NATS

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Mr J Johnson
South Kesteven District Council
Council Offices
St Peters Hill
Grantham
Lincolnshire, NG31 6PZ

24th March 2009

Your Ref: S09/0296/EIAFP
Our Ref: N/SFG/W(F)8452

Dear Sir,

Wind Farm: Neslam Farm, Sempringham Fen

The proposed development has been examined by our technical and operational safeguarding teams and although the proposed development is likely to impact our electronic infrastructure NATS (En Route) Plc ("NERL") has no safeguarding objection to the proposal.

Details of the NERL assessment are outlined in the attached report TOPA W(F)8452.

Please email NATSSafeguarding@nats.co.uk with the results of the planning application process for this development. NERL assessments take into account both existing and previously assessed wind farm developments and knowing the results of the planning application process significantly assists NERL with the assessment of other developments.

If you have any queries regarding this matter you can contact us on the telephone number given at the top of this letter.

Yours faithfully

[redacted]

Sarah Allen
Technical Administrator
On behalf of NERL Safeguarding Office

CC: Mike Watson, Pager Power

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NATS

Engineering and Programmes

Technical and Operational Assessment of Proposed Development at Neslam Farm

Our Reference - N/SFG/W(F)8452

Your Reference - S09/0296/EIAFP

TOPA/W(F)8452 ◇ Issue 1

Publication history

Issue	Month/Year	Change Requests in this issue
Issue 1	March 09	

Referenced documents

List of documents referenced in this publication, for example:

(1) End-to-End Assessment Methodology - S1/-WI/03
(2) Surveillance Technical Assessment Methodology - S1/-WI/01
(3) Operational Assessment Methodology - S1/-WI/02

Contents

1 Background

1.0.1 NATS En Route Plc ("NERL") is responsible for the safe and expeditious movement in the en-route phase of flight for aircraft operating in controlled airspace in the UK. To undertake this responsibility NERL has a comprehensive infrastructure of radars, communication systems and navigational aids throughout the UK, all of which could be compromised by the establishment of a windfarm. In this respect NERL is responsible for safeguarding this infrastructure to ensure its integrity to provide the required services to Air Traffic Control (ATC). In order to discharge this responsibility NERL assess the potential impact of every proposed windfarm development in the UK, this document defines the assessment of the potential impact of the proposal as detailed in section 2.

2 Wind-farm Details

2.0.1 NERL have been requested by South Kesteven District Council to assess the potential impact of a 6 turbine development at Neslam Farm, Sempringham Fen, Sleaford, NG34 0NH.

Turbine Locations

Designator	Easting	Northing	Hub Height	Tip Height
1	514802	333068	80	125
2	514825	332747	80	125
3	514109	332494	80	125
4	514395	332469	80	125
5	514496	332229	80	125
6	514837	332396	80	125

Turbine Characteristics

Feature	Detail
Turbine Manufacturer and Model	-
Rotor Diameter (m)	90
Rotation Rate (rpm)	-
Tower base diameter/ dimensions (m)	-
Tower top diameter/ dimensions (m)	-

3 Assessment of Effect on NERL Navigational Aids

3.0.1 No impact on NERL Navigational Aids

4 Assessment of Effect on NERL Air-Ground Voice Communication Systems

4.0.1 No impact on NERL Air-Ground Voice Communication Systems

5 Assessment of Effect on NERL RADAR

5.1 Sites Potentially Effected

5.1.1 The proposed development falls within the operational range of the following NERL Radar systems;

Potentially Effected Radar

Radar	Easting	Northing	Range (nm)	Bearing (True)
Claxby Radar	512440	396150	34.4	179.9°
Clee Hill Radar	359440	277980	88.6	70.1°
Cromer Radar	625330	340030	60.2	268.8°
Debden Radar	555540	234840	57.3	338.8°
Great Dun Fell Radar	371030	532210	132.7	144.0°
Heathrow Radar (10cm)	508200	175970	84.6	3.4°
Heathrow Radar (23cm)	507500	176030	84.6	3.6°
Heathrow Radar (RSS 10cm)	508410	174700	85.3	3.3°
Pease Pottage Radar	525170	133080	107.8	358.2°
Stansted Radar	553090	222710	62.9	342.2°

5.2 Predicted Effect on Clee Hill

5.2.1 The effect on Clee Hill has been assessed as negligible.

5.3 Predicted Effect on Cromer

5.3.1 The effect on Cromer has been assessed as negligible.

5.4 Predicted Effect on Debden

5.4.1 The effect on Debden has been assessed as negligible.

5.5 Predicted Effect on Great Dun Fell

5.5.1 The effect on Great Dun Fell has been assessed as negligible.

5.6 Predicted Effect on Heathrow (10cm)

5.6.1 The effect on Heathrow (10cm) has been assessed as negligible.

5.7 Predicted Effect on Heathrow (23cm)

5.7.1 The effect on Heathrow (23cm) has been assessed as negligible.

5.8 Predicted Effect on Heathrow (RSS 10cm)

5.8.1 The effect on Heathrow (RSS 10cm) has been assessed as negligible.

5.9 Predicted Effect on Pease Pottage

5.9.1 The effect on Pease Pottage has been assessed as negligible.

5.10 Predicted Effect on Stansted

5.10.1 The effect on Stansted has been assessed as negligible.

5.11 Predicted Effect on Claxby

5.11.1 Using the theory as described in Appendix A and the specific propagation profiles to the turbines it has been determined that at a range of only 34.4nm and with insufficient terrain screening available to attenuate the signal, turbines of this size are likely to cause false primary plots to be generated.

5.11.2 A reduction of the primary radar's ability to detect small aircraft at low altitude in the airspace residing directly above the windfarm is also anticipated.

5.11.3 The effect on the co-mounted Claxby SSR has been assessed as negligible.

5.12 Summary of Potential Effect

5.4.1 The radar safeguarding assessment reveals that the windfarm development is located within an area where there is insufficient terrain shielding from the Primary Radar Service at Claxby. Due to the large dimension of the wind turbines and the distance from the radar it is anticipated that the reflected power from the wind turbines will be of adequate value to be detected by the radar and consequently generate false plots. A reduction in the radar's probability of detection, for real targets, is also expected.

6 OPS Review Process

6.1 Required Reviewers of TOPA and their response

TOPA Responses

Unit or Role	Comment
RDP Asset Management	No Objection
Civil ATC	No Objection
London Military ATC	No Objection

6.2 Output of Windfarm Assessment Group

6.2.1. It has been assessed that this application does not impact on NERL at the present time and is therefore the WAG recommends not raising an objection to the proposed development.

7 Conclusions

7.0.1 The proposed development has been examined by NERL's technical and operational safeguarding teams and although the proposed development is likely to impact our electronic infrastructure NERL has no safeguarding objection to the proposal.

8 Appendix A – Radar Background Theory

8.1 PSR False Plots

When radar transmits a pulse of energy with a power of Pt the power density, P, at a range of r is given by the equation;

$$P = Gt.Pt/(4\pi\, r^2)$$

Where Gt is the gain of the radar's antenna in the direction in question.

If an object at this point in space has a radar cross section of σ, this can be treated as if the object re-radiates the pulse with a gain of σ and therefore the power density of the reflected signal at the radar is given by the equation;

$$Pa = \sigma.P/(4\pi\, r^2) = \sigma.Gt.Pt/((4\pi)^2\, r^4)$$

The radar's ability to collect this power and feed it to its receiver is a function of its antenna's effective area, Ae, and is given by the equation;

$$\mathrm{Pr} = Pa.Ae = Pa.Gr.\lambda^2/(4.\pi) = \sigma.Gt.Gr.\lambda^2.Pt/((4\pi)^3\, r^4)$$

Where Gt is the Radar antenna's receive gain in the direction of the object and λ is the radar's wavelength.

In a real world environment this equation must be augmented to include losses due to a variety of factors both internal to the radar system as well as external losses due to terrain and atmospheric absorption. For simplicity these losses are generally combined in a single variable L.

$$\mathrm{Pr} = \sigma.Gt.Gr.\lambda^2.Pt/((4\pi)^3\, r^4.L)$$

8.2 SSR Reflections

When modelling the impact on SSR the probability that an indirect signal reflected from a wind turbine has the signal strength to be confused for a real interrogation or reply can determined from a similar equation;

$$\mathrm{Pr} = \sigma.Gt.Gr.\lambda^2.Pt/((4\pi)^3\, rt^2\, rr^2.L)\,]$$

Where rt and rr are the range from radar-to-turbine and turbine-to-aircraft respectively. This equation can be rearranged to give the radius from the turbine within which an aircraft must be for reflections to become a problem.

$$rr = (\lambda^2/(4\pi)^3)^{1/2}.(\sigma.Gt.Gr.Pt/(rt^2.\mathrm{Pr}.L))^{1/2}$$

8.3 Shadowing

When turbines lie directly between a radar and an aircraft not only do they have the potential to absorb, or deflect, enough power such that the signal is of insufficient level to be detected on arrival it is also possible that azimuth determination, whether this done via sliding window or monopulse, can be distorted giving rise to inaccurate position reporting.

8.4 Terrain and Propagation Modelling

All terrain and propagation modelling is carried out by a software tool called ICS Telecom (version 6.99). All calculations of propagation losses are carried out with ICS Telecom configured to use the ITU-R 526 propagation model.

9 Appendix B – Diagrams

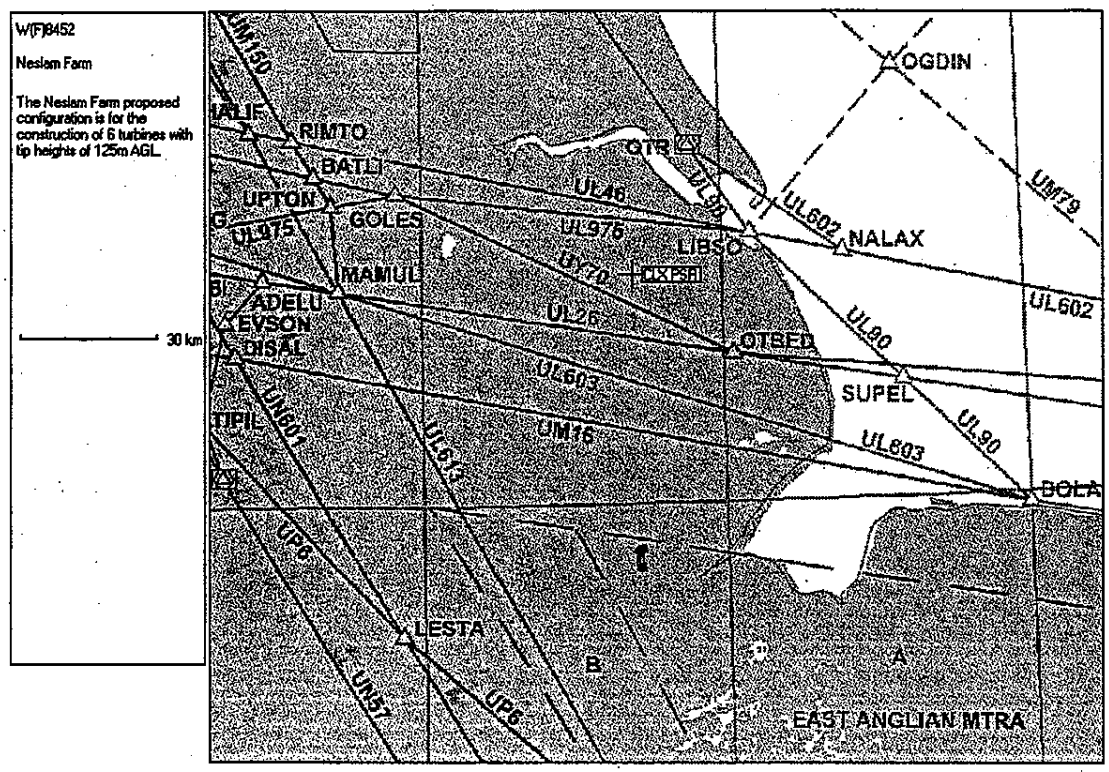

Figure 1: Neslam Farm proposed location shown on an airways chart

JUSTIN JOHNSON

From: CHERYL TAYLOR
Sent: 26 March 2009 12:28 PM
To: JUSTIN JOHNSON
Subject: FW: S09/0296/EIAFP Neslam Farm Sempringham Fen Sleaford

-----Original Message-----
From: Chas Griffin [mailto:chas.griffin@jrc.co.uk]
Sent: 26 March 2009 12:25
To: PLANNING
Cc: Ofcom Gerry
Subject: S09/0296/EIAFP Neslam Farm Sempringham Fen Sleaford

Dear Mr Johnson
Thank you for the opportunity to comment on the proposed development

JRC analyses proposals for wind farms on behalf of the UK Fuel & Power Industry to assess the potential of these developments to cause interference to radio systems operated by utility companies in support of their regulatory operational requirements.

In the case of this proposed wind energy development, JRC does not foresee any potential problems based on known interference scenarios and the data you have provided. However; if any details of the wind farm change, particularly the disposition or scale of any of the turbines, it will be necessary to re-evaluate the proposal.

In making this judgement, JRC has used its best endeavours with the available data, although we recognise that there may be effects which are as yet unknown or inadequately predicted. JRC cannot therefore be held liable if subsequently problems arise that we have not predicted.

It should be noted that this clearance pertains only to the date of its issue. As the use of the spectrum is dynamic, the use of the band is changing on an ongoing basis and consequently, you are advised to seek re-coordination prior to submitting a planning application, as this will negate the possibility of an objection being raised at that time as a consequence of any links assigned between your enquiry and the finalisation of your project.

JRC offers a range of radio planning and analysis services. If you require any assistance, please get in touch by phone or email.

Regards

Chas Griffin

Wind Farm Team

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