Defence**

### **Sqn Ldr Colin Deane**

#### **Paragraph 7**

- 2.1 Sqn Ldr Deane provides an estimate for the use of the range but does not provide any actual figures showing trends in the use of the range. Our aviation report [SWFL 10.3, Figure 3] contains figures showing a decline in use of the range by low flying aircraft since 1995, with particularly low usage recorded in 2006-7. At paragraph 36 of his evidence Sqn Ldr Deane states that the range "trains approximately 3000 aircraft each year". If this is a reference to the number of training slots used then it represents a significant decline since the mid- to late-1980s [see SWFL 10.5 Appendix 1].
- 2.2 There is evidence that the use of the range for live electronic warfare (EW) training by aircraft may be subject to further decline in the coming years. A Parliamentary Answer in 2006 indicated that the Ministry of Defence was considering the most cost-effective way of providing EW training after the withdrawal of current systems from service in 2009 [SWFL 10.5 Appendix 1]. During a meeting with the MoD on 30 January 2008 Sqn Ldr Deane indicated that this

was believed to be a reference to increased use of simulation as opposed to live flying training.

- 2.3 Sqn Ldr Deane's statement that the range "may be used during any time of a 24 hour day" is correct in principle but overstates the actual usage of the range. The normal hours as set out in the UK Aeronautical Information Publication are 0900-1700 Monday to Thursday and 0900-1600 Friday. Evening openings do occur periodically but weekend openings are extremely rare.

#### **Paragraph 8**

- 2.4 None of the off-site training referred to would be affected by any of the proposed wind farms. Indeed, insofar as this activity takes aircraft and EW equipment away from Spadeadam itself, this must reduce any potential for activity over the wind farms and therefore reduce any such impact.

#### **Paragraph 9**

- 2.5 Sqn Ldr Deane estimates foreign use of the range as 70 days per year. That would equate to 35% of the 200 days on which he states in his paragraph 7 that the range is in use. However in the presentation to developers at RAF Spadeadam on 9 January 2008, a chart showing the breakdown of use of the range showed foreign use of the range as 12%.

#### **Paragraph 13**

- 2.6 Sqn Ldr Deane states that "(i)t is the realism that makes the training valuable." However I can see nothing in Sqn Ldr Deane's evidence that explains how wind turbines would make the training unrealistic. Wind energy is a rapidly growing global technology. Military forces are increasingly likely to operate in areas where wind turbines are present. Therefore training in the presence of wind turbines is likely to increase realism, not decrease it.

**Paragraph 14**

2.7 Sqn Ldr Deane's statement that "(e)ffectively ATC is the lookout for the pilot" is highly contestable, and arguably even a dangerous proposition. The vast majority of traffic at Spadeadam is operating under a FIS or a RIS . Most of them will be operating under the VFR. When operating VFR, whether under a RIS or a FIS, the responsibility for collision avoidance rests solely with the pilot, by seeing and avoiding other aircraft which come into conflict. The only possible role of the controller is, under a RIS, to give the pilot a cue as to where to focus his lookout in order to visually detect conflicting aircraft, and under a FIS, to warn of imminent conflicts "where a controller suspects, from whatever source, that a flight is in dangerous proximity to another aircraft". That definition does not encompass situations where the controller is working an aircraft in or close to an area of clutter but has no information suggesting that an aircraft might be operating, unseen to radar, within that clutter.

**Paragraph 15**

2.8 No figures have been provided which demonstrate what proportion of sorties into the range arrive and/or depart through the gap between Otterburn Range and Newcastle Airport.

2.9 Sqn Ldr Deane states that "(w)hen aircraft enter the range from the North Sea MDAs and AARAs they do so using the quickest and shortest route. This invariably means from the North East in between Newcastle Zone and Otterburn Range." This is not borne out by the maps showing the relative locations of the North Sea MDAs (Managed Danger Areas), AARAs (Air-toAir Refuelling Areas) and Spadeadam – see SWFL 10.5 Appendix 2. The shortest track from most of D323 and D412, AARA 6 and the southern parts of AARA 7 to Spadeadam would be between Newcastle and Durham Tees Valley. The shortest track from most of D613 and most of AARA 3 to Spadeadam would be to the north of Otterburn. The only areas for which the shortest track to

Spadeadam is through the Otterburn-Newcastle gap are D513 and AARA 5, plus the southernmost parts of D613 and AARA 3.

- 2.10 Even if it is correct that most aircraft route into or out of the range through the Otterburn-Newcastle gap, "long transits" to the range will not be required as a result of the wind farm(s) because avoidance will not be required, even for aircraft on a RAS, for the reasons set out in my main proof.
- 2.11 If helicopters are using areas of reduced radar cover to operate at extremely low level to evade EW equipment, they will nevertheless be in radio contact with Spadeadam and will therefore be 'known traffic'. Their presence will be notified to other traffic using the range, even if they are not visible on radar. Wind turbines would not alter this situation. Sqn Ldr Deane states that "a few miles to the east of the EWTR is an area of low ground that is particularly useful for this tactic". This is understood to be a reference to the low ground of the North Tyne Valley, west of the wind farms. The presence of the wind farms would have no impact on helicopters' ability to use this tactic.
- 2.12 Sqn Ldr Deane refers to aircraft conducting EW evasive manoeuvres against the simulated SA6 weapon system up to 47nm away. This demonstrates that many of the aircraft using the range facilities have no need to fly over or even within 5nm of Steadings, which is only up to 19nm from the range facilities. Spadeadam's newly acquired autonomous radar status from January 2008 will increase the proportion of the range's traffic which carries out its EW training missions well to the east of Spadeadam, at high level. The wind farms can have no impact on these aircraft.

### **Paragraph 16**

- 2.13 Sqn Ldr Deane states that "(t)he three proposed wind farms are positioned within the airspace routinely flown by military and civilian

aircraft transiting through the Northumberland area under the control of ATC RAF Spadeadam". If they are "under the control of" Spadeadam, or even just in radio contact with Spadeadam, then these aircraft are 'known traffic', so even if it became difficult for a controller to track the aircraft through clutter generated by wind turbines, the wind farm would not cause the controller to issue any additional avoidance advice to other traffic in the area.

- 2.14 Sqn Ldr Deane states that it would "invariably be the case" that the wind turbine returns would cause a controller to suspect that an unknown aircraft was in dangerous proximity to his own aircraft. However in support of this argument he offers only a partial quote of the relevant text from JSP 552. After the text he quotes, the document continues: "and the controller cannot assume responsibility for its issuance at all times or for its accuracy." [see SWFL 10.5 Appendix 3] In my view, when the full sentence is quoted, it completely changes the context of Sqn Ldr Deane's assertion. Rather than having a duty of care to assist the pilot to remain clear of hazards, the controller providing a FIS has a duty of care to assist the pilot only when he has information that makes him suspect that aircraft are in dangerous proximity to each other – and even then, the provision of a warning is as far as his duty of care extends. In the CAA's review of Air Traffic Services Outside Controlled Airspace (ATSOCAS), the views of civil, RAF and RN controllers were canvassed on what constitutes an impending collision which would warrant issuing a warning to a pilot when in receipt of a FIS. The RAF controllers' views were summarised as follows [see SWFL 10.5, Appendix 4]:

"If perceived risk of collision and controller has capacity, pass traffic information. Criteria for calling traffic difficult to quantify since it would depend on aircraft types, relative speeds and workload; a guideline would be a perceived risk of collision or conflicting traffic likely to come within 1000 ft/2nm.

Many military pilots feel that they are over controlled and think that service provision under FIS and RIS are similar. Would prefer to have the old option of a listening watch."

There is no suggestion from this that controllers would feel obligated to notify pilots of any radar clutter as if it was an aircraft in dangerous proximity, and the quote above indicates that pilots do not want regular traffic information when they are in receipt of a FIS.

- 2.15 Also, as part of the ATSOCAS Review, a CAA/MoD/NATS group reviewed the issue of duty of care and produced a statement in December 2007. The relevant part reads as follows:

"the nature of the ATS task in Class F/G airspace means that it is not possible to be totally prescriptive about all actions to be taken, particularly with regard to unknown traffic and the passing of advice and warnings on high risk conflicts to pilots who have requested lower level services (i.e. Basic Service and Traffic Service). Consequently, the need for controllers/FISO to use their professional judgment is essential in order that they meet their duty of care for the specific situation in question. Nothing in this document prevents controllers/FISOs from using their own discretion in any particular circumstance."<sup>1</sup>

- 2.16 If it remains the MoD position that radar clutter generated by the Steadings turbines ought to be called as traffic to every aircraft flying through or close to it, even if they are only on a FIS, then the simplest solution is to write some text into the Spadeadam Range Orders read by pilots before they use the facility, and perhaps into the relevant parts of the UK Low Flying Handbook for Low Flying Areas 12 and 13, which makes clear that the area of the wind farm(s) may generate radar clutter, that controllers will not routinely

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<sup>1</sup> CAA Safety Regulation Group, Air Traffic Standards Division, *Public Consultation – UK Air Traffic Services Outside Controlled Airspace*, Ref 9W/15/03/14/3, 6 December 2007, paragraph 1.4.

call the clutter as traffic to aircraft on a FIS, and that pilots should maintain a good lookout while flying through this area.

### **Paragraph 17**

2.17 Sqn Ldr Deane states that "(t)he returns anticipated to be generated by the turbines on each of the three windfarms will be impossible to distinguish from returns generated by aircraft". This is an assertion which is not borne out by the findings of the RAF's 2005 trials report [CD 301]. For example:

"Figure 4 shows how the structure of the wind turbine reduced the sensitivity of the radar by raising the ambient noise level. The exploded section, below right, shows a marked reduction in strength of return from the Dominie T Mk1A overflying the turbines. A controller could see that these returns still belong to the same aircraft." [CD 301 p.9]

"during this Trial there were numerous occasions when a Watchman Operator was still able to distinguish between a reduced amplitude return from a real aircraft and the impermanent clutter returns from a wind turbine. It is likely that the automatic plot extractor on a T101 AD Radar struggled to match the sophistication of the human brain in this role." [CD 301 Annex B paragraph 6]

"A controller can see that the returns in Figure 6 still belong to the same aircraft but there will be a level of signal reduction below which a plot extractor would fail to produce a plot even though the controller could still distinguish the return for his aircraft. The situation is more pronounced in Figure 7. Again, a controller can clearly follow the path of his aircraft but a plot extractor would probably drop multiple plots overhead the turbines, even though none were turning in this example." [CD 301 Annex B paragraph 7]

**Paragraph 18**

2.18 If it is already difficult for controllers to maintain track identity on an aircraft with SSR failure, it is highly unlikely that this aircraft would be given anything more than a FIS. Responsibility then rests solely with the pilot for collision avoidance. This was amply illustrated by the case referred to by Sqn Ldr Deane of the Harrier working the range during our visit to RAF Spadeadam on 9 January. During its sortie on the range its primary radar return dropped out completely, irrespective of any clutter, and the controller was unable to identify it on departure until well clear of the range. Throughout its time over and in the vicinity of the range the aircraft was operating under a FIS.

**Paragraph 19**

2.19 I do not agree that there would be a particular hazard from pipeline and powerline inspection helicopters. These flights are carried out with close attention to deconfliction from military low flying by means of procedures set out in Aeronautical Information Circular 92/2006. This requires the helicopter operator to pre-notify their activity to the RAF Low Flying Booking Cell at least 14 hours in advance, then to phone on the day of flight to provide further details of their flight (which are then passed to any military pilots booking to operate in the area) and to receive information on planned military low flying activity in the area. These flights have a discrete SSR code which enables controllers to identify them as powerline/pipeline inspection flights and in normal circumstances the helicopter pilots will be in radio contact with the nearest suitable air traffic service provider. In the case of any such helicopters operating in the area of the Steadings wind farm they may be in radio contact with Newcastle, however it would be simple to draw up a procedure which required or recommended inspection helicopter pilots to contact Spadeadam when operating in this area.

2.20 The implication of Sqn Ldr Deane's evidence in this paragraph is that without a clear radar picture, pipeline and powerline inspection helicopters are not operating safely. This is misleading. These flights, and all military low level flights in the area, are conducted under VFR, with pilots wholly responsible for seeing and avoiding conflicts. For the vast majority of their time at low level these aircraft receive no form of radar service and operate entirely on a see and avoid basis.

2.21 Although Sqn Ldr Deane's evidence on the issue of pipeline/powerline inspection helicopters draws heavily from the letter from the RAF Spadeadam SATCO, Flt Lt Gibbins, [MOD/2/2(3)], there are some parts of the letter which Sqn Ldr Deane chooses not to quote:

- ▶ Flt Lt Gibbins' statement that "ordinarily the helicopter performing this task will 'check in' with Spadeadam ATC in case of activity" is not reproduced by Sqn Ldr Deane;
- ▶ the statement "They are transponder equipped and squawk a specific code to show their status" is also omitted by Sqn Ldr Deane.

When these two statements are taken into consideration, it is clear that in normal circumstances pipeline/powerline helicopters in the area are 'known traffic' to Spadeadam and even if their primary return became small or lost, the SSR return would still give controllers an accurate indication of their location.

2.22 Flt Lt Gibbins' letter goes on to state that a loss of radar identity of such a helicopter could "increase the controller's workload in achieving standard separation against aircraft entering and exiting the range." However the helicopter pilot will be expecting no such separation because he will be operating VFR and not being separated from any other aircraft except visually. Range traffic would only expect controllers to provide "standard separation" from the helicopter if they had requested and been provided with a RAS.

The available statistics [SWFL 10.5 Appendix 5] indicate that only a very small fraction of Spadeadam range traffic receives a RAS.

## **Paragraph 20**

- 2.23 The implication in this paragraph is that military aircraft would be unable to carry out air-to-air refuelling because, in the presence of the wind farms, they could not fly between Otterburn and Newcastle while in receipt of a RAS. This is untenable for the following reasons:
- there is no requirement for aircraft transiting to or from refuelling to be on a RAS; they could equally be on a RIS or a FIS
  - even for aircraft which are on a RAS, Sqn Ldr Deane gives no consideration to the possibilities for offering a Limited RAS while operating close to or over radar clutter
  - see my comments in paragraph 2.9 above in respect of the distances and routes to AARAs
  - the closest AARA to Spadeadam is actually AARA 13, over the Irish Sea, therefore not requiring transit through the Otterburn-Newcastle gap
  - even if it was correct that aircraft routing from or to an AARA on a RAS from Spadeadam would not be able to transit through the Otterburn-Spadeadam gap, these aircraft would have the alternative option of obtaining a radar service from the normal controlling authority for the nearest AARAs – 5, 6 and 7 – the air defence Control and Reporting Centre at Boulmer. The MoD has accepted that the Steadings wind farm will not have a significant impact on Boulmer's radar at Brizlee Wood so Boulmer could provide a service to these aircraft, as it will be doing anyway as the aircraft approach the AARA (Steadings to the edge of AARA 5 is less than ten minutes flying time at 450 knots).
- 2.24 It should also be noted that any aircraft transiting through the Otterburn-Newcastle gap at less than 3000 feet cannot be provided with a RAS so for these aircraft there can be no requirement to

avoid any of the wind farms; consequently there can be no restriction on their use of this section of airspace.

### **Paragraph 21**

- 2.25 On the assertion that avoiding action turns cause increased sortie length :
- (a) this is generally not correct since sortie length for a combat aircraft is dictated by fuel load; when the fuel gets to a pre-determined level the aircraft either returns to base or to a tanker aircraft
  - (b) avoiding action turns are not required for the wind farms since the clutter is predictable and if necessary aircraft can be put on a limited radar service for the brief period crossing the wind farms
  - (c) if the effect of avoiding action turns over Northumberland is so drastic, pilots will very soon learn not to request a RAS – then they will not be given avoiding action turns
  - (d) the Senior Air Traffic Control Officer (SATCO) at Spadeadam confirmed on 9 January that it is standard operating practice for all aircraft within the range area to be on a FIS. If the wind farms are perceived to require avoidance by any aircraft on a RAS, all that would be required would be to transfer inbound aircraft from a RAS to a FIS a little further east than currently happens.
- 2.26 If additional clutter caused by wind farms did lead to longer sorties, culminating, as Sqn Ldr Deane asserts, in additional flying at weekends with all the additional resulting costs, there must have been some evidence of this occurring as a result of the ten operational wind farms identified by Mr Spencer [Annex D, Tables 3 and 4] as being visible to the radars at Spadeadam. The first of these wind farms was built in 2000. But the MoD has produced no evidence of any such effects generated by these existing wind farms.

**Paragraph 22**

2.27 No evidence is produced for Sqn Ldr Deane's assessment that the impact of the wind farms would be operationally very significant. In his preceding paragraphs he identifies the worst effects as occurring in relation to RAS traffic. However he produces no figures on how much RAS traffic there is, where it typically comes from and what alternatives it might have in the event of wind farm clutter being judged to require avoidance. There is also no analysis of the feasibility of putting aircraft on a Limited RAS, a RIS, a Limited RIS or a FIS for the period when they are crossing the wind farm.

2.28 The only known data on the proportions of Spadeadam range traffic which request – and receive – a RAS from Spadeadam controllers are those which were provided in a letter from MoD to the representatives of Steadings Wind Farm Ltd on 30 December 2007 [see SWFL 10.5, Appendix 5]. This stated that data had been collected for the month of November 2007 and of the 376 aircraft which used the range in that month:

- ▶ 1.6% received a RAS
- ▶ 32.2% received a RIS
- ▶ 66.2% received a FIS

It is clear from these figures that the provision of RAS by Spadeadam is a relatively rare event. Consequently any alleged impact of the Steadings or other wind farms which relates to a requirement to avoid the wind farms, were it to occur, would be infrequent.

**Paragraph 23**

2.29 Sqn Ldr Deane does not offer evidence on which effects from which of the existing wind farms have generated increases in the workload of Spadeadam controllers.

2.30 Sqn Ldr Deane states that "(a)ny mistake by a radar operator at RAF Spadeadam can have disastrous consequences". This

statement ignores the position at RAF Spadeadam as against other air traffic service units in the UK, because the vast majority of traffic at Spadeadam is flying VFR and/or on a RIS or a FIS, with the pilots remaining responsible for collision avoidance. Only with the introduction of Spadeadam's autonomous status will Spadeadam controllers be wholly responsible for the separation of aircraft inside controlled airspace, above FL195. But the MoD has specifically stated to the developers of the Green Rigg project that "(w)hilst within Class A and C airspace the primary radar clutter is not a concern".[SWFL 10.5, Appendix 6]

- 2.31 Sqn Ldr Deane refers in this paragraph to "increased radar clutter and radar shadow" as a result of the wind turbines. However I can find no prior reference in his evidence to the concept of radar shadow, no assessment of whether and to what extent it exists in relation to the Steadings turbines, and no assessment of the operational significance of any such shadow.

#### **Paragraph 24**

- 2.32 This is the only part of Sqn Ldr Deane's evidence where effects on the Great Dun Fell radar are assessed. The only effects discussed are those on the use of the Great Dun Fell radar by the Scottish Air Traffic Control Centre (Military) at Prestwick - ScATCC (Mil) - and not on its use by Spadeadam controllers under the unit's new autonomous radar status. This appears to be a further change of position by the MoD. The MoD's outline and final Statements of Case refer only to impacts on the Spadeadam use of the Great Dun Fell radar, not to its use by ScATCC (Mil), which has not been explained to the inquiry.
- 2.33 I do not agree that "aircraft transiting under a RAS would be regularly re-routed". From my experience of observing radar controllers at work, of talking to controllers and of receiving air traffic services as a pilot, I consider it far more likely that aircraft transiting

close to any wind farm clutter under a RAS would be temporarily put on a Limited RAS and not routed away from the wind farm.

### **Paragraph 25**

2.34 SSR label garbling is always far more likely to occur as a result of overlapping with another SSR label than it is from overlap with primary clutter. But even if it does occur, Sqn Ldr Deane makes no mention of the controller's ability to rotate the label of any SSR label in order to improve its visibility. During our visit to Spadeadam on 9 January we observed the controller rotating the SSR label on one of his aircraft in order to avoid overlap with another aircraft's label. This is standard practice at any unit which has displays with a label-rotate facility.

### **Paragraph 43**

2.35 Sqn Ldr Deane states that "(o)ther wind farm proposals lying close to but not in immediate proximity to operations controlled by MOD ATC Units have been approved" but does not refer to any specific examples. A list of RAF and other military airfields which have existing wind farms within radar line of sight is contained in my appendices [SWFL 10.5 Appendix 7]. This shows that the RAF has experience of working with numerous wind farms as close as 6.5km to its operational air traffic control radars, compared with the 31+ km between the Spadeadam radars and the Steadings turbines. They include three cases of turbines located inside the Military Aerodrome Traffic Zone (MATZ) and a further four cases where the turbines are located a short distance outside the MATZ. These cannot be described as "not in immediate proximity to operations controlled by MOD ATC units".

2.36 Sqn Ldr Deane states that "there are existing [wind farm] developments which have been constructed that do present interference on the radar displays at RAF Spadeadam. Fortunately, these are in areas where little or no activity takes place." Sqn Ldr

Deane is presumably referring here to the wind farms listed in Tables 3 and 4 of Annex D of Mr Spencer's evidence.

- 2.37 On the face of it, it is difficult to agree that the areas round all of those wind farms listed by Mr Spencer are, in Sqn Ldr Deane's words, "areas where little or no activity takes place". Indeed if that was the case then the Steadings wind farm itself must be an area where little or no activity takes place. I consider there is an alternative explanation. First, on the available evidence, very few (less than one in sixty) of the aircraft using the range request and are provided with a RAS, so even if it was accepted – and I do not - that no RAS is provided around existing wind farms, the impact is small because RAS is rarely provided. Second, the rules and procedures for the provision of RAS are flexible. They allow for controllers to limit the service where they consider it appropriate, including when operating in the vicinity of clutter. Controllers will apply those criteria tactically, using their own skill, judgement and knowledge of local conditions. This will enable them to continue to provide a RAS within 5nm of wind farms, even in the presence of clutter.
- 2.38 Sqn Ldr Deane states that "when aircraft are manoeuvring close to these areas of clutter, **dependent on the type of service being provided**, the controller will pass the relevant hazard information to the pilot..." [my emphasis]. This contradicts paragraph 10j of his Statement of Case and paragraph 16 of his proof of evidence, where he states that it would "invariably" be the case that controllers would regard radar returns from the wind turbines as representing another aircraft in dangerous proximity and would issue a warning to the pilot. The implications of his statement in this paragraph are clear – if the pilot of an aircraft using the range is in receipt of a FIS, he will not routinely be given warnings of the wind farm as if it was another aircraft. Consequently any concerns

relating to the additional controller and pilot workload of issuing and responding to such warnings are without substance.

#### **Paragraph 44**

2.39 Sqn Ldr Deane refers to radar returns from "high sided vehicles transiting on the A69 passing over hill crests". However the radar returns from road traffic which were clearly visible on the Spadeadam radar screens during our visit on 9 January 2008 were not from traffic passing over hill crests, they came from a long straight stretch of the A69, some 6km in length, between Greenhead and Low Row, south of the Berry Hill radar. It was showing regular radar returns along this entire length. Sqn Ldr Deane first asserts that these radar returns are much smaller than those from wind turbines but then goes on to say that "(r)egardless, controllers will still apply the same degree of information and advice to pilots, should there be any doubt as to whether a hazard exists." While I agree that the action the controller takes will depend on his or her judgement of what the radar returns represent, I do not agree with the implication that controllers will always call any radar clutter as conflicting traffic. Experienced controllers are well aware of the areas within their radar coverage where road traffic is likely to appear, and will act accordingly. The same is true where the source of the radar returns is wind turbines.

#### **Paragraph 45**

2.40 Sqn Ldr Deane states "see above" for discussion of the parameters governing radar shadow, but I can find no such evidence in his proof, and only the briefest mention of the phenomenon in Mr Spencer's proof. Sqn Ldr Deane then goes on to say "(o)n our calculations the total amount of shadow that will be produced by these turbines will result in an operationally very significant amount of area (both in terms of its size and its location) where the radar servicing RAF Spadeadam will receive no return on flying objects in respect of which RAF Spadeadam is supposed to be tracking and

providing a service." But he produces no figures to back up this assessment. Therefore the assertion that "the functionality of RAF Spadeadam will be materially diminished" purely because of this unexplained unquantified shadow is not credible.

- 2.41 Sqn Ldr Deane states that Spadeadam offers "a service...to civilian light aircraft on a regular basis" for transiting the local area. However no figures are provided to back this up. I would make the following observations:
- (a) air traffic services are not "offered" to aircraft; it is up to the pilot to request whatever level of service he wants; in the vast majority of cases with light civil aircraft (I would expect upwards of 90%) this will be a non-radar Flight Information Service
  - (b) I would expect that RAS is rarely provided by Spadeadam to civil light aircraft, for the following reasons:
    - Spadeadam is not the notified Lower Airspace Radar Service (LARS) provider for the area, Newcastle is
    - the vast majority of civil light aircraft in this area will be operating VFR and cannot, therefore, ask for a RAS.
  - (c) if light civilian aircraft do contact Spadeadam for a service, this is to the benefit of the provision of air traffic services by Spadeadam, because by contacting them, these aircraft cease to be unidentified radar returns and become 'known traffic'.
- 2.42 As noted above in relation to Sqn Ldr Deane's paragraph 24, the reference here to the Great Dun Fell radar is, again, only to its use by ScATCC(Mil), not by Spadeadam. This appears to be a further change in the MoD's position.

**Mr Mark Spencer****Paragraph 5**

2.43 Mr Spencer does not appear to have been asked to assess any effects on the Great Dun Fell radar, and there is no assessment of this radar in his evidence.

**Paragraph 7**

2.44 At Note 2, Mr Spencer states that the 2006 Clatter trials led MoD to the conclusion that, even with the additional mitigation demonstrated by both the ADT and Sensis systems, the Watchman radar could not provide for "safe control of aircraft in the vicinity of wind turbines." As my Appendix 7 shows, MoD has seventeen years experience of providing air traffic radar services in the vicinity of wind turbines at at least fourteen air traffic units, in all cases using Watchman (or earlier generation) radars with no installed wind farm mitigation whatsoever. By definition these services must be safe otherwise the units would have been closed down.

**Paragraphs 22-31**

2.45 Mr Spencer states that it is the signal strengths from the moving structures of the turbines that will cause them to be displayed on the radar, but does not mention that for all but four of the 62 turbines, the static structure also generates signal strengths greater than the minimum detectable by the radar. This would be the basis for any reduction in probability of detection of aircraft above the wind farms, as mentioned in his paragraph 49.b. However, if this effect of wind farms is to be considered, then similar analysis should be applied to all other static objects which generate radar returns greater than the minimum discernible signal on the Watchman radar. This could include steep terrain, radio masts, chimneys and high buildings. But no such analysis appears to have been carried out.

**Figures 2 & 4**

- 2.46 The labels on the turbines obscure the eastern boundary of the radar coverage in these figures, but it is clear that any difficulty in either the Deadwater Fell or the Berry Hill radars seeing aircraft flying at 250ft (=76m) in the area east of the wind farm already exists, wholly independent of the presence or absence of wind turbines. This means that aircraft at low level cannot be getting a radar service in this area, even without any wind turbines. Further, to receive a RAS in this area aircraft would need to be at the minimum radar vectoring altitude of 3000ft. At this altitude Mr Spencer's Figure 11 demonstrates that there is good cover from the Lowther Hill radar.

**Annex D, Table 1**

- 2.47 7 Winscales Extension is in the wrong location. However the location given is close to Great Orton, which is missing from the list.
- 2.48 22 Tormy Wheel is in the wrong location. It is in West Lothian and would not be visible to either Spadeadam radar.
- 2.49 Other wind farms missing from the list in Table 1 are:  
Robin Rigg (under construction)  
Carcant (consented)  
Langhope Rig (MoD all-clear August 2006 but refused on other grounds; appeal inquiry commences March 08).

### **3. Evidence of NATS En Route Ltd (NERL)**

#### **Mr Mark Asquith**

##### **Paragraph 4.16**

- 3.1 The publicly available version of the Interim Guidelines (as checked on the DBERR and BWEA websites on 31 January 2008) is still the original version published in 2002. This contains different text from the version quoted by Mr Asquith in his paragraph 4.17.

##### **Paragraph 4.19**

- 3.2 Eurocontrol Surveillance Standards require use of PSR in busy terminal airspace and "the Scottish terminal airspace is classified as such." However the Scottish terminal airspace is 66km away from the nearest boundary of the Steadings wind farm.

##### **Paragraph 6.1.2**

- 3.3 81% of those wind farms to which NERL does not object have some form of impact but "we ensure that the operational safety and efficiency will be maintained." However Mr Asquith does not explain how this is achieved. Is the clutter generated by these wind farms simply accepted? Are aircraft vectored around it? No evidence is offered on these points. Clearly if NERL has accepted and proven means of maintaining safety and efficiency in the presence of radar-visible wind farms then there should be some assessment of their applicability to the Steadings and other wind farms.

##### **Paragraph 7.11**

- 3.4 Mr Asquith states that "it is wrong to merely look at standard routes". Our assessment has not looked only at standard routes in relation to potential impact on NERL.

**Paragraph 8.1.7**

- 3.5 As regards the potential for unknown or lost aircraft to infringe airway L602, the base of the airway is at FL205. There is a further 1000ft below that which is Class C controlled airspace which all aircraft require a clearance to enter. Below that is 9,500 feet of airspace (i.e. above FL100) within which all aircraft except gliders must carry a transponder (ANO 2007 Schedule 5). Thus, any powered aircraft infringing airway L602 would have to have carried out an illegal climb through more than 10,000 feet of airspace. One of the biggest categories of infringers, light recreational aircraft, are with very few exceptions unpressurised and incapable of operating at altitudes as high as 20,500 feet. This would leave aircraft with undetected failed transponders as the only realistic potential powered aircraft infringers. Mr Asquith does not offer any figures for the number of unauthorised infringements of this airway but I would expect the figures to be low for the reasons outlined above.
- 3.6 As regards the potential for gliders to infringe the airspace, their operations above FL195 are highly regulated and kept laterally clear of airways. Further detail is provided in SWFL 10.5 Appendix 8.
- 3.7 Another measure which will enhance controller confidence that they can identify potential infringers of their airspace is the policy implemented from 3 January 2008 that aircraft receiving a Flight Information Service from Scottish Information will be instructed to select the transponder code 7401 [see SWFL 10.5 Appendix 9]. In addition to its primary purpose of enabling controllers to contact an aircraft which is believed to be about to infringe controlled airspace, this simple measure will also reduce the proportion of radar returns on ScACC displays which are primary-only, since, prior to this measure, a substantial number of pilots of transponder-equipped aircraft did not routinely have their transponders switched on when receiving a FIS from Scottish Information.

- 3.8 At sub-paragraph (f) Mr Asquith asserts that creation of an SSR-only zone around the wind farm "requires that either the wind farm be technically blanked from the display or that the controllers live with the clutter". There is a third option – use of the Lowther Hill radar, if necessary on a second display adjacent to the main one, in a similar manner to the way adjacent displays are already used by Tay Sector controllers.

**Paragraph 8.1.8**

- 3.9 It is not clear why SSR-only would have to apply to the entire Tay Sector. If it was judged to be required, the use of SSR inside L602 could be tied with the operation of a Transponder Mandatory Zone in the airspace below the airway.
- 3.10 I do not agree with the implication of Mr Asquith's evidence here that the existence of any primary-only radar returns within the lateral boundaries of L602 constitutes a potential safety risk. It is normal accepted practice in UK air traffic control that primary radar returns seen underneath a section of controlled airspace, in a location where no aircraft has contacted the controller for clearance to enter that airspace, are deemed by controllers not to be inside that controlled airspace. This approach is in use every hour of every day at every airport with controlled airspace around it, in situations where the primary-only traffic may well be flying only 500 feet below airliners making approaches to the airport inside controlled airspace. If the risk assessment in relation to L602 is asserted to be different from that applied around the approaches to Britain's commercial airports then this should be spelled out and justified.

**Paragraphs 8.1.9 to 8.1.15**

- 3.11 This analysis of the Mode S proposals takes no account of the specifics of the Phase 2 proposal which went to consultation on 1 February. This contains specific proposals for carriage of transponders by gliders; for Transponder Mandatory Zones; and for

all aircraft inside controlled airspace, whether operating VFR or IFR, to carry and operate a transponder. The latter measure will mean that all aircraft operating to or from Newcastle Airport will have to be transponder-equipped from, at the latest, 31 March 2012. This alone will increase the proportion of flights in the vicinity of Steadings which are transponding.

**Paragraph 8.1.15**

- 3.12 The reference to a Mode S briefing sheet making no reference to wind farms is misleading. The main consultation document for the introduction of Mode S [CD 292] lists 'Impact of Wind Turbines on Aviation' as one of eight issues which need to be addressed, and 'Provide Potential Mitigation for Impact of Wind Turbines on Aviation' as one of the guiding policy principles applied in devising the CAA's proposals for Mode S.
- 3.13 Mr Asquith implies here that unless it can be guaranteed that every aircraft in every inch of UK airspace is operating a transponder, then no transponder carriage policy change can address the issues raised by wind farms. This is a wholly unrealistic approach. It is never possible to guarantee that all users of airspace will comply with all rules to the letter. This does not mean that those rules are not fit for purpose. The fact is that even the CAA's current proposals for phased extension of transponder carriage will lead to a growing proportion of airspace users having transponders, and will also lead to a reduction in the proportion of the UK's airspace within which it is possible to fly legally without a transponder. This will lead to a reduction in the risk associated with primary-only radar returns.

**Paragraph 8.2.1**

- 3.14 Mr Asquith states that "(i)f controllers are unsure of the nature of a radar return...they are required to take avoiding action" and quotes MATS Part 1 in support of this. However there is no wording in this

section of MATS Part 1 which deals with controller uncertainty about the nature of a radar return. The only instance of the word "unsure" in the whole of MATS Part 1 relates to inexperienced pilots unsure of procedures (MATS Part 1 Appendix E para 5.2.2). Nor does the word "uncertain" occur in relation to controller perception of the nature of any radar returns. The implication by Mr Asquith is that if a ScACC controller observes any primary only return in lateral proximity to an aircraft they are controlling in L602, they will issue that aircraft with avoiding action. I do not believe this occurs. There will be countless times when controllers will observe intermittent primary returns from unknown sources within the lateral boundaries of L602. These may be ground clutter breaking through, road traffic, or civil aircraft operating many thousands of feet below the airway. If controllers routinely issued avoiding action on all of these contacts, airliners would be constantly changing heading and, as noted above, it would be impossible for aircraft to land at or take off from virtually any airport in the UK. The fact is that normal controller interpretation of primary only returns when controlling traffic inside controlled airspace is that, unless the controller has information suggesting that an aircraft is lost, has suffered radio failure or is making an unauthorised penetration of the airspace, he will assume that the return is not an aircraft inside controlled airspace, and will not issue avoiding action.

- 3.15 The suggestion is that wind turbine returns will appear like a lost aircraft. However no explanation of what a lost aircraft looks like on radar is provided. Does a lost aircraft go round in circles? How is that differentiated from an aircraft deliberately circling a particular spot, for example while sight-seeing, taking photographs or teaching students how to carry out a forced landing? If there are aircraft carrying out those types of manoeuvre, do they also "suggest the appearance of unknown or lost aircraft" and cause controllers to vector their traffic around them? I suggest this is highly unlikely.

3.16 I have personal experience, during visits to the Scottish Area Control Centre, of observing aircraft being vectored directly over the clutter from wind farms. In particular I have observed departures from Edinburgh being issued with instructions by ScACC controllers to take up more direct routings which took them through or very close to clutter generated by the 62-turbine Black Law wind farm, and I have seen aircraft inbound to Edinburgh being handed over from ScACC to Edinburgh Approach on tracks which route them through the clutter from the Bow Beat wind farm (the entry point for IFR arrivals at Edinburgh is, coincidentally, located at the Bow Beat wind farm site). Both Bow Beat and Black Law are visible to the ScACC Lowther Hill radar.

3.17 There are numerous other examples where NERL has experience of wind farm developments which are visible to their radars and are underneath sections of airspace where ScACC controllers are providing services. Among these are:

- ▶ the newly-constructed 14-turbine Earlsburn wind farm, south west of Stirling, together with the recently consented and NERL-approved 7-turbine development at Craigengelt. These two developments straddle the centreline of UP600 and are below Class E airspace where unidentified light aircraft regularly mix with IFR departures from Glasgow to the north east;
- ▶ Windy Standard, 15.5nm WSW of Lowther Hill and in an area overflowed regularly by both en route and Prestwick traffic;
- ▶ Hagshaw Hill, 12nm NNW of Lowther Hill and directly under the main inbound route for 80% of Glasgow Airport's traffic;
- ▶ Hare Hill, 12nm west of Lowther Hill and under the approach and departure routes for Prestwick;
- ▶ Ardrossan, 40nm NW of Lowther Hill, under one of the main routes for traffic departing from Glasgow Airport.

If these wind farms were causing unacceptable impacts on the provision of air traffic services by ScACC I would expect NERL to

have produced evidence in the form of airprox reports or Mandatory Occurrence Reports relating to incidents caused by wind farm radar clutter. But no such reports have been produced to the inquiry.

- 3.18 Paragraph 8.2.1 also states that "actual aircraft **will** also be hidden by clutter through the masking effect of SSR labels" [my emphasis]. However there is no demonstration of how this will occur, no assessment of its probability, no examples given, and no reference to the routine controller practice of rotating SSR labels on the display to overcome any difficulties in reading the labels.

### **Paragraph 8.2.2**

- 3.19 Mr Asquith states that "(t)he consideration of how NERL come to know about unauthorised penetrations of class C airspace is an important one". Despite this, none of the NERL witnesses has produced any data on the number of unauthorised penetrations of L602 between Newcastle and Talla in recent years.

### **Paragraph 8.2.3**

- 3.20 Mr Asquith asserts that "controllers may get used to the appearance of false returns from a wind farm and become complacent about the appearance of unknown returns". As noted above, controllers routinely assume primary only returns under the approaches to virtually every airport in the UK to be outside controlled airspace. I do not believe that is complacency, rather, it is a deliberate operational policy decision by NERL based on a realistic assessment of the risk of airspace infringements by these unidentified aircraft. Similarly, NERL now has many years of experience of controllers providing services in areas where there is wind farm clutter. This is ample time for the company to have gathered data on incidences of complacency and to have introduced measures to combat it, should it be found to be a problem. But no data of this sort are presented in the NERL evidence.

**Mr Doug Maclean****Paragraph 3.1.11**

- 3.21 Since "(n)o specific flow of traffic is measured along L602 or UL602", it cannot be possible to measure the impact of any additional controller workload on the capacity of that section of airspace, let alone on the sectors as a whole.

**Paragraph 3.2.3**

- 3.22 Mr Maclean notes that the Talla Sector " is a TMA sector where the provision of PSR is mandatory". However the Steadings wind farm lies 15 nautical miles outside the Talla Sector boundary, which is at OTBUN.

**Paragraph 3.2.7**

- 3.23 Mr Maclean notes that "upgrading of service [from RIS to RAS] seldom currently takes place under ScACC control in the vicinity of the proposed wind farms." Thus, despite the potentially complex mix of commercial airliner and military fast jet traffic in this airspace, it is rare for controllers to have to give avoiding action. This strongly suggests that traffic densities are in practice quite low in this area.
- 3.24 Mr Maclean states that "(a) significant amount of traffic descending into, and climbing out from, Newcastle Airport to the north west are provided with a Radar Information Service outside controlled airspace". Since they are in receipt of a RIS there is no requirement to vector them round any radar returns, only a requirement to inform the pilot of any potential conflicts seen on radar. In the event that wind farm clutter on the Great Dun Fell radar was judged to be unacceptable, services to these aircraft could be provided using the Lowther Hill radar.

- 3.25 Mr Maclean outlines in this paragraph the mix of services provided by the Tay Sector, both inside and outside controlled airspace. However it should be noted, when considering the workload on Tay Sector controllers, that not all civil aircraft operating within the Tay Sector receive an air traffic service from civil Tay Sector controllers. A considerable number of scheduled commercial flights between Aberdeen and airports in eastern England, including Newcastle, Durham Tees Valley and Norwich, receive a service from Scottish Military when operating outside controlled airspace between Aberdeen and Newcastle. Insofar as this reduces the number of aircraft worked by Tay Sector, it will limit their workload.

### **Paragraph 3.2.8**

- 3.26 "All these services require an uncluttered radar display to be available to the controllers." It is not clear where that requirement is laid down, and since NERL already provides services to aircraft in areas of wind farm clutter, it would appear that any such requirement does not apply there.
- 3.27 "If there is a significant area of clutter on the radar display, and the controller is providing a Radar Information Service, the controller is required to vector the aircraft round the clutter."  
Again, there is no indication of where that requirement is laid down. The criteria applying to a RIS are set out in MATS Part 1 Section 1 Chapter 5 para 1.5 [CD 295]. Those criteria do not include any requirement for vectoring RIS traffic around clutter.
- 3.28 "If the aircraft cannot be kept 10 miles clear of significant clutter the services have to be downgraded or even terminated – see NATS ATC Doc 1." NATS ATC Doc 1 is an excerpt from MATS Part 1 on the criteria for limiting a radar service. At no point does it say controllers "have to" downgrade (the correct term is in any case "limit") the service – it says "controllers may elect to continue to give the service by limiting the extent to which it is provided". This is

therefore a voluntary and discretionary action on the part of controllers. For aircraft on a RIS it would depend on the controller's judgement as to whether he can continue to provide "traffic information in respect of all conflicting unknown aircraft". If he judges that he cannot, he may (not must) opt to limit the service. This will involve telling the pilot that he is now on a Limited RIS and giving information on its extent (e.g. "for the next five miles") and cause (e.g. "due to radar clutter"). This is standard practice in most ATC units providing services outside controlled airspace.

- 3.29 If the controller is providing this service to Newcastle inbound/outbound traffic using the Lowther Hill radar, there will be no wind farm clutter on his display so the requirement to consider whether to limit the service will not even arise.

**Paragraph 3.2.9**

- 3.30 Mr Maclean refers to a "large variation in aircraft performance". The original NATS assessment of Steadings [CD 308] states that the traffic on L602 is mostly jet. Traffic in UL602 will by definition be almost exclusively jet. There is no large variation in aircraft performance here.
- 3.31 "Many aircraft are assigned headings and intermediate levels to separate them whilst in the climb or descent phases of flight" Climbing and descending aircraft which are being separated laterally must be placed at least 5nm apart, and preferably at least 2nm inside the airway. Aircraft being separated using these criteria would have to be placed on either side of the wind farm clutter and would therefore be highly unlikely to overfly the Steadings wind farm, which is a minimum of 2.7nm inside the airway.

**Paragraph 3.2.10**

- 3.32 Mr Maclean refers to the "sudden appearance of unknown aircraft operating outside controlled airspace which are permitted to operate

right up to the edge of the airspace without receiving an ATC service". In relation to L602, this is not correct. Controlled airspace extends down to FL195 underneath L602 and to either side of it. Military aircraft are permitted to operate in the Temporary Reserved Airspaces (TRAs) either side of L602 but these do not include the airspace between FL195 and FL205 underneath L602. Military aircraft are permitted to operate autonomously (i.e. without receiving an air traffic service) in TRAs, but this is understood not to be the case in TRA 005 (between L602 and Spadeadam), which is controlled by Spadeadam. In TRA 007 (on the north side of L602), autonomous military aircraft operations are permitted but are subject to the normal rules for such flights which include:

- ▶ aircraft must select SSR transponder code 7006
- ▶ aircraft "should aim to operate no closer than 3 nm to the lateral boundary or within 500 ft of the vertical limit of an active TRA where contiguous with controlled airspace".[see SWFL 10.5 Appendix 10]

Thus the advice to controllers to keep their aircraft 2nm inside CAS and to autonomous aircraft to keep within 3nm of the boundary of a TRA will normally achieve minimum 5nm separation between these aircraft.

### **Paragraph 3.2.11**

3.33 The whisker plot does not say anything conclusive about traffic patterns in L602/UL602 since it presumably includes all radar-visible aircraft at all levels, inside and outside controlled airspace.

### **Paragraph 3.2.17**

3.34 In this paragraph Mr Maclean makes clear that lateral separation is in frequent use because it allows for continuous climb and descent of opposite direction traffic. As noted above, because Steadings (and the others) is located close to the middle of the airway, it should be perfectly possible to have opposite direction tracks straddling any clutter in the middle, therefore no need for any

additional vectoring around any clutter, over and above that applied in order to keep opposite direction traffic laterally separated by at least 5nm.

**Paragraph 3.2.18**

3.35 From my experience as a pilot I believe Mr Maclean's account of the RT exchanges required to achieve vectoring is unrealistic. In the majority of cases the controller would simply say "turn left 10 degrees and report that heading". Also, as Mode S comes in, much of the process he describes will become redundant since heading information will appear in the Track Data Block. In any case, additional vectoring should not be necessary for the busiest periods when opposite direction traffic is being laterally separated. Plus, any vectoring required to get them to opposite sides of the airway will have been done well before the Steadings area because inbounds to Edinburgh/Glasgow will have started their descent at or before Newcastle while the outbounds are still climbing all the way to the Newcastle area.

**Paragraph 3.2.19**

3.36 In relation to the need for overlapping radar cover, L602 clearly has overlapping cover from Lowther Hill and Great Dun Fell. But Mr Maclean's Map 7 shows that this area also has overlapping cover from many other radars including Claxby, Aberdeen and Glasgow. Since the base of L602 is FL205 over Steadings, back-up cover from one of those radars could be used when Lowther Hill breaks down. Mr Maclean's NATS ATC Doc 4 shows that Claxby can support 5nm separation between primary targets out to 150nm range. Steadings is 119nm from Claxby and OTBUN (the handover point from Tay Sector to Talla Sector) is 132nm from Claxby, so Claxby could support 5nm separation across the whole of Tay Sector's section of L602. Using the ATDI online tool, I estimate that the base of radar cover over Steadings from Claxby is in the region of 7,000 feet above sea level.[see SWFL 10.5 Appendix 11]

**Paragraph 3.2.21**

3.37 It is incorrect to imply that no transponders are required in the Class G airspace around Steadings. Transponders are mandatory for all aircraft above FL100 (except for gliders until Mode S Phase 2 comes in – see above). That constitutes about half of the volume of uncontrolled airspace above Steadings.

**Paragraph 3.2.23**

3.38 Mr Maclean suggests here that the wind farms may introduce doubts about the accuracy of SSR – but this is contrary to NATS policy on the effects on SSR, which is that they consider the potential for effects from wind farms out to 30km but in practice only object if within 10km (see Mark Asquith evidence paragraphs 4.17-4.18).

**Paragraph 3.2.25**

3.39 Mr Maclean's description of controllers often changing displayed range and position, and having different scales displayed on two adjacent displays, is a clear demonstration that controllers are far more flexible in the management of their workload than the evidence of Dr Isaac would imply.

**Paragraph 3.2.26**

3.40 It is clear from Mr Maclean's evidence in this paragraph that it would not be possible to have two aircraft flying in opposite directions along L602 with their TDBs both located on the same side of the position symbol, without them overlapping as they pass and consequently 'garbling'. But Mr Maclean makes no reference to the simple device available to the controllers to guard against this difficulty – they can rotate the label of at least one of the aircraft to the other side of its position symbol, in order to maintain the legibility of both TDBs. I would expect that this is already routinely

done by Tay Sector controllers handling opposite direction traffic on L602. The wind farms would make no difference to this practice.

#### **Paragraph 4.1.1**

3.41 I disagree that wind turbines are "likely to be interpreted as aircraft". ScACC controllers do not interpret the many wind turbines which they can already see in this way, so I can see no reason why they should start doing so with the Steadings wind farm.

#### **Paragraph 4.1.5**

3.42 In relation to Mr Maclean's comments about aircraft on a RAS:

- ▶ my experience from observation of controllers at work at many different ATC units is that controllers are able to differentiate between wind turbine returns and aircraft and, rather than vector aircraft around them, are more likely to temporarily limit the service if they judge that any action is required;
- ▶ it is ScACC policy to not normally provide a RAS so even if Mr Maclean was right that RAS traffic would have to be vectored around wind farms, it would only happen on rare occasions;
- ▶ Mr Maclean has already stated (his paragraph 3.2.7) that upgrading from RIS to RAS is "seldom" required in the area of the proposed wind farms.

#### **Paragraph 4.1.6**

3.43 Mr Maclean claims that the majority of ScACC traffic across the Steadings area will be flying at 250kts. I do not accept this to be the case, for the following reasons:

- ▶ Scottish TMA traffic is only one portion of the traffic crossing the Steadings area. No mention is made of the speeds of en route traffic in UL602. Much of this is transatlantic traffic. If these aircraft were flying at a ground speed of 250 knots it would take them eleven and a half hours to get from Northumberland to New York by the shortest Great Circle route. Clearly, then, these aircraft are flying at speeds well in excess of 250 knots.

- ▶ for Scottish TMA inbounds, the specified Speed Limitation Point for the Edinburgh and Glasgow Standard Terminal Arrival Routes (STARs) is at HAVEN, which is 37nm beyond Steadings to the north west. But even then, the speed limitation normally only applies when aircraft are below FL140 at or beyond HAVEN [see SWFL 10.5 Appendix 12]. Up until that point the aircraft will have been descending from their cruising altitude – the STARs indicate that aircraft are expected to be between FL260 and FL220 as they cross Steadings. Jet airliners are generally not good at simultaneously descending and slowing down, and in any case pilots will not want to slow down early since it prolongs their flight unnecessarily. Consequently I think it is highly unlikely that Scottish TMA arriving jet traffic will be flying as slowly as 250 knots over Steadings.
- ▶ for Scottish TMA departures climbing south eastwards on L602, most of them will have had the speed restriction of 250 knots below FL100 (which is from Rule 21 of the Rules of the Air Regulations) removed by air traffic control even before they have left Edinburgh or Glasgow's airspace. This allows them to accelerate well before reaching the Steadings area.
- ▶ the 250 knot rule does not apply in Class A airspace, which aircraft enter at HAVEN
- ▶ the 250 knot rule does not apply to IFR flights in Class C airspace, which aircraft enter as they pass FL195
- ▶ the rule specifies that the limit is 250 knots indicated airspeed (IAS). The relationship between IAS and True Air Speed (TAS), from which ground speed is derived, changes as the aircraft climbs due to the reduction in air pressure with height. At 21,000 feet at standard temperatures and pressures, 250kts IAS is equal to a TAS of approximately 350 knots.
- ▶ as set out in the draft Aviation Report [SWFL 10.3 paragraph 5.11, footnote 19], an estimate of 350 knots ground speed was derived from the fact that the Eurocontrol Base of Aircraft Data, which controllers use as a reference for airspace planning,

shows that typical jet airliner types such as Fokker 100, Boeing 737, 757 and 767, Airbus A319, A320 and A321 will be flying at True Air Speeds of at least 375 knots when climbing or descending at or above 20,000 feet.

**Paragraph 4.3.4**

- 3.44 "Vectoring...would take aircraft away from their most efficient route"  
This does not automatically follow, if they are already being vectored to maintain lateral separation from other traffic on L602.

**Section 4.4**

- 3.45 Mr Maclean talks here about impacts on airspace capacity but no figures are given, and NERL has no baseline to work from because they have acknowledged that they do not know how many aircraft use L602/UL602.

**Mr Jason Strong****Paragraph 3.9**

3.46 Mr Strong states that the reduction in probability of detection is "particularly for smaller returns such as small aircraft or those flying at lower elevation angles". But in this airspace, ScACC controllers are predominantly monitoring airliners at many thousands of feet, not small aircraft at low elevation angles, so any effects will be insignificant.

**Paragraph 3.10**

3.47 The radar shadow zone is here accepted as being "not significant".

**Paragraph 4.6**

3.48 In this long paragraph, Mr Strong outlines in some detail the process for taking Great Dun Fell radar out of service for replacement, but does not specify which radar will be used to provide cover of L602 and UL602 while Great Dun Fell is out of service. The Lowther Hill radar will clearly play a key role in this. If Lowther Hill can operate as a back-up for Great Dun Fell in this way, it should be usable to provide cover of L602 and UL602 in the event that the performance of Great Dun Fell is regarded as unacceptable.

**Paragraph 5.7**

3.49 On the assertion that aircraft are only flying at 250 knots ground speed, see my comments in paragraph 3.42 above. I note that Mr Strong refers to "the majority of aircraft" but only mentions climbing and descending traffic. Aircraft in the cruise are apparently not considered.

**Paragraph 5.8**

3.50 As with the other NERL witnesses, Mr Strong seems to assume that controllers never use their principal tool for addressing problems of TDB overlap or garbling – rotating the SSR label.

**Paragraph 6.5**

3.51 Mr Strong states that "blanking has never been implemented specifically to mitigate a wind farm". This is contrary to my understanding, both of existing wind farms which have been blanked out, such as Out Newton in Yorkshire, and of current NERL discussions with wind farm developers.

**Paragraph 6.15 and 6.17**

3.52 In these paragraphs, Mr Strong rejects use of Lowther Hill to monitor the airspace above the wind farms on the grounds that it would require the blanking out of Great Dun Fell, leading to only single radar coverage over the area. However Claxby can provide cover down to about 7000 feet in the event of Lowther being out of service, and there is no reason why the Great Dun Fell cannot be used simultaneously with Lowther Hill to provide cover around the wind farms, for example by adopting the normal practice for Tay Sector controllers of having different radar pictures selected on adjacent displays.

#### 4. Evidence of Newcastle International Airport (NIA)

##### Paragraph 4.2.20

- 4.1 Mr Rodgers provides details of three airprox incidents from 1999. However it is not clear what the relevance of these is to the proposed wind farm developments, for the following reasons:
- ▶ in all three cases, all aircraft were transponding and the Tornado's action of climbing towards controlled airspace was picked up by the Newcastle controller because of the displayed Mode C data. The wind farms would not affect this.
  - ▶ in none of the incidents was radar clutter an issue. The first incident happened in close proximity to the existing turbines at Kirkheaton but no mention is made of any effects of the clutter from these on either the Newcastle or Great Dun Fell radars.
  - ▶ measures to reduce the likelihood of recurrences of these airproxes were introduced in 2000 and remain in place.

##### Paragraph 4.2.21

- 4.2 Regarding the Shorts 360/Tornado incident, this aircraft elected to fly in Class G airspace where a military exercise was known to be in progress. Again, all aircraft were transponding.
- 4.3 Regarding the November 2007 incident:
- ▶ the incident report makes it clear that the reporting Newcastle controller thought that the Scottish Area Control Centre and/or RAF Spadeadam should have co-ordinated the conflicting traffic; the Newcastle controller also attempted to co-ordinate himself
  - ▶ clutter was not a factor
  - ▶ all aircraft were transponding

##### Paragraph 4.2.25

- 4.4 I do not agree that "(t)he Talla track lies within the AIAA and the Spadeadam and Otterburn ranges". The Talla track does not lie within the AIAA because its upper limit is 4500ft. It is extremely

unlikely that any commercial aircraft would be flying as low as that. Nor is the Talla track within the Spadeadam range, whose danger area boundaries are south of the lateral limits of L602. I believe Mr Rodgers' Map 1 is drawn inaccurately – it shows L602 overlapping the northern corner of the Spadeadam danger area D510, which it does not. The Otterburn range is within the lateral limits of L602 but NIA Map 1 shows a track from Newcastle to Talla which passes clear to the south of both of the Otterburn danger areas, D512 and D512A.

4.5 Mr Rodgers states that "(a)ll of the transatlantic flights to and from the airport use the TALLA track". This will depend on the weather patterns over the Atlantic. For flights to Orlando, Cancun and Puerto Plata in particular, the most direct Oceanic track may start off the west of Ireland, necessitating a southerly departure from Newcastle via airway P18 and then west to Dublin, well away from the area of the wind farms.

4.6 "Flights to Glasgow also route via the TALLA track"  
There are no scheduled commercial flights from Newcastle to Glasgow.

#### **Paragraph 4.2.27**

4.7 Mr Rodgers' figures suggest that, at the peak times when the airport is handling 350 movements a day, the Talla traffic will amount to about 1.4% of the total.

#### **Paragraph 4.3.2**

4.8 The number of aircraft receiving a LARS from Newcastle is encouraging since, by definition, all of these aircraft are 'known traffic' to Newcastle. I presume this includes all the low flying military aircraft which are mandated to contact Newcastle when transiting through the Hexham Gap.

**Paragraph 4.3.3**

4.9 The nearest Steadings turbine is more than 3nm from the Hexham Gap on the definition provided by Mr Rodgers. All low flying military aircraft are required to contact Newcastle two minutes prior to transiting that gap, so these aircraft are all known traffic to Newcastle. Two minutes at a typical 450 knots is 15 nautical miles so low flying military aircraft approaching the area from the north east will have contacted Newcastle well before reaching the wind farm area.

**Paragraph 5.1.2**

4.10 When Great Dun Fell is out of service "an alternate source will be provided under the terms of the contract with NATS". Mr Rodgers does not specify but this alternate source must be the Lowther Hill radar. However Mr Rodgers makes no mention of the possibility of using the Lowther Hill radar in the area of the wind farms.

**Paragraph 5.3.3**

4.11 In relation to Mr Rodgers' example of the Hadyard Hill wind farm and the radar at Prestwick:

- ▶ the layout of this wind farm was specifically negotiated between the developers and Prestwick Airport and approved by the airport
- ▶ the screen shot shows no returns at all from the 20-turbine Hare Hill wind farm (at 18nm just north of the approach to runway 31)
- ▶ the screenshot shows only minimal returns from the Windy Standard wind farm (136°/19nm)
- ▶ also showing is the Ardrossan wind farm (330°/13nm) which also provides Prestwick controllers with no difficulties.

**Paragraph 5.3.5**

4.12 When the Hare Hill wind farm was built, Prestwick ATC devised a mitigation which involved offering aircraft vectoring to avoid the clutter by 5nm, or a direct track taking aircraft over or close to the

wind farm on a limited radar service. Virtually without exception pilots chose the latter option.

### **Paragraph 8.2.2**

- 4.13 Mr Rodgers states that "the best quality of radar service must be provided to air traffic in this area". But this is only partly within NIA's control. The type of radar service (RAS/RIS) is for the pilot to decide, not controllers. Most military aircraft and all VFR traffic will opt for a RIS or a FIS.

### **Paragraph 8.2.3**

- 4.14 Military fast jets are operating VFR on a see and avoid basis. Virtually all GA traffic out to the north west will also be operating VFR on see and avoid and almost certainly not receiving a radar service. For these aircraft the responsibility for collision avoidance rests solely with the pilots. A controller who did not spot a conflict between a pop-up from low level and a GA aircraft, both of them on a FIS, would not be regarded as not meeting his duty of care, because the contract with the pilots gives the pilots the responsibility for collision avoidance. As regards conflicts with commercial airliners, these will be at levels of 5000ft and above in this area, giving more time for controllers to spot conflicts.

### **Paragraph 8.2.4**

- 4.15 Mr Rodgers suggests that the risk to airliners of military fast jets pulling up from low level are "made worse in the event that the fast-jet climbs rapidly towards an airliner fitted with a Traffic Alert and Collision Avoidance System". On the contrary, TCAS does not make the situation worse, it makes it significantly better, because the TCAS will give the pilot a warning of a transponding aircraft pulling up from low level even if neither the controller nor any of the pilots involved can see the conflict. In fact, in situations where the fast jet is too low to be visible to Newcastle's SSR as well as PSR,

TCAS is a great advantage because the airliner will have much better visibility of the fast jet's SSR and will get good prior warning.

**Paragraph 8.2.12**

4.16 Mr Rodgers makes reference to "a number of airproxes" in the airspace – but none of the airproxes referred to was on the Newcastle-Talla track. If there really is a problem in this airspace it would surely be reflected already in reports of airproxes and/or ATC Mandatory Occurrence Reports (MORs).

**Paragraph 8.3.1**

4.17 The NIA evidence makes no mention of ScACC providing a service to its traffic departing to or arriving from the north west of Newcastle. However the NERL evidence makes clear that this is done on a regular basis. This would significantly alter the assessment of any risk to this traffic.

**Paragraph 9.2.21**

4.18 "To the extent that developers rely on such mitigation, NIAL will require to see a [safety case] in accordance with CAP 764"  
It cannot be a developer's responsibility to write a safety case. It can only be written by the ATS provider. The CAA will not consider any safety case written by (or for) anyone other than an ATS provider. CAP 764 – and indeed CAP 670 before it – make clear that any such safety case should be produced on the basis of co-operation between the ATS provider and the developer.

**Paragraph 9.3.4**

4.19 Mr Rodgers states that "the Talla track is the only direct route for transatlantic aircraft". However as our aviation report states (paragraph 4.18), the NATS Standard Routes Document lists 14 routes from Newcastle to Oceanic entry points via L602, of which 6 have alternative routes which do not go via L602. In addition there are other transatlantic routes through Irish airspace where the

recommended route is southwards from Newcastle inside controlled airspace then west over Dublin.

**Paragraph 9.4.9**

4.20 It is indeed possible that the CAA's proposed timescales for Mode S implementation may slip. But these are not grounds for rejecting, or regarding as impractical, specific elements of the CAA's proposals, such as Transponder Mandatory Zones.

**Paragraph 9.4.10**

4.21 There are bound to be questions about the detailed implementation of a particular TMZ. But even for pilots of aircraft without radios, let alone transponders, the existence of a TMZ does not preclude their flight. As with the existing rules for access to controlled airspace, flights by non-radio or non-transponder aircraft can be accommodated by prior arrangement. For more regular access, for example by gliding clubs, this can be dealt with by Letters of Agreement, as it has been for glider access to or through controlled airspace for many years.

4.22 Further details of the CAA proposals for TMZs were issued on 31 January 2008. These make clear that the legislative powers to implement TMZs already exist but propose the creation of a standardised mechanism to handle applications for TMZs.[see SWFL 10.5 Appendix 13]

4.23 An additional measure which could be adopted in conjunction with, or in lieu of, a TMZ is a Mandatory Radio Area. This would require all aircraft entering the designated airspace to be in radio contact with a specified agency. The legislative powers already exist to create such an area and there is a precedent for this measure in the Upper Heyford Mandatory Radio Area, which existed until the early 1990s. As with TMZs, a Mandatory Radio Area can also have provision in it for entry or transit by non-radio aircraft providing they

have obtained prior approval from the controlling authority by telephone.

**Paragraph 10.4.5**

4.24 No assessment is made in Mr Rodgers' evidence of the use of the Lowther Hill radar to provide radar services to Newcastle traffic to/from the north west.

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