

From: DIO ODC-IPS SG2a ,
Sent: 12 September 2014 11:06
To:
Subject: Re easo-authorized: Hill of Lychrobbie wind turbines
Attachments: 20140912 ADATS report redacted.doc; 20140912 Burn of Whilk assessment.doc

Please find attached a redacted version of the Level 2 report for Hill of Lychrobbie. A Level 3 report has been carried out. Our Level 3 reports are carried out using a spreadsheet calculation tool. The tool cannot be release as it includes classified information. The calculation has concluded that the turbines are around 6 dNm above the detection threshold of the Watchman. This is a significant amount.

I also attach an operational impact assessment for the turbines at Burn of Whilk.

You state you know that the Hill of Lychrobbie turbines would be less detectable than the turbines at Upper Smerral would have been. Please provide details of the calculations used to come to this conclusion.

I believe that you have been provided with Level 1 and Level 2 assessments that you requested relating to other developments in the vicinity.

With regard to your request to visit RAF Lossiemouth to discuss operation matters with Air Traffic Control staff there. I can advise that a visit to RAF Lossiemouth is neither relevant or appropriate as the operational staff at the Station do not assess the wind turbine applications. It is the Defence Infrastructure Organisation that administers the wind farm assessment process and we have a team of technical advisors within the MOD including a wind farm team within the RAF who are responsible for carrying out the assessments. If you wish to come to Sutton Coldfield and discuss the matter with them here, that could be arranged. Please provide dates when you would be available.

Kind regards

| Safeguarding Officer - Infrastructure Professional Services -

Safeguarding
DIO Operations Development and Coherence
**Defence
Infrastructure
Organisation**

Telephone: | **MOD Telephone** | **Fax**
Ema
Website: www.gov.uk/mod-safeguarding

From:
Sent: 05 September 2014 09:27
To: DIO ODC-IPS SG2a
Cc:
Subject: Re: Hill of Lychrobbie wind turbines FAO:

David

25/06/2015

Its over a week since I sent the emails below and I haven't had a response. Could you confirm you've received my requests.

Wind Harvest Limited

On 27 Aug 2014, at 18:39,

wrote:

One point to add to my previous email - the DIO letter of 28 July states that you have a Level 2 assessment for Hill of Lychrobbie. I would appreciate if you could provide the Level 2 assessment report to us now, followed by the Level 3 assessment when this is completed.

Regards

Wind Harvest Limited

On 27 Aug 2014, at 16:52,

wrote:

I refer to my emails of 11th June 2014 and 1st July 2014 requesting a Level 3 assessment for Hill of Lychrobbie. Can you confirm when this will be available? We know that the Hill of Lychrobbie turbines are less visible than Upper Smerral, and hence must be borderline detectable at best, so you can understand why we are keen for DE to undertake the more detailed analysis.

I refer to your email of 1st July stating that you have passed our request for a meeting with Lossiemouth ATC staff to the RAF. Have you had any response? If the Level 3 assessment shows some degree of visibility, we would hope that the associated operational impact could be properly assessed through discussion with Lossiemouth directly.

It would be useful to have the Level 3 results during September as we expect the application to be taken to the October planning committee. The MoD is the only objector to the project, which has significant local and political support. I'm sure you would agree that it would be preferable if the MoD presented a fully considered position to the council on this important community project.

It may also be worth noting that Upper Smerral was refused and not appealed, while our subsequent Newlands of Housty project on the same site was refused and has just passed its deadline for appeal, so cumulative impacts should not be a factor.

Regards

Wind Harvest Limited

25/09/2015

On 1 Jul 2014, at 17:03

- wrote:

Thanks for the quick response.

Clearly, given the discussion we are having we need to see the results of a Level 3 assessment for Lychrobbie, if that has not already been done.

We still consider that it is important for us to see the Level 1 Or 2 (as appropriate) assessments which were done for the other projects nearby - Upper Smerral, Lower Rumster, Upper Clyth and Burn of Whilk - and I would be grateful if you could forward those as well.

Regards

On 1 Jul 2014, at 14:02, D:O ODC-IPS SG2a :

wrote:

My email of 22/04/14 did not state that we had carried out a level 3 assessment of impact of The Hill of Lychrobbie development on the Lossiemouth radar. It simply stated our radar expert had concluded that the buildings would not provide shielding. I have asked him to confirm the assessment method that he used to arrive at this conclusion.

My email also made no mention of level 3 assessments for Upper Smerrall, Lower Rumster, Upper Clyth or Burn of Whilk. Decisions for all of these developments were made on the basis of Level 1 or Level 2 assessment.

We do not hold a copy of the RAF's operational assessment for Burn of Whilk on file.

I will pass your request for a site visit on to the RAF.

Kind regards

| Safeguarding Officer - Infrastructure Professional Services -

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Website: www.gov.uk/mod-safeguarding

25/06/2015

Please respond to the email below.

Regards

Begin forwarded message:

From: _____
Subject: Hill of Lychrobbie wind turbines FAO:
Date: 11 June 2014 17:12:12 GMT+01:00
To: [DIOODC-IPSSG2a](#):
Cc: .

Thank you for your response of 22nd April 2014 re our community wind cluster at Hill of Lychrobbie.

Please forward a copy of the ADATS Level 3 assessment of the Lychrobbie turbines so that we can assess your conclusion re lack of shielding.

We also require copies of the other Level 3 assessments for the projects in the vicinity of Lychrobbie (i.e. Upper Smerral (at 84m), Lower Rumster, Upper Clyth, Burn of Whilk) to check consistency with your assessment of Lychrobbie.

Further, we also require a copy of the HQ Air Command operational assessment for Burn of Whilk. I believe Burn of Whilk is currently under construction but if it is in fact operational, is the experience of the radar operators that it is now operationally acceptable?

Once we have reviewed this information we may need to visit RAF Lossiemouth to discuss operational matters with ATC staff there. I'm sure you wouldn't object to this direct approach, given how useful it would be and the fact that Defence Estates does not have the manpower to undertake such visits itself.

It may also be relevant that the Newlands of Houstry project (which replaced the refused Upper Smerral project) has now itself been refused.

Regards

Wind Harvest Limited

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26/06/2015

www.windharvest.co.uk

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Ministry
of Defence

AIR DEFENCE & AIR TRAFFIC SYSTEMS RADIO SITE PROTECTION

TECHNICAL REPORT

Issue: 1
Date: 29 November 2013

Title: WR80026/01
DIO 19464 – AIR TRAFFIC CONTROL (ATC)
RADARS – ASSESSMENT OF THE DEVELOPERS
PROPOSAL TO ESTABLISH A WINDFARM AT
HILL OF LYCHROBBIE, NEAR DUNBEATH,
HIGHLANDS

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FOI FORMAT AND SUMMARY

20131129-DIO19464 Concerns Hill of Lychrobbie-RSP1b-U

Radar Field Strength and/or Radar Line-of-Sight analysis indicates that the proposed windfarm at Hill of Lychrobbie shows a high degree of probability that it will be detected by one or more MoD radars to a degree that will affect their function.

Issue: 1 Dated: 29 Nov 13

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Defence Infrastructure Organisation – Return to Originator

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ADATS Task Spt 3

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Figure 1 – Local area map for Hill of Lychrobbie windfarm

Figure 2 – Coverage prediction plot for Lossiemouth Watchman

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REFERENCES

- A. E-mail from Defence Infrastructure Organisation, DIO 19464 dated 28 Nov 13
- B. JSP846 – Issue 6 dated 09 Oct 12
- C. QINETIQ/D&TS/SEA/TA0705054/1.0 – Assessment of Wind Turbine Effects for DCSA
- D. AWC/WAD/72/655/TRIALS dated 10 May 05 – The effect of wind turbine farms on ATC radar (Qixotic Zephyr trial)
- E. AWC/WAD/72/655/TRIALS dated 06 Jan 05 – The effects of wind turbine farms on Air Defence radars (Swift Crofter trial)
- F. Further evidence of the effects of wind turbine farms on AD radar dated 12 Aug 05 (Mistral Crop trial)

Issue: 1 Dated: 09 Nov 2013

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Standard Assumptions and Terms

RLOS - Radio Line of Sight. This is a linear path estimation of line-of-sight at radar wavelengths that compensates for refractive effects by assuming a reduced earth curvature (4/3 earth radius).

Clutter is taken into consideration as part of the propagation model that generates coverage plots and can significantly reduce the probability of detection by the radar.

Stated accuracy for the Ordnance Survey ground height data is $\pm 3\text{m}$ to 1RMS. DES ADATS maintains mapping data at far greater accuracy for the radar positions. The radar aperture heights used in calculation reflect this increase in accuracy.

Areas of the coverage plots shaded in blue indicate where a turbine of the dimensions given is predicted to be detected by the radar.

Level 1 Assessment: Considers RLOS only and is used for radars where no parameters other than physical location are available. This method is not considered to be particularly accurate.

Level 2 Assessment: Calculated probability of detection from available radar parameters, turbine parameters and terrain data. The total RCS of the turbine is used in all instances. This report constitutes a Level 2 Assessment.

Level 3 Assessment: A more extensive Probability of Detection calculation, utilising sectioned RCS. This method is considered to give more accurate answers when RLOS is not present and diffraction is the sole method of detection.

Turbine RCS: A measure of the radar reflectivity of the complete turbine structure.

Turbine Visibility: The amount of the turbine visible over terrain, considering RLOS only. In general, a large positive value is a strong indicator that the turbine will be detected.

Max height for no visibility: A sample cut-off height below which all of the turbine would be obscured by terrain. Note that this figure will vary between turbines with different ground heights in the same proposal.

Visibility over clutter: The amount of the turbine which is un-obscured from the radar by building clutter and terrain (where this is the same as the Turbine Visibility, no clutter exists in the beam path). Where this value is zero or very small, the turbine is completely obscured by clutter and the detection probability will be greatly reduced.

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1 Scope

1.1 The purpose of this report is to ascertain the likely effects of the proposed wind turbines at Hill of Lychrobbie on the performance of Radar Systems at MoD-related sites.

2 Introduction

2.1 Reference A is a proposal to establish a wind farm of 3 turbines at Hill of Lychrobbie, near Dunbeath, Highlands. National Grid References were provided for all positions (i.e. 17205 32065). The highest point of the turbine blades will be 74 metres above ground level. A local map of the proposed area is shown at Figure 1.

2.2 Siting restrictions for radars are defined in Reference B. Reference C details the methods of determining Radar Cross-Section (RCS) values from a generic wind turbine. Reference D defines specific restrictions for siting wind turbines, which apply when there is Line of Sight (RLoS) between radar and turbine. References E and F define additional restrictions applicable only to Air Defence (AD) radars.

3 Effects of Wind Turbines on Radar Performance

3.1 It has been shown that where RLOS exists and/or Radar Field Strength detection occurs, the wind turbines will appear as genuine aircraft targets. This effect has been shown to mask aircraft responses, even when the aircraft is in a high elevation beam and the turbine is in a lower sidelobe. The radar may also be desensitised by its clutter processing within the sector containing wind turbines.

3.2 Additionally, shadowing of aircraft at similar radar to target elevation angles at the wind turbines may occur, degrading radar performance. However, this is only expected to occur over short distances from wind turbines.

3.3 In close proximity, turbines can cause spurious reflections of returns. This is particularly a problem for Secondary Surveillance Radars.

4 Assessment of the Proposed Wind Farm

4.1 RAF Lossiemouth Watchman Radar Field Strength Coverage summary

4.1.1	Range to Windfarm:	62.8km
	Angle to Windfarm:	356.5°
	RLOS Visibility	74m
	Turbine RCS:	90.1m ²
	Aux Beam:	Outside

4.1.2 A Field Strength Coverage plot was generated for the radar using these parameters (Figure 2), indicating that all of the turbines will be detected by the radar.

4.1.3 All other radars at this site have been checked.

4.2 There are no concerns regarding the following radars, which have been checked:

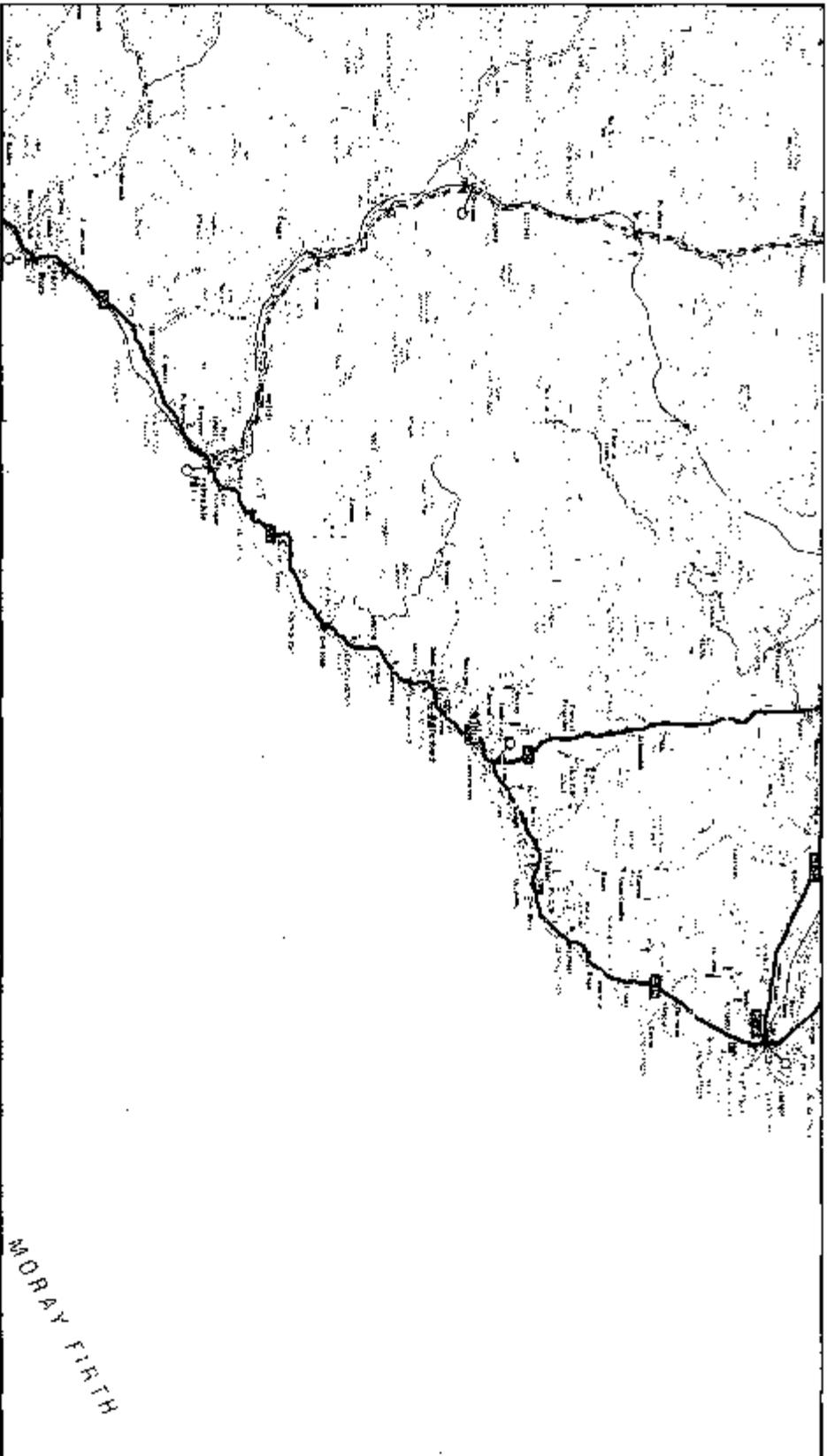
4.2.1 RAF Buchan, Benbecula

4.3 The proposed wind farm is beyond the protected range and/or outside the protective arcs of all other radars.

5 Conclusion and Recommendations

It is recommended that the Operations Staff check whether the proposed wind farm at Hill of Lychrobbie is in an area of vital air traffic operations controlled by the radar at RAF Lossiemouth. If so a decision to object to the proposal should be considered on the grounds referred to in paragraph 3.1 and paragraph 3.2.

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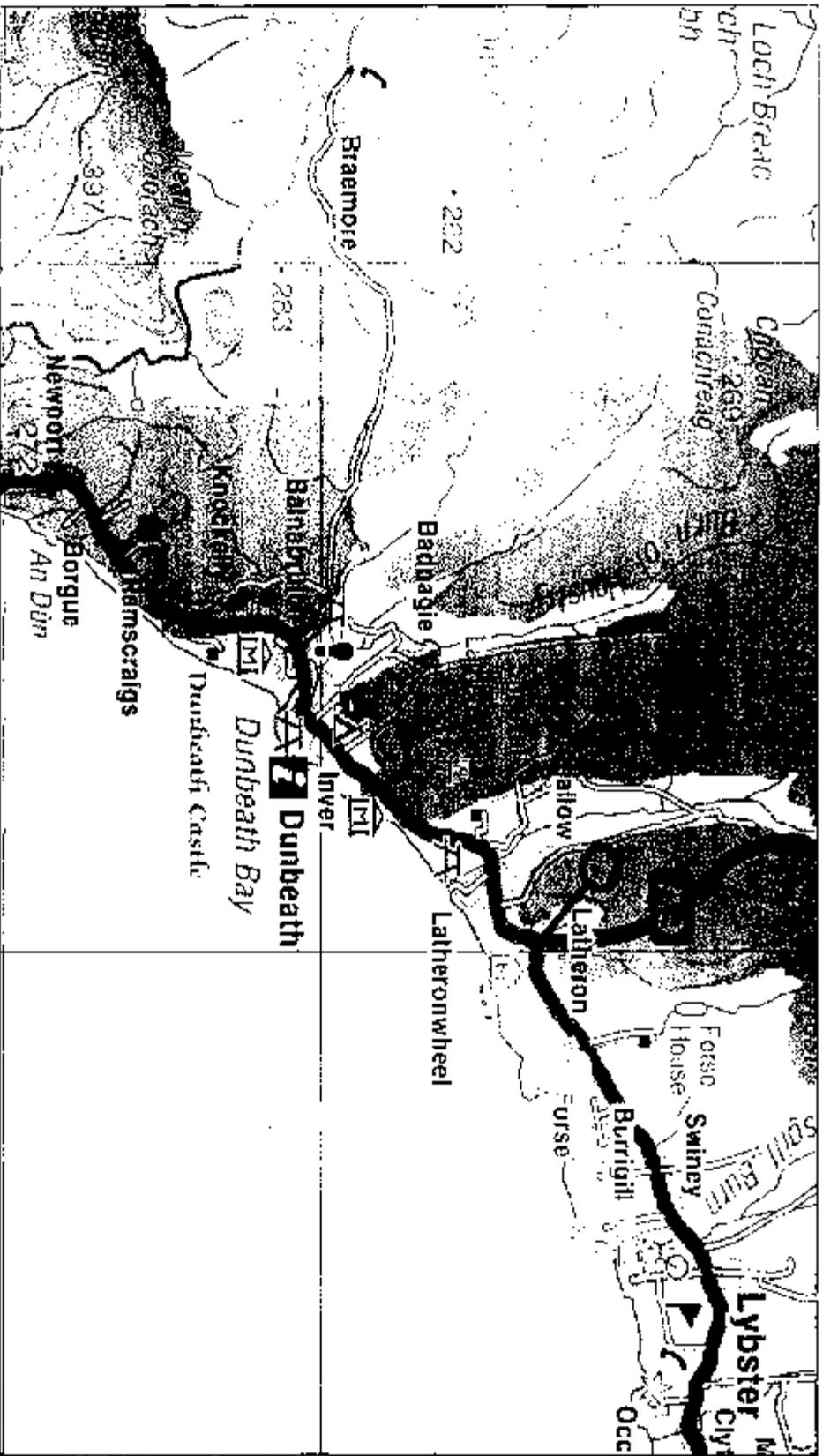


Local area map for DIO 19464 Hill of Lychrobbie windfarm (ND 17205 32065)

Figure 1

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DIO 19464 coverage estimate plot for Lossiemouth Watchman (74m, 90, 1m² RCS, 345° - 05°)

Figure 2

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1 Gp conducted an operational assessment of the Burn of Whilk development in February 2010; although there is no record of what was considered, there is a letter from 1 Gp to DIO stating that despite being Radar Line of Sight (RLOS) the effect would be manageable. The letter went on to say that cumulative effect would result in radar degradation and that propagation of turbines in the area could lead to concerns being raised to protect radar coverage.

Careful consideration is given to each application upon which MOD is consulted, and each development proposal is assessed on its merits from a technical and operational perspective, taking into account cumulative effects. The MOD Air Traffic Control (ATC) subject matter expert (SME) has reviewed the Burn of Whilk proposal and concluded that if it was to be submitted today, 1 Gp would object on the basis of the information made available since 2010. Changes since 2010 include:

- Multiple updates to documents providing clarification about the impact of wind turbines, including: CAP 764, Defence Standard 00972 and CAP 670. New documents providing clarification about the impact of wind turbines: Eurocontrol guidelines. These all resulted in ATC SMEs conducting operational impact assessments upon all proposed developments within the flight checked range of the PSR (typically either 40 or 60nm), as opposed to only those within 15nm, as was previously the case.

- Now ADATS HTZ defraction model introduced in April 2011, giving more accurate technical assessments.

- New MOD policy mandating a Traffic Service for Tutors, following 2 mid-air collisions.

- Baseline results from the Tech Demo trial in the summer of 2013.

- Consideration of cumulative effect.

- Revocation of the 2-year pre-planning policy which had meant that a reassessment was not conducted if it had been less than 2 years since a previous operational assessment.

Moreover, 1 Gp Safeguarding SMEs commenced a review of all sites in November 2013 and specifically conducted a review of RAF Lossiemouth in May 2014.

During this visit, the ATC SMEs observed that there was an area of multiple primary radar returns that was constantly changing shape and size in the vicinity of the Burn of Whilk development. These returns cause a significant problem for RAF Lossiemouth Air Traffic Controllers when controlling aircraft inbound to the airfield from the north and north-east, particularly when other aircraft are routing in and out of Tain Range. This impacts on the provision of Air Traffic Services to aircraft operating in the Moray Bowl and the provision of Lower Airspace Service (LARS) in the area. LARS is used to help separate different flying activities and enhance flight safety in a given area. This service is available to any aircraft operating in uncontrolled airspace, from ground level up to 10,000ft, within a 40nm radius of Lossiemouth; however, services are often provided under the LARS scheme to aircraft beyond these limits. LARS is regarded as a very important service which is sponsored by the Department for Transport (DfT) and is determined by the Assistant Director Airspace Policy 2 (ADAP2) as key to enhancing the levels of safety of the airspace in an area that can be busy with a mixture of aviation activities.