Corporate Communications
External Information Services

4 April 2016
EIR Reference: E0002698

Dear XXXX

I am writing in respect of your recent request, of 4 March 2016 for the release of information held by the Civil Aviation Authority (CAA).

Your request:

Please send to me any documents relating to the installation, operation and further testing of two wind turbines installed by Severn Trent Water in Derby which cannot be used because they are interfering with radar services at East Midlands Airport.

Our response:

Having considered your request in line with the provisions of the Environmental Information Regulations 2004, we are able to provide the information attached.

We have redacted some personal information that is not already in the public domain. In the CAA's view, disclosure of such personal information would be unfair and disclosure would therefore be a breach of the first data protection principle. Regulation 13(1) provides an exception from the duty to disclose this information. A copy of this exception can be found below.

If you are not satisfied with how we have dealt with your request in the first instance you should approach the CAA in writing at:-

Caroline Chalk
Head of External Information Services
Civil Aviation Authority
Aviation House
Gatwick Airport South
Gatwick
RH6 0YR

caroline.chalk@caa.co.uk

The CAA has a formal internal review process for dealing with appeals or complaints in connection with requests under the Environmental Information Regulations. The key steps in this process are set in the attachment.

Should you remain dissatisfied with the outcome you have a right to appeal against the decision by contacting the Information Commissioner at:-

Information Commissioner's Office
FOI/EIR Complaints Resolution
Wycliffe House
Water Lane
Wilmslow
SK9 5AF
https://ico.org.uk/concerns/

If you wish to request further information from the CAA, please use the form on the CAA website at http://publicapps.caa.co.uk/modalapplication.aspx?appid=24.

Yours sincerely

Mark Stevens
External Response Manager

CAA INTERNAL REVIEW & COMPLAINTS PROCEDURE

- The original case to which the appeal or complaint relates is identified and the case file is made available;
- The appeal or complaint is allocated to an Appeal Manager, the appeal is acknowledged and the details of the Appeal Manager are provided to the applicant;
- The Appeal Manager reviews the case to understand the nature of the appeal or complaint, reviews the actions and decisions taken in connection with the original case and takes account of any new information that may have been received. This will typically require contact with those persons involved in the original case and consultation with the CAA Legal Department;
- The Appeal Manager concludes the review and, after consultation with those involved with the case, and with the CAA Legal Department, agrees on the course of action to be taken;
- The Appeal Manager prepares the necessary response and collates any information to be provided to the applicant;
- The response and any necessary information is sent to the applicant, together with information about further rights of appeal to the Information Commissioners Office, including full contact details.

Environmental Information Regulations – Regulations 13

(1) To the extent that the information requested includes personal data of which the applicant is not the data subject and as respects which either the first or second condition below is satisfied, a public authority shall not disclose the personal data.

(2) The first condition is—

(a)in a case where the information falls within any of paragraphs (a) to (d) of the definition of "data" in section 1(1) of the Data Protection Act 1998, that the disclosure of the information to a member of the public otherwise than under these Regulations would contravene—

(i)any of the data protection principles; or

(ii)section 10 of that Act (right to prevent processing likely to cause damage or distress) and in all the circumstances of the case, the public interest in not disclosing the information outweighs the public interest in disclosing it; and

(b)in any other case, that the disclosure of the information to a member of the public otherwise than under these Regulations would contravene any of the data protection principles if the exemptions in section 33A(1) of the Data Protection Act 1998(**1**) (which relate to manual data held by public authorities) were disregarded.

(3) The second condition is that by virtue of any provision of Part IV of the Data Protection Act 1998 the information is exempt from section 7(1) of that Act and, in all the circumstances of the case, the public interest in not disclosing the information outweighs the public interest in disclosing it.

(4) In determining whether anything done before 24th October 2007 would contravene any of the data protection principles, the exemptions in Part III of Schedule 8 to the Data Protection Act 1998 shall be disregarded.

(5) For the purposes of this regulation a public authority may respond to a request by neither confirming nor denying whether such information exists and is held by the public authority, whether or not it holds such information, to the extent that—

(a)the giving to a member of the public of the confirmation or denial would contravene any of the data protection principles or section 10 of the Data Protection Act 1998 or would do so if the exemptions in section 33A(1) of that Act were disregarded; or

(b)by virtue of any provision of Part IV of the Data Protection Act 1998, the information is exempt from section 7(1)(a) of that Act.

Directorate of Airspace Policy

[redacted]
Derby City Council
Via email

27 October 2010

Ref ERM/DAP/Wind/DerbySewageTreatmentWorks

Dear [redacted]

Application No 09/10/01144 – Proposed Wind Turbine Development at Derby Sewage Treatment Works, Megaloughton Lane, Spondon, Derby

Thank you for your recent correspondence relating to the subject planning application. You have sought related Civil Aviation Authority (CAA) comment; I trust the following is useful.

As commented within the associated Environmental Statement (ES) the development (like any wind turbine development) has the potential to impact upon aviation operations and activities in a number of ways; the Department for Trade and Industry (DTI – now the Department for Energy and Climate Change)-sponsored document 'Wind Energy and Aviation Interests' and Civil Air Publication 764 refer[1].

I can advise that the development might have the potential to impact upon the operation of and those associated with East Midlands Airport. I note that the environmental statement details the extensive discussions between the applicant and the Airport and it is essential that the Council seek the Airport's comments on the proposal. In relation to the technical and operational impacts of a wind turbine development on an Airport's operations, the CAA consider that the Licensee is the expert in these matters.

To validate the related comment within the ES, it is recommended that both the MoD and NATS are provided the opportunity to comment upon the application and that any concerns expressed are taken into account during any related future planning deliberations.

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

- There might be a need to install aviation obstruction lighting to some or all of the associated wind turbines should this windfarm development be progressed. While the Authority would not make a case for turbines with blade tip heights below 150m, I note that both the MoD and the local Police Air Support Unit have made requests for low intensity lighting to aid nighttime operations. We would support such requests.

[1] These documents are available at http://www.bwea.com/pdf/Wind-Energy-and-aviation-interim-guidelines.pdf and http://www.caa.co.uk/docs/33/Cap764.pdf respectively. Please note that after a full review CAP 764 was re-issued on 12 February 2009.

Civil Aviation Authority
CAA House 45-59 Kingsway London WC2B 6TE www.caa.co.uk
Telephone [redacted] Fax 0207 453 6565 [redacted]

- International aviation regulatory documentation requires that the rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines that are deemed to be an aviation obstruction should be painted white, unless otherwise indicated by an aeronautical study. It follows that the CAA advice on the colour of wind turbines would align with these international criteria. As with the potential need for lighting, in isolation, the CAA would make no special case for marking.

- The number of pre-planning enquiries associated with windfarm developments has been significant. It is possible that the proliferation of wind turbines in any particular area might potentially result in difficulties for aviation that a single development would not have generated. It is, therefore, not necessarily the case that, because a generic area was not objected to by the aviation industry, future, similarly located potential developments would receive the same positive response[2].

I note that there appears to be an aviation issue associated with this application and request that we are kept informed of progress of aviation matters.

Whilst none of the above negates any requirement to consult in line with ODPM / DFT Circular 1/2003, I hope this information matches your requirements. Please do not hesitate to get in touch if the Council requires any further comment or needs clarification of any point.

Yours sincerely

{Via email}

[redacted]
Renewable Energy Project Officer

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

Continued (2 of 2 pages)

[redacted]

From: CAA Aerodrome Standards Department
Sent: 20 July 2012 09:14
To: [redacted]
Subject: FW: Derby City Council Planning Application Re-Consultation, Ref: 09/10/01144, Derby Sewage Treatment Works, Megaloughton Lane, Spondon, Derby
Attachments: DocCon02Email.pdf

Over to you [redacted]; enjoy

From: developmentcontrol@derby.gov.uk [mailto:developmentcontrol@derby.gov.uk]
Sent: 19 July 2012 14:50
To: CAA Aerodrome Standards Department
Subject: Derby City Council Planning Application Re-Consultation, Ref: 09/10/01144, Derby Sewage Treatment Works, Megaloughton Lane, Spondon, Derby

Dear Sir / Madam,

Derby City Council Planning Application Re-Consultation

TOWN AND COUNTRY PLANNING ACT 1990

TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT PROCEDURE) (ENGLAND) ORDER 2010

Application No:	DER/09/10/01144/PRI
Location:	Derby Sewage Treatment Works, Megaloughton Lane, Spondon, Derby
Proposal:	Erection of two wind turbines, access track, control building, temporary site compound and ancillary development
Case Officer:	Sara Booty

This is a re-consultation for the above planning application, I would be pleased if you could send me any observations that you wish to make, within the next **21 days,** electronically through our eplanning service.

View the Planning Application Details

To submit your comments electronically please follow the online instructions, We advise attachments can accompany your comments.

Note:** If you find "the consultation period for this application is not open", please wait until the next day to submit your comments through the service.

If your comments are not received before the 21 days expires my response to the developer may be made without the benefit of your views.

You should be aware that any comments you provide, may be made available on our website, www.derby.gov.uk/eplanning. If there are any documents, in whole or in part, that you do not wish

to be published online, please contact our planning administration team on 01332 256076 or 01332 255950 or email developmentcontrol@derby.gov.uk

Yours faithfully,

[redacted] | Principal Planner |Development Management | Neighbourhoods | Saxon House, Friary Street, Derby, DE1 1AN | Telephone [redacted] | [redacted] | www.derby.gov.uk

one Derby one council

[redacted]

From: [redacted]
Sent: 20 October 2009 11:21
To: [redacted]
Subject: Derby Sewage Treatment Works WindFarm

Our Ref: DAP/Wind/Derby Sewage Treatment Works\1412
Your Ref: 5581 - Derby

Dear [redacted]

Wind Farm Proposal – Derby Sewage Treatment Works

Thank you for notification of the title proposal. This Directorate has the following observation(s):

This development might affect the following aeronautical site(s), the licensee/operator of which should be consulted:

East Midlands Airport
[redacted]
Safeguarding Officer
Building 34
East Midlands Airport
Castle Donnington
Derby
DE74 2SA
Phone Number: [redacted]
Email: safeguarding@eastmidlandsairport.com

It is in your interests to contact the persons or organisations identified above, as recommended in the Wind Energy and Aviation Interim Guidelines. By so doing you should ensure that there are no unexpected aviation objections when you reach the stage of applying for planning permission. You are also advised that the appropriate Local Planning Authority should be able to provide information relating to safeguarding requirements of local aerodromes.

There may be issues related to en route navigational facilities. Accordingly details of your proposal have been copied to National Air Traffic Services for any comment. If you do not hear from NATS or wish to contact them, they can be contacted at:
National Air Traffic Services Ltd
Navigation Spectrum & Surveillance
Corporate and Technical Centre
4000 Parkway, Whiteley
Fareham
Hampshire, PO15 7FL
Email: nerlsafeguarding@nats.co.uk
For completeness it would also be sensible to establish the related viewpoint of local emergency services air support units. This is because of the unique nature of their operations in respect of operating altitudes and potentially unusual landing sites.

In respect of any aviation need to increase the conspicuity of the turbines, developers should be aware that there may be a need to install aviation obstruction lighting to some or all of the associated wind turbines should this development be progressed. This comment is made specifically if there were concerns expressed by other elements of the aviation industry; ie the operators. For example, if the Ministry of Defence or a local aerodrome had suggested such a need, we the Civil Aviation Authority (sponsor of policy for aviation obstruction lighting) would wish, in generic terms, to support such a claim. We would do so if it could reasonably be argued that the structure(s), by virtue of their location and nature, could be considered a significant navigational hazard. That said, if the claim was clearly outside credible limits (ie the proposed turbine(s) was/were many miles away from an any aerodrome or it/they were of a height that was unlikely to effect even military low flying) the Authority would play an 'honest-broker' role.
All parties should be aware that international aviation regulatory documentation requires that the rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines that are deemed to be an aviation obstruction should be painted white, unless otherwise indicated by an aeronautical study. It follows that the CAA advice on the colour of wind turbines would align with these international criteria.

The number of pre-planning enquiries associated with windfarm developments has been significant. It is possible that the proliferation of wind turbines in any particular area might potentially result in difficulties for aviation that a single development would not have generated. It is, therefore, not necessarily the case that, because a generic area was not objected to by the aviation industry, future, similarly located potential developments would receive the same positive response.
Developers are advised that there is a civil aviation requirement in the UK for all structures over 300 feet high to be charted on civil aviation maps (I understand that the ministry of defence utilises a lower threshold height). Should this proposed wind turbine development progress and the 300 feet height be breached, to achieve this civil aviation charting requirement, developers will need to provide details of the development to:
Defence Geographic Centre
AIS Information Centre
Jervis Building
Elmwood Avenue
Feltham
Middlesex
TW13 7AH
Telephone: 020 8818 2708 (This number is for Defence Geographic, not the undersigned.)

An amendable version of the proforma is available electronically at
http://www.bwea.com/docs/developers_proforma.doc and can be E-mailed to windfarms@caa.co.uk when submitting preplanning information.

Please be aware that due to the rationalisation of CAA Email addresses the windfarms Email address is now windfarms@caa.co.uk, the previous address windfarms@dap.caa.co.uk will no longer work.
Regards

[redacted]

[redacted]
S&SM Administration Officer
Civil Aviation Authority
Surveillance and Spectrum Management, K6G6, CAA House, 45-59 Kingsway, London, WC2B 6TE
Tel [redacted] Fax 020 7543 6556 Email [redacted]

[redacted]

From: [redacted]
Sent: 20 October 2009 11:21
To: 'safeguarding@eastmidlandsairport.com'
Subject: Derby Sewage Treatment Works WindFarm

Reference: DAP/Wind/Derby Sewage Treatment Works\1412

Dear Mr [redacted]
Wind Farm Proposal – Derby Sewage Treatment Works

The enclosed wind farm notification proforma has been submitted to this Authority in accordance with the Wind Energy and Aviation Interests Interim Guidelines. I would be grateful if you would bring it to the attention of your aerodrome licensee and ATS unit. The developer has been asked to contact you to discuss the proposal.

This information is Commercial in Confidence. It has been sent to you to enable you to assess the impact of the proposal on your aircraft operations. Details should not be communicated to any person or organisation not directly responsible for the safety of air operations at your unit.

Please note this proforma has not been generated by the CAA, it has been submitted by a developer or individual whose details should be on the second page of the proforma. Any opinions, concerns or queries that you may have regarding the location or dimensions of any development should be addressed to the developer or individual listed on the proforma.

Aerodrome operators / licensees attention is drawn to CAP764 CAA Policy and Guidance on Wind Turbines (available on the CAA Website at www.caa.co.uk/cap764), which details generic CAA Policy and guidance. Particular note should be made of the CAA request to be notified of site specific aerodrome safeguarding requirements, CAP764 chapter 3 paragraph 2 section a) refers.

Regards

[redacted]

[redacted]
S&SM Administration Officer
Civil Aviation Authority
Surveillance and Spectrum Management, K6G6, CAA House, 45-59 Kingsway, London, WC2B 6TE
Tel [redacted] Fax 020 7543 6556 Email [redacted]

[redacted]

From: [redacted]
Sent: 27 July 2015 08:16
To: [redacted]
Cc:
Subject: RE: FW: FW: FW: FW: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

[redacted]

For clarification, the Safety Case Part 2 for the deployment of an Aveillant in-fill Radar to remediate the Spondon Farm wind farm development (to the North of East Midlands) is with me for review and acceptance, however the Safety Case Part 3 (describing the site test evidence) and Safety Case Part 4 have not yet been submitted.

Regards,
[redacted]

From: [redacted]
Sent: 24 July 2015 15:08
To: [redacted]
Cc: [redacted]
Subject: FW: FW: FW: FW: FW: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

Hi [redacted]

As you know, Charnwood Planning Authority recently contacted us regarding the matter of a single wind turbine at Lodge Farm (see attached file and email trail below), which East Midlands Airport has objected to. The Local Planning Authority is being pressed to determine whether it is acceptable to remove the conditions on the planning approval, which the airport has objected to. This particular case is somewhat complicated as I understand the applicant is 'piggy backing' on another turbine application involving mitigations currently being developed between the airport and Aveillant. Unfortunately the Safety Case, which I believe is being reviewed by CAA ATM (?) is not quite ready for sign off, but the [Lodge Farm] applicant will miss the deadline for funding if they wait for the Safety Case to reach its conclusion.

Although it has come into us (Aerodromes) originally, I do not feel it is something for us to be too involved in as it does not involve any physical penetrations. That said, the LPA is looking for a response from the CAA, so can I ask you to discuss this at the Management Meeting to determine who is the best person to respond? I will send a holding response to Charnwood Council.

Regards
[redacted]

ps: The LPA has mis-quoted a comment I made in my response to them (see highlighted section below), which I will clarify when I send the holding response.

From: [redacted]
Sent: 23 July 2015 10:25
To: [redacted]
Cc: [redacted]
Subject: Re: FW: FW: FW: FW: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

Good Morning [redacted],

Thank you for the update. Please find attached our response which we hope will help bring the matter to a close. I agree we need to avoid a tit for tat situation and have proposed two possible solutions in the attached letter for the CAA to review. This will hopefully allow us to enter into an agreement with EMA asap to ensure we can fund, build and operate our turbine. As outlined in the attached cover letter the timescales involved have now reached a critical point and it is imperative we reach a solution within the next 1-2 weeks.

I look forward to hearing from you.

Kind regards,
[redacted]

On Wed, Jul 22, 2015 at 9:27 AM, [redacted] > wrote:

[redacted]

Please find enclosed detailed comments of the EMA. I look forward to receiving the response from the CAA in order to assist me in making a decision regarding the proposal to remove conditions 17 and 18 from the turbine permission.

[redacted] I assume the applicants have chance to respond to the airports comments?

[redacted] How long do you think you will need to respond to these comments from the airport to allow the CAA to look at these?

I'm conscious that this could become a tit for tat ongoing communication so would like a final assessment within a shortish period as possible.

I look forward to hearing from you.

[redacted]

Principal Planning Officer

Charnwood Borough Council

[redacted]

[redacted]

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From: [redacted]
Sent: 20 July 2015 16:39
To: [redacted]
Subject: Re: FW: FW: FW: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

[redacted]

Thank you for the updates. Did [redacted] send you on anything today yet?

Regards,
[redacted]

On Mon, Jul 20, 2015 at 1:07 PM, [redacted] wrote:

[redacted]

[redacted] told me last Friday that he would issue the full response by yesterday as he on leave until then. I have not yet received it. The CAA after initially having no comment to make on the

proposal when questioned further what this meant, then indicated that they want to wait and see what the airport has to say before making a judgement as to whether a mitigation scheme is considered necessary. I will forward on the comments received by the CAA and will chase [redacted] up on this as it should be here by today as he promised.

[redacted]

Principal Planning Officer

Charnwood Borough Council

[redacted]

[redacted]

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From: [redacted]
Sent: 20 July 2015 11:31
To: [redacted]
Subject: Re: FW: FW: FW: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

Good Morning [redacted],

Did you hear anything at all from the CAA when you chased them? Also any update from EMA either?

Regards,
[redacted]

On Mon, Jun 29, 2015 at 4:39 PM, [redacted] wrote:

Thanks [redacted],

I have already emailed CAA and given them three weeks for comment and asked them to discuss this with me if necessary.

[redacted]

Principal Planning Officer

Charnwood Borough Council

[redacted]

[redacted]

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From: [redacted]
Sent: 29 June 2015 16:20
To: [redacted]
Cc: [redacted]
Subject: Re: FW: FW: FW: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

Good Afternoon [redacted]

Thank you for sending that on. I note that EMA have referred to a mitigation solution being available shortly, however in the absence of any detail on type, cost and timescale as well as technical evidence to demonstrate that mitigation is required in the first place the Applicant would like you to request advice / an objective comment from the CAA as agreed last Thursday.

I have put together a cover letter to that effect. Please see attached.

If you can please advise me when you have contacted the CAA by email aerodromes@caa.co.uk that would be much appreciated.

Kind regards,

[redacted]

On Mon, Jun 29, 2015 at 9:30 AM, [redacted] wrote:

[redacted]

Latest response from the EMA for information.

[redacted]

Principal Planning Officer

Charnwood Borough Council

[redacted]

[redacted]

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From: [redacted]
Sent: 29 June 2015 09:06
To: [redacted]
Subject: Re: FW: FW: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

[redacted],

Thank you for your email unfortunately I am still await responses from other internal consultees however we have had some developments over the last week which means we will be ready to mitigate the development shortly subject to agreement of terms with the applicant/developer. As always stated with reference to this development there is a risk to air safety and this was clearly stated by our Air Traffic Manager at the meeting we all had, the development is 5km south of our 9NM final approach with our traffic passing just to the east of the site (approximately 3NM). We are mandated to offer a separation distance of 5NM from traffic from an unknown contact and the development is within this. The mitigation measure will remove the turbine return from our display as it can discern between aircraft and wind turbines and filter the wind turbines out removing the risk, especially in an area where unknown contacts are common due to the number of small light aircraft transiting under our controlled airspace.

As we have always maintained we object to the removal of their conditions as this would leave the area

unmitigated. If the LPA does grant the permission to the development then we shall have to refer the case to the Civil Aviation Authority and begin the processes required to call in the case to the secretary of state, something which we would obviously prefer not to do as this will essentially put the development on hold which it is decided. This would seem a shame seeing as we are now a matter of months away from being able to mitigate the development and as a result they would be able to begin the process of ordering and erecting their turbines.

More than happy to discuss further if you wish.

Kind Regards
[redacted] BEng(Hons) MSc(Hons) MIET

Airfield Operations Manager
for East Midlands Airport

Aerodrome Safeguarding Officer
for East Midlands and Bournemouth Airports

East Midlands Airport
Building 34
Castle Donington
Derbyshire
DE742SA

E: [redacted]
T: [redacted]
M: [redacted]

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[redacted] ---24/06/2015 10:10:13--- [redacted] It's been six weeks now since consultation and you promised a response two weeks ago, so can I

From: [redacted]
To: [redacted]
Date: 24/06/2015 10:10
Subject: FW: FW: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

[redacted],

It's been six weeks now since consultation and you promised a response two weeks ago, so can I have this as soon as possible. Thanks. If I do not receive a full response by the end of the week I will consider recommending approval of removal of the conditions on the grounds of lack of evidence of any harm to aircraft safety.

[redacted]
Principal Planning Officer
Charnwood Borough Council
[redacted]

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From: [redacted]
Sent: 23 June 2015 16:27

To: [redacted]
Cc: [redacted]
Subject: Re: FW: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

Good Afternoon [redacted]

Did you receive anything from EMA since returning to the office yesterday and today?

Kind regards,
[redacted]

On Fri, Jun 19, 2015 at 1:35 PM, [redacted] wrote:
Ok, thank you [redacted]

On Fri, Jun 19, 2015 at 1:24 PM, [redacted] wrote:
Not yet [redacted] that Ive seen. Im working from home today so we'll see what I have on Monday back at work.

[redacted]
Principal Planning Officer
Charnwood Borough Council
[redacted]

[redacted]

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From: [redacted]
Sent: 19 June 2015 12:59
To: [redacted]
Cc: [redacted]

Subject: Re: FW: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

Hi [redacted]

Has anything been received from EMA yet regarding their "full response" which they referred to in their last correspondence?

Regards,
[redacted]

On Thu, Jun 18, 2015 at 1:49 PM, [redacted] wrote:
Ok, no problems.

[redacted]
Principal Planning Officer
Charnwood Borough Council
[redacted]

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From: [redacted]
Sent: 18 June 2015 12:04
To: [redacted]
Subject: Re: FW: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

Thank you [redacted],

Would you mind holding off on making a decision on the application until our aviation consultant has had a chance to consider the new evidence that EMA are due to submit today / tomorrow please?

Kind regards,
[redacted]

On Wed, Jun 17, 2015 at 2:27 PM, [redacted] wrote:
[redacted]

As indicated on the phone.

[redacted]
Principal Planning Officer
Charnwood Borough Council
[redacted]

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From: [redacted]
Sent: 16 June 2015 09:27
To: [redacted]
Subject: Re: FW: Further Information for Planning Reference P14/16752 for Removal of Condition Nos. 17 & 18 of Planning Permission P/13/2506/2

Good Morning [redacted]

As discussed on the phone the amount of data and submitted material is taking us some time to analyse however we have the following points to make:

- East Midlands Airport is its own Air Navigation Services Provider, ANSP, and as a result we are solely responsible for the safety of aircraft within our own airspace. National Air Traffic Services, NATS, deal with aircraft operating in the main routes to the local aerodromes and are handed to EMA ATC at approximately 30 miles away. Although NATS do provide aerodrome ATC at some airports such as Manchester and Stansted and are a statutory consultee in their own right for the aircraft operating in the routes across the UK to reach the local aerodrome they have no authority at EMA.
- East Midlands Airport, as an ANSP, has to have a defined and robust assessment process for all developments something which has been undertaken for this development. We are more than happy to share this as a part of the fuller response.
- The applicant discusses in depth the impact that the Old Dalby windfarm will have on EMA and that we should be able to accommodate their development as part of the same mitigation measure. Given that at this moment in time the mitigation plan for Old Dalby has not yet been finalised we cannot confirm that this would be the case. We are in the process of designing a robust procedure which will allow us to operate aircraft in the area as is currently however the feeling of our Air Traffic Services Manager is that the extension of any operational mitigation area would further restrict the ability to control traffic in the area, something which is not acceptable.
- EMA has always maintained that the applicants development would need technical mitigation and this is something that they could source themselves at this moment in time if they so wished and we would cooperate with them on that however I understand that this would be excessive in price and as a result we are more than prepared to accommodate them in the regional technological mitigation when this is available which will be before the expiry of any consent that they have been granted. The consent was granted in April of 2014 and our mitigation measure will be available before April 2017, we would notify them in advance of the mitigation measure being ready to agree how they can come on board with this solution allowing sufficient time for them to order and erect turbines.
- A question for yourself as the LPA is would you be prepared for the turbines to be erected and sit still for a period of time which we cannot as of yet confirm, also will the developer be happy to commit to this, I would suspect not.
- Prior to any consent being granted EMA did not commit to any timescales for the development's mitigation being live and the majority of the work we are now undertaking through the planning system would have been dealt with before this stage if the developer had sought pre-application advice, something which they did not.
- The developer appears to have the impression that EMA is undertaking no work on their development, this is not the case. We have been working on the implementation and integration of this technology for another development for the past 2 years addressing all the issues that occur with a brand new technology within such a heavily regulated environment. As we have always stated this work is directly transferable to the applicants development as once we have the system fully integrated and working on another turbine as well as an approved safety case from the national safety regulator we will have done the majority of the proof of safe operation for the regulator allowing us to deploy further technology with ease.

I hope this helps clarify some points but we will happily discuss further when we have the full response back.

Kind Regards
[redacted] BEng(Hons) MSc(Hons) MIET

Airfield Operations Manager
for East Midlands Airport

Aerodrome Safeguarding Officer
for East Midlands and Bournemouth Airports

East Midlands Airport
Building 34
Castle Donington
Derbyshire
DE742SA

E: [redacted]
T: [redacted]
M: [redacted]

Looking for a new career opportunity? Check out: http://jobs.magworld.co.uk

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Kind regards

[redacted] BA. MSc. Environmental Planning
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www.eastmidlandsairport.com

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Mob: [redacted]

[redacted]

From: [redacted]
Sent: 29 January 2016 15:04
To: [redacted]
Cc: [redacted]
Subject: RE: Spondon wind turbines

Many thanks both – much appreciated.

From: [redacted]
Sent: 29 January 2016 13:14
To: [redacted]
Cc: [redacted]
Subject: RE: Spondon wind turbines

[redacted],

This is Ok with me.

Best regards,
[redacted]

From: [redacted]
Sent: 29 January 2016 12:21
To: [redacted]
Cc: [redacted]
Subject: RE: Spondon wind turbines

Hi [redacted]

Slight tweaks suggested. [redacted] feel free to add if necessary.

"Aviation and wind turbine technology can co-exist but if airports or air traffic control bodies have safety concerns, they may request , for example, appropriate mitigation for the effects of wind turbines on their radar systems.

"This is the case for the wind turbines at Spondon, where such concerns were reflected in a local authority planning condition that means effective radar mitigation technology must be in place and approved before the turbines can be fully operational. We are working closely with the ~~East Midlands~~ Airport regarding approval of the radar mitigation technology ~~in place~~ for these wind turbines and expect the matter to be resolved very shortly."

[redacted]
Surveillance Policy
Airspace, ATM & Aerodromes
Civil Aviation Authority

Tel: [redacted]

Follow us on Twitter: @UK_CAA

From: [redacted]
Sent: 29 January 2016 11:46

To: [redacted]
Subject: Spondon wind turbines

Hi [redacted],

Thanks for your help with this earlier. I've drafted a statement below. Can you please have a quick look and let me know if there are any problems? Any issues with naming East Mids?

Statement regarding wind turbines at Spondon

A CAA spokesperson said:
"Aviation and wind turbine technology can co-exist but airports or air traffic control bodies may request technology is installed to mitigate any effects of wind turbines on their radar systems.

"This is the case for the wind turbines at Spondon, where there is a local authority planning condition in place that means effective radar mitigation technology must be in place and approved before the turbines can be fully operational. We are working closely with East Midlands Airport regarding approval of the radar mitigation technology in place for these wind turbines and expect the matter to be resolved very shortly."

Thanks

[redacted]
Media Relations Manager
Corporate Communications Department
Civil Aviation Authority

Tel: [redacted]
Mob: [redacted] (out of hours press office mobile)

Follow us on Twitter: @UK_CAA

[redacted]

From: Windfarms
Sent: 20 July 2012 15:01
To: 'developmentcontrol@derby.gov.uk'
Subject: RE: Derby City Council Planning Application Re-Consultation, Ref: 09/10/01144, Derby Sewage Treatment Works, Megaloughton Lane, Spondon, Derby

Dear Sir/Madam

Request for Comment under the Town and Country Planning Act 1990 and the Town and Country Planning (Scotland) Act 1997

There is currently a high demand for CAA comment on wind turbine applications which exceeds the capacity of the available resource to respond to requests within the timescales required by Local Planning Authorities. The CAA has no responsibilities for safeguarding sites other than its own property, and a consultation by a Council is taken as a request for clarification of procedural matters. Councils are reminded of their obligations to consult in accordance with ODPM/DfT Circular 1/2003 or Scottish Government Circular 2/2003, and in particular to consult with NATS and the Ministry of Defence as well as any aerodromes listed in Annex 3 of the above documents, taking note of appropriate guidance and policy documentation. Should the Council be minded to grant consent to an application despite an objection from one of the bodies listed in the circular, then the requisite notifications should be made. In addition, consultation should be undertaken with any aerodrome particularly if it has lodged an unofficial safeguarding map with the Council, including local emergency service Air Support Units (e.g. Police Helicopter or Air Ambulance).

There is an international civil aviation requirement for all structures of 300 feet (91.4 metres)* or more to be charted on aeronautical charts.

- Any structure of 150 metres* or more must be lit in accordance with the Air Navigation Order and should be appropriately marked. Smaller structures may also be required to be lit by aviation stakeholders particularly if they fall under Section 47 of the Aviation Act.

- Cumulative effects of turbines may lead to unacceptable impacts in certain geographic areas.

The Ministry of Defence will advise on all matters affecting military aviation.
Should the Council still have a specific query about a particular aspect of this application the CAA will help in the clarification of aviation matters and regulatory requirements. Site operators remain responsible for providing expert testimony as to any impact on their operations and the lack of a statement of objection or support from the CAA should not be taken to mean that there are no aviation issues, or that a comment from an operator lacks weight.

Guidance relating to the impact of wind turbines upon aviation can be found at http://www.caa.co.uk/docs/33/Cap764.pdf. More generic comment relating to the CAA involvement in the planning process is described at http://www.caa.co.uk/docs/33/DAP_GuidanceOnCAAPlanningConsultationRequirements.pdf.

Yours Faithfully

[redacted]
Squadron Leader (RAF)
Surveillance and Spectrum Management
Directorate of Airspace Policy
Civil Aviation Authority
45-59 Kingsway London WC2B 6TE
Tel: [redacted] Fax: 020 7453 6565
windfarms@caa.co.uk
*The effective height of a wind turbine is the maximum height to blade tip.

[redacted]

From: [redacted]
Sent: 29 January 2016 09:53
To: [redacted]
Subject: RE: Press Enquiry - Aveillant East Midlands / Spondon Wind Turbines

Hi [redacted]

Sorry I keep missing your calls. I have done a bit of background searching and it seems that [redacted] is dealing with this issue. He's been working on it for some time and says they (Nottingham East Midlands) are very close to getting their approval. He's happy to brief you on the current situation and can be contacted on X[redacted]

Regards,

[redacted]

From: [redacted]
Sent: 29 January 2016 08:05
To: [redacted]
Subject: Press Enquiry - Aveillant East Midlands / Spondon Wind Turbines

Morning [redacted],

Can you give me a call as soon as you get this – I need to deal with a Press Enquiry concerning a wind farm radar solution for Spondon.

I need to know the progress of the Safety Case.

Thanks

[redacted]
Surveillance Policy
Airspace, ATM & Aerodromes
Civil Aviation Authority

Tel: [redacted]

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Derby City Council

one Derby one council

Civil Aviation Authority
Building 65, Ambassador Road
East Midlands International Airport
Castle Donington
Derby
DE74 2SA

Your ref: dccCons35
Our ref: DER/09/10/01144/PRI
Date: 19/07/2012
Contact: [redacted]
Telephone: [redacted]
E-mail: developmentcontrol@derby.gov.uk

Dear Sir/Madam

Town and Country Planning Act 1990
Town and Country Planning (Development Management Procedure) (England) Order 2010

Application No: DER/09/10/01144/PRI
Location: Derby Sewage Treatment Works, Megaloughton Lane, Spondon, Derby
Proposal: Erection of two wind turbines, access track, control building, temporary site compound and ancillary development
Case Officer: [redacted]

This is a re-consultation for the above proposal. I am reconsulting you on consultation responses received from the Highways Agency and East Midlands Airport. I would be pleased if you could send me any observations that you wish to make, within the next **21 days,** electronically through our eplanning service.

You can view the consultation responses received at **www.derby.gov.uk/eplanning** enter the application number: ***09/10/01144*** in the 'Quick Search' box.

To submit your comments in connection with these consultation responses electronically please follow the online instructions, We advise attachments can accompany your comments.
Note:** If you find "the consultation period for this application is not open", please wait until the next day to submit your comments through the service.

If your comments are not received before the 21 days expires my response to the developer may be made without the benefit of your views.

You should be aware that any comments you provide, may be made available on our website, www.derby.gov.uk/eplanning. If there are any documents, in whole or in part, that you do not wish to be published online, please contact our planning administration team on 01332 256076 or 01332 255950 or email developmentcontrol@derby.gov.uk

Yours faithfully

[redacted]
Principal Planner
Development Management

Site Name: Derby Sewage Treatment Works	Received (E?): 24/9	Resp:	20 Days: N / Y
Nil Comments:	Copy to: NATS File Log		
Positive Response:	Refer to: - Nottingham - Hucknall - East Midlands - Tatenhill - Derby ~~Copy to:~~ - Donington } Heli - Langley Priory } ports - - NATS Log		
Comments:			

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TNEI Services Ltd
Milburn House
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Newcastle upon Tyne
NE1 1LE

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Fax: 0191 211 1432
[redacted]
www.tnei.co.uk

Directorate of Airspace Policy
K6 Gate 3
CAA House
45-49 Kingsway
London
WC2B 6TE

24th September 2009

Dear Sir/Madam,

WIND TURBINE DEVELOPMENT: LAND AT DERBY SEWAGE TREATMENT WORKS, SPONDON, DERBY.

Please find enclosed a proforma consultation form for two wind turbines at Severn Trent Water's Derby Sewage Treatment Works.

I would be grateful to receive your comments on the proposal at your earliest convenience.

If I can be of any further assistance in this matter, please contact me on the above telephone number.

Yours faithfully,

[redacted]

[redacted]
Senior Consultant

+-(BWEA email #1692)**WIND FARM DEVELOPERS APPLICATION PROFORMA:**

Civil Aviation & Ministry of Defence Safeguarding

NOTICE TO WIND FARM DEVELOPERS

Please submit a completed application form for all new or revised onshore and offshore wind farm plans. This form has been compiled in consultation with the British Wind Energy Association. Its purpose is to standardise the information provided and to expedite the assessment of your proposed wind farm development. Assessment is made against air safety and defence interests, through evaluation of the possible effects on air traffic systems, defence systems and low flying needs.

NOTICE TO PLANNING AUTHORITIES

This form has been compiled with the assistance of the Civil Aviation Authority (CAA), the Ministry of Defence (MOD), the National Air Traffic Service (NATS) and the British Wind Energy Association (BWEA), to assist in the processing and assessment of wind farm applications. It is important that copies of this form are forwarded within the planning consultation process. This will help these organisations trace their records of any earlier consultations, as well as provide them with the relevant information for their assessments.

WHAT TO DO WITH THIS FORM

Please provide as much detail as possible by **filling in the shaded areas.** If the specific turbine and/or exact positions have yet to be established then fill in the likely turbine size (hub height, rotor diameter) and boundary points as a minimum. On completion send copies to both the following addresses.

Safegaurding
Defence Estates
Blakemore Drive
Sutton Coldfield
B75 7RL

Directorate of Airspace Policy
K6 Gate 3
CAA House
45-49 Kingsway
London, WC2B 6TE

It is important that a copy of this form is retained for inclusion with subsequent planning applications at the same site. If no application has been made prior to a planning application, please include a completed form in your planning application.

Tesco Project Tray wind turbine	
Also known as:	

Developers reference	5581 - Derby
Application identification No.	

Related/previous applications (at or near this site): Provide reference names or numbers	

Developer Information

Company name:	TNEI Services Ltd
Address:	Milburn House Dean Street Newcastle upon Tyne NE1 1LE
Contact:	[redacted]
Telephone:	[redacted]
Facsimile:	0191 211 1432
e-mail:	[redacted]

Relevant Wind Turbine Details

Wind turbine manufacturer:			
Wind turbine model:			
Wind farm generation capacity (MW)	**3.3**	**Number of turbines**	2
Blade manufacturer			
Number of blades	3		
Rotor diameter	104	Meters	
Rotation speed (or range)		Rpm	
Blade material including lightning conductors			
Wind turbine hub height	80	Metres	
Tower design (* delete as required)	* Tubular		
Tower base diameter/dimensions		Metres	
Tower top diameter/dimensions		Metres	

Comments

Are there any details or uncertainties that may be helpful to add ?

Turbine Locations

Please provide as much information as you can. The position and height above sea level of every machine if available, the site boundary if not. The height above sea level is the above ordinance datum (AOD) used to specify all heights on OS maps. Please note grid references **and** latitude/longitude and must be included. For co-ordinate conversion: **www.gps.gov.uk**

An Ordinance Survey (OS) map, or maritime chart, should be submitted with this pro-forma, showing locations of proposed turbine/turbines or scheme boundaries. Please number the turbines or boundary points on the map, to correlate with the information provided below.

Copy this page as necessary to account for all turbines or boundary points

Wind farm Name & Address:	**Severn Trent Water – Derby Sewage Treatment Works** **c/o TNEI Services**

Turbine no.	1			**Height** AOD (m) of tower base					
Grid Reference	**390351**				100 km square letter(s) identifier			**SK**	
Easting (10 m)	**3**	**9**	**0**	**2**	Northing (10 m)		**3**	**5**	**1**	**0**
	Degrees				Minutes		Seconds			
Latitude	**5**		**2**		**5**	**4**	**4**		**3**	
Longitude	**W**		**1**		**2**	**5**	**1**		**6**	
Turbine no.	2			**Height** AOD (m) of tower base					
Grid Reference	**392347**				100 km square letter(s) identifier			SK	
Easting (10 m)	**3**	**9**	**2**	**9**	Northing (10 m)		**3**	**4**	**7**	**8**
	Degrees				Minutes		Seconds			
Latitude	**5**		**2**		**5**	**4**	**3**		**3**	
Longitude	**W**		**1**		**2**	**5**	**0**		**2**	
Turbine no.				**Height** AOD (m) of tower base					
Grid Reference					100 km square letter(s) identifier				
Easting (10 m)					Northing (10 m)					
	Degrees				Minutes		Seconds			
Latitude										
Longitude										
Turbine no.				**Height** AOD (m) of tower base					
Grid Reference					100 km square letter(s) identifier				
Easting (10 m)					Northing (10 m)					
	Degrees				Minutes		Seconds			

Table 10.5 Summary of Viewpoint Sensitivity, Magnitude of Change in View and Materiality of Effects (During Operational Phase)

Reference Number	*Viewpoint Location*	*OS Grid Ref*	*Distance to Nearest Turbine (m)*	*Sensitivity of View*	*Number of Hubs Theoretically Visible*	*Number of Blade Tips Theoretically Visible*	*Magnitude of Impact*	*Materiality of Effect*
1	Pride Parkway	437175 334749	1887	High	2	2	Medium	Moderate
2	Cherry Tree Hill, North	438989 337055	1954	High	2	2	Medium	Moderate
3	Cherry Tree Hill, South	438896 335855	765	High	2	2	Medium	Moderate
4	Footbridge over A52	439829 335671	982	Medium	2	2	Medium	Moderate
5	Spondon, Railway Station	439695 335128	527	Low	2	2	Medium	Slight
6	Nottingham Road	440454 335095	1198	High	2	2	Medium	Moderate
7	Borrowash	442175 334735	2878	High	2	2	Low	Slight
8	Elvaston Country Park	441129 333223	2405	High	2	2	Low	Slight
9	Alvaston	438671 333664	1281	High	2	2	Medium	Moderate
10	Alvaston Park	438140 334328	1178	High	2	2	Medium	Moderate
11	Darley Abbey	435052 338101	4981	High	2	2	Low	Slight
12	Upper Vicarwood	431406 339651	8770	Medium	2	2	Low	Slight
13	Midshires Way	444361 337652	5820	High	2	2	Low	Slight
14	Shardlow	442768 330086	5839	Low	2	2	Low	Slight
15	Melbourne	458161 312322	1300	Low	2	2	Low	Slight

10.6.17 Effects on Visual Receptor Groups

From analysis of the assessment viewpoints it is possible to draw some conclusions about the materiality of effects on different receptor groups at different distances from the proposed development.

10.6.17.1 Visual Effects on Residential Receptors

The ground level elements of the development would not be visible from any residential properties. Therefore the effects on visual amenity experienced by residential properties relate primarily to the two turbine structures.

A detailed Residential Amenity Study (RAS) is presented in Appendix F of the ER and aims to consider residential properties within approximately 2km of the nearest turbine and determine whether any modifying factors influence the significance of visual effects on any of these properties.

It is acknowledged that there are a large number of residential properties within 2km of the site and that where these properties have unrestricted views towards the site, the proposed turbines would be prominent in the view. However it also noted that very few of the properties within 2km of the site have unrestricted views of the turbines. Most are orientated away from the site or have vegetation or buildings between them and the turbines that would restrict views in the direction of the site. Typically most of the properties within 2km would just catch glimpses of the turbine blade tips above and beyond adjacent buildings.

It is also noted that the views experienced by most of the properties within 2km of the site are inevitably already heavily influenced by the presence of existing urban features such as industry, major highways (including the A52, the A6 and Raynesway) and other buildings. Therefore, whilst there are residential areas within 2km of the site from which the turbines would be prominent the magnitude of change in the townscape would be less perceptible and less out of character than if the same turbines were experienced in a rural landscape.

It is considered that there would be a medium magnitude of change and therefore a ***moderate effect*** on the private visual amenity of a relatively small proportion of the residential properties within Spondon, Alvaston, the Cherrytree Hill estate of Chaddesden and the new residential estate off Pride Parkway, known as City Points. However there would be no greater than a ***slight effect*** on the majority of properties within these areas.

The new residential development currently being built adjacent to Spondon Railway Station will be the closest residential properties to the proposed wind turbines. Whilst these properties are located only 0.5km from the nearest turbine, the baseline view from these properties is across a railway line and the Acordis chemical plant. In this context, whilst prominent, the turbines would not detract from the existing view and there would be no greater than a ***moderate effect*** on their private visual amenity.

When viewed from any of the above residential areas, the turbines would not obstruct the view in any direction and would not prevent an appreciation of the underlying and surrounding townscape.

Between 2km and 5km of the site there are many residential estates and villages as well as numerous individual or isolated properties. At this distance and where there are unobstructed views of the turbines, they would be seen within an established urban context. At this distance there would be a ***slight effect*** on visual amenity experienced by residential properties.

Beyond 5km from the site, there would be several villages and numerous individual properties with distant glimpses of the turbines. However beyond this distance, the turbines would not be prominent in the view and it is considered that the development would have no greater than a ***slight effect*** on visual amenity experienced by residential receptors.

10.6.17.2 Visual Effects on Long Distance Trails and Public Rights of Way

There are three long distance footpaths which run within the 10km study area. The closest of these to the site is Derwent Valley Heritage Way; it passes approximately 0.8km south of the site. The ZTV suggests that the Derby turbines would be visible on this footpath for much of its length between Duffield and Shardlow. The ZTV however does not take account of the considerable extent of vegetation (hedgerows, trees and woodlands) and urban infrastructure within the landscape that would screen or partially obstruct views of the turbines from much of this length.

The main views of the turbines would be experience as the footpath passes directly along the southern boundary of the sewage treatment works. As the footpath passes the site and continues south eastwards towards Shardlow there would be intermittent glimpsed or partial views of the turbines back up the valley. Travelling north from the site along the footpath the route passes through the urban areas of Derby and built form would greatly restrict views in the direction of the site.

Within 2km of the site, and where there are unobstructed views of the turbines, they would be prominent but seen within an established industrial context. Therefore there would be a localised ***moderate effect*** on the visual amenity experienced along the footpath within 2km of the site but no greater than a ***slight effect*** on other sections of the route. In the context of the route as a whole (approximately 82 miles) the moderate effect would only be experienced along a very short section of the overall route.

The Bonnie Prince Charlie Walk ends approximately 4km North West of the site. The ZTV suggests that the Derby turbines would be visible on this footpath for all of its length within the 10km study area, between Radbourne and Derby City Centre. The ZTV however does not take account of the considerable extent of the built form that makes up Derby city that would screen or partially obstruct views of the turbines from much of this length.

Therefore there would be no greater than a low magnitude of change and consequently a ***slight effect*** on the visual amenity experienced by people using the Bonnie Prince Charlie Walk between Radbourne and Derby City Centre. In the context

of the route as a whole (approximately 28 miles) the slight effect would only be experienced along a short section of the route.

The Midshires Way passes approximately 4.5km north east of the site at Dunnshill. The ZTV suggests that the Derby turbines would be visible on this footpath from Kegworth in the south east up to Dunnshill. However, the ZTV does not take account of the considerable extent of vegetation (hedgerows, trees and woodlands) within the landscape that would screen or partially obstruct views of the turbines from much of this length.

As the footpath continues north west it drops in and out of coverage on the ZTV suggesting that there are several locations along the route that fall outside the zone of theoretical visibility, once again those places that are theoretically able to view the turbine will have views interrupted by the built form within Derby as it winds around the north of the city. At this distance the turbines would not be prominent in the context of the urban extent of Derby.

There would be no greater than a low magnitude of change and consequently a ***slight effect*** on the visual amenity experienced by people using the Mid Shires Way between Duffield and Kegworth. In the context of the route as a whole (approximately 360 miles) the slight effect would only be experienced along a very short section of the overall route.

Other long distance footpaths, namely the Robin Hood Way, Trent Valley Way, Centenary Way and Ivanhoe Way pass through the 20km study area but none of them pass within 10km of the site. Although the ZTV suggests that the Derby turbines would be visible from some sections of these routes, in reality views of the turbines would be limited to very short sections at elevated positions. At this distance and in the context of the wider panoramic views available from these high points, the turbines would not be prominent. Therefore there would be no greater than a ***slight effect*** on the visual amenity experienced along any of these long distance trails.

Regional Cycling Route 6 passes directly along the southern boundary of the site, following the path of the Derwent Valley Heritage Way. The route runs between Nottingham across to Derby and then down towards Loughborough. Within 2km of the site, and where there are unobstructed views of the turbines, they would be prominent but seen within an established industrial context. Therefore there would be a localised ***moderate effect*** on the visual amenity experienced along the cycleway within 2km of the site but no greater than a ***slight effect*** on other sections of the route.

National Cycle Route 54 passes within 3.5km of the site. Although the ZTV suggests that there would be views of the turbines from much of its length, in reality roadside hedgerows would screen the turbines from most of its length as it follows the path of the River Derwent as it travels north. There would be a low magnitude of change and consequently no greater than a ***slight effect*** on visual amenity experienced along this route.

In addition to the long distance cycleway and footpaths near the site, a public footpath runs north east from Alvaston to connect with the Derwent Valley Heritage Way and National Cycle Route 6, south of the site. There is also a footpath that follows the path of a Roman Road from the Long Eaton area it cuts across and skirts

around the northern boundary of the site to the north of the railway line. There are a series of small footpaths 0.8km north of the site between Cherry Tree Hill and Derby.

Along each of these routes, the proposed wind farm would be prominent in the view. However, at no point would it obstruct or prevent an appreciation of the underlying and surrounding townscape. In the context of the urban townscape, there would be a ***moderate effect*** on visual amenity experienced from them.

There would also be intermittent views of the turbines from several other public rights of way within the study area. With distance from the site, the effects on visual amenity would incrementally reduce. At locations where there are unobstructed views of the turbines from public rights of way within approximately 2km of the site, there would be a ***moderate effect*** on visual amenity. Beyond approximately 2km from the site, there would be no greater than a ***slight effect*** on visual amenity.

10.6.17.3 Visual Effects on Major Roads

The A6/A5111 (Alvaston Bypass/Raynesway) links the A50 and the A52 and runs along the western boundary of the site. Views from this highway are screened on both sides by lines of healthy hedgerows that support sporadically placed mature trees. However the proximity and direction of turbines in relation to the road means that there will be a number of places where there will be unobstructed views of the turbines.

Travelling northwards from the A50, the A6 is elevated above the surrounding landscape and would enable a view of the turbines at a distance of approximately 4.5km. From this elevated section of the road, the turbines would be seen in the distant urban context of Derby. As the road drops back down to be at grade with the surrounding landscape, the turbines would be screened by tree belts along the roadside and within the grounds of Elvaston Castle. The turbines would therefore not be visible at the roundabout junction with the B5010. Continuing northwards along the Alvaston Bypass, the road is within a cutting which would restrict views of the turbines. The turbines would then become visible at relatively close proximity on the approach to the roundabout junction with the A5111 (Raynesway). The turbines would be prominent from the A511 as it skirts around the development site. The turbines would be visible in the established industrial context of the Derwent Valley. There would be a medium magnitude of change to the visual experience driving along this section of the highway but this would have no greater than a ***slight effect*** on visual amenity.

The A52 runs from Newcastle under Lyme to Mablethorpe and passes 0.5km to the north of the turbines and runs close to the northern boundary of the site. As discussed in viewpoint 4, driving westwards on the A52, the ZTV suggests that the Derby turbines would be visible from the entire length of the A52 between the junction with the M1, through Derby and North West towards Ashbourne. In reality, there is a considerable amount of roadside vegetation and urban development along both sides of this road that would greatly restrict or obstruct the view of the turbines.

The turbines would be sufficiently distant from the Road that they would almost entirely be screened by intervening buildings and vegetation or the artificial embankments and cutting of the road. There would be locations along this road where there would be glimpses of the turbine blades, and from all of the pedestrian footbridges there would be views of both turbines. The development would result in a

medium magnitude of change in the baseline view experienced from the section of the road within 2km of the site and there would be no greater than a ***slight effect*** on the visual amenity of people using the A52.

The A50 runs from Warrington to Leicester and passes 5km to the south of the site. As discussed in Viewpoint 14, there is a considerable amount of roadside vegetation and urban development along both sides of this road that would greatly restrict or obstruct the view of the turbines from much of its length. There would be occasional glimpsed views of the turbines when travelling west on the A50 between Shardlow and the junction with the A6. The development would result in a low magnitude of change in the baseline view and therefore there would be no greater than a ***slight effect*** on the visual amenity of people using the A50.

There would be no greater than a slight effect on the visual amenity of any other 'A roads' within the study area.

The nearest railway line to the site passes 0.5km to the north of the turbines. The railway line sits in a cutting and is well vegetated on both sides. As trains pass the site they will have partial views of the turbines that will be seen above the vegetated embankment and in the context of an industrial landscape.

The views would be glimpsed and momentary as the trains passed the site. Spondon railway station sits to the east of the site and trains stopping at this station travelling west would have views of the turbines. Once again these views would be over large industrial units and dense vegetation. The turbines would result in a localised medium magnitude of change in the view experienced by users of the railway and therefore there would be no greater than a ***slight effect*** on their visual amenity.

10.6.17.4 Visual Effects on Historic and Tourism Viewpoints

Although the ZTVs and wirelines suggest that the Derby Wind Turbines would be visible from the whole of Elvaston Castle and Country Park, as discussed in viewpoint 8 the turbines would be 3km from this parkland and at this distance the turbines would be almost entirely screened by mature tree belts that surround the parkland.

The turbines would be completely screened everywhere when viewed from ground level within the country park apart from one location near the car park where there would be a very minor glimpse of the tips of the turbine blades above the tree belt on the western side of the open field. These would be barely perceptible and not detract from the open character of the park. Therefore, there would be no greater than a very ***slight effect*** on views experienced by people at Elvaston Castle and Country Park.

Darley Abbey lies 5km to the north west of the site and as discussed in viewpoint 11 the visualisation illustrates that from within the World Heritage Site there would only be the slightest of intermittent glimpses of the turbines. At this distance the turbines would not be prominent in the view and it should be noted that the turbines lie within the urban context of the industrial areas of Derby. Therefore there would be no greater than a ***slight effect*** on the visual amenity experienced by visitors to Darley Abbey.

10.7 Cumulative Effects

At the time of preparing this report there are 2 other wind farms either in operation, under construction, in the planning system or at scoping stage within 20km of the Derby site. These are identified in Figure 10.1.

The first of these is known as the Newthorpe wind turbine, a single wind turbine at the sewage treatment works at Newthorpe which has the same specification as those to be used at the Derby development. This development is due to be submitted at approximately the same time as the Derby application. Newthorpe lies 13km north east of the Derby site and sits in the Erewash Valley surrounded by urban areas.

The other development is at East Midlands Airport. This site has been consented but not yet constructed. There will be 4 turbines on the site but all are much smaller and considered to have very little potential to result in any visual impact beyond a small radius around the airport and certainly no cumulative impact with the Derby turbines. The site lies 10.5km south east of the Derby development and is within the confines of East Midlands Airport. This site has not therefore been considered in detail.

A cumulative ZTV has been produced to illustrate the theoretical cumulative visibility between the Derby wind turbines and the Newthorpe wind turbine (Figure 10.29).

10.7.1 Cumulative Effects on Landscape Character

The Derby and Newthorpe sites are located over 13km from each other. It has already been determined that there would be no greater than a slight effect on the landscape character of the rural landscape between the Derby turbines and Newthorpe as a result of the Derby turbines alone.

At any location between these two sites where both of these sites are visible at the same time, it is acknowledged that there would be a marginally greater overall impact on landscape character than if only one of these two sites were developed in isolation. However, as can be seen in Figure 10.29, there would in fact be very few locations where there would be any theoretical visibility between the two sites and in reality once the screening effect of vegetation and built structures has been taken into account, there would be even fewer locations where the two sites were visible at the same time. Given that both sites are located within urban or urban fringe locations and there is clearly evidence of urban activity in the vicinity of both these sites, it is considered that there would be no greater than a ***slight cumulative effect*** on landscape character anywhere between these two sites.

10.7.2 Cumulative Visual Effects

10.7.2.1 Simultaneous and Successive Cumulative Visual Effects

The cumulative ZTV (Figure 10.29) suggests that there would be a small number of locations within the study area where the Derby turbines would be visible either simultaneously (i.e. in the same angle of view) or successively (i.e. by turning around on the spot) with views of the Newthorpe turbine. However, it should be noted that in reality the intervening landscape between the two sites is a mosaic of agricultural fields containing hedgerows, tree groups and small buildings, as well as small towns which contain numerous urban structures. Therefore there would be very few

locations with unobstructed views in both directions. In particular, it is noted that there are few elevated hilltops which enable panoramic views in both directions.

As the Derby site is approximately 13km from the Newthorpe site, under no circumstance would there be any location where a visual receptor was less than 6.5km from both sites at any one time.

It has already been assessed in this chapter that beyond a distance of approximately 2km from the Derby Wind Turbines, there would be no greater than a ***slight effect*** on visual amenity as a result of the development. This is due to the fact that beyond 2km from the proposed development, the turbines would be seen in the context of a much wider landscape and, whilst possibly visible; they would not be prominent or comprise a major element in the view. Beyond this distance, the visual experience would be influenced to a much greater extent by numerous other human influences in the immediate landscape surrounding the location from which the visual receptor is looking at the turbines. The same conclusion is likely to apply to the visual effects of the Newthorpe turbine.

In the tract of landscape which lies between the two sites, there are two ridges in the landform that may enable successive views in the direction of both sites. This first ridge lies approximately 6.2km north east of the Derby site, on top of which there are a number of isolated and elevated farmsteads such as Boyah Grange and Key Farm. The Midshires Way also follows this ridgeline as has been discussed in viewpoint 13. The ridge is well vegetated and so the farmsteads and long distance footpath would have only glimpsed views to the Derby turbines in the south west, and glimpsed views to the north east towards Newthorpe.

The second ridge is within the town of Ilkeston situated to the south west but within 1km of the Newthorpe site. As well as a residential settlement there is a National Cycle route that runs along this ridge in the landform. Ilkeston is an area that has a complex road network with considerable volumes of medium density housing and this would serve to reduce and filter the views towards the derby site and in reality there would be no unobstructed views in the direction of the Derby site from this ridge.

As these ridges lie at distances greater than 5km from the one or both sites considered within this cumulative assessment, the proposed turbine would have no greater than a ***slight cumulative effect*** on visual amenity.

10.7.2.2 Sequential Cumulative Visual Effects

The cumulative ZTV presented in Figure 10.29, suggests that there may be a sequential effect on the visual amenity of people travelling on the A6096 between Derby and Ilkeston and also between junctions 24 and 26 of the M1.

It has already been assessed that the M1 lies at least 8km from the Derby turbines and that they would have no greater than a slight effect on visual amenity of people travelling along this route. The Derby and Newthorpe sites would not be visible at the same time along this motorway and there would be a considerable distance between sections of the motorway where there were glimpses of either site. It is therefore considered there would be no greater magnitude of change in the visual amenity already assessed in this assessment and therefore there would be ***no additional cumulative effect*** on the M1.

The A6096 that joins Derby and Ilkeston passes over a ridge almost half way between the two sites. From south of this ridge, the Derby site would be intermittently visible when travelling southwards and north of this ridge, the Newthorpe site would be intermittently visible when travelling northwards. However both sites would only be visible when viewed in the context of existing urban areas. It is considered that there would be no greater than a ***slight cumulative effect*** on the visual amenity of people using the A6096.

10.8 Minimisation Measures

Measures to minimise the landscape and visual effects have been embedded within the initial site selection and design stage of the proposal.

Site Selection:

At this stage potential landscape impacts were given equal consideration alongside other engineering and environmental issues. The site was selected, amongst other reasons, because there are no national or local landscape designations covering the site or the immediately surrounding area. The industrial character of the valley was also considered to have a lower sensitivity to development than other areas in the Derbyshire area.

The current use of the site for sewage treatment meant that there were open spaces in which turbines could be accommodated with minimal effect on the landscape features such as hedgerows, woodlands and other vegetation of landscape value.

Site Design:

An iterative design approach was adopted for the arrangement of structures on the site. Following baseline site work and the identification of the most important landscape features, the turbines were arranged to cause least disturbance to these features.

The access tracks within the site were also designed with consideration given to the effects on landscape features and character. The tracks have been designed to minimise the number of breaks required in the hedgerows. They have also been designed, as far as possible to follow existing site access to minimise the effect at ground level. A number of options were considered for the access tracks before arriving at the final layout.

Taking all other engineering and environmental constraints into account, the proposed layout of the turbines on site was specifically designed to achieve a well spaced arrangement when viewed from the nearest residences. The resulting arrangement avoids unnecessary clustering of turbines or any overlapping of turbine blades when viewed from the most sensitive visual receptor locations.

The turbines themselves would be painted a non-reflective semi matt pale grey colour (or similar as agreed with the local planning authority) thus helping them to merge into the skyline. Unlike some other forms of development, it is neither possible nor considered appropriate to screen turbines.

In the long term, when the wind turbines are decommissioned, the turbines and other associated structures would be removed. The landscape would be restored to its current condition. Thus the landscape and visual effects of the proposal are largely reversible.

10.9 Residual Effects

The proposal is the result of an iterative design process that placed the minimisation of landscape and visual effects at its core. As a result, the effects of the proposal could not be minimised further.

10.10 Summary of Landscape and Visual Effects

10.10.1 Summary of Landscape Effects

The Derby site lies within the flat industrial landscape of the River Derwent valley. The site is primarily occupied by a sewage treatment works with large areas of open scrub or rough grass between the buildings on site. The works are bordered to the north and east by dense native hedgerows and mature deciduous trees.

The proposed development site is located within a long established industrial valley. Aside from the sewage treatment works, there are heavy industrial works to the north, east and west of the site. Heading into Derby city centre, much of the heavy industry has been replaced by business units and other large scale land uses such as the Pride Park Stadium and park and ride facilities. Buildings and structures associated with the sewage treatment works are located on both sides of the meandering River Derwent and consist of filter beds, tanks, operational plant, accommodation buildings and car parking. Directly to the east of the site is the Acordis plant which comprises a dense development of industrial units and chimneys including several tall chemical tanks which are prominent in the surrounding areas.

The A5111, the A52 and the Midland Mainline railway pass in close proximity to the site boundary. To the north east is the residential settlement of Spondon. To the north west of the junction between the A5111 and the A52 is the residential area of Cherrytree Hill and Chaddesden. To the south of the A5111 and the A6 is the residential area of Alvaston.

Overall the landscape has an urban character with strong industrial influences but with pockets of localised green open space. The character of the town beyond the river valley is more residential.

The turbines and access tracks are proposed within open and unused parts of the sewage treatment works. Therefore there would be no greater than a ***slight effect*** on existing landscape features within the site.

The primary impact on the landscape character of the immediately surrounding area would arise from the introduction of 2 new turbines and access tracks within the site.

The Derby turbines would not affect the landform of the surrounding landscape and there would be a low magnitude of change on vegetation structure. Access tracks would be similar in width to typical access roads around and across the sewage

treatment works and therefore the addition of the new tracks would be barely perceptible.

The turbines would appear as tall structures in an industrial valley landscape. The height of the turbines would be greater than other vertical structures in the immediate area although there are numerous manmade vertical features throughout the urban area, such as tall buildings, pylons and industrial chimneys, most notably the chemical tanks within the adjacent Acordis plant. The metallic structure of the turbines would not appear out of character with the industrial units surrounding it.

Therefore there would be only a ***slight effect*** on the character of the industrial valley.

From certain locations within the valley side settlements of Spondon, Alvaston and Cherrytree Hill/Chaddesdon the turbines would be intermittently prominent but clear views of the turbines would be greatly restricted by intervening buildings and vegetation. The turbines would attract attention but would not be detrimental to the appearance of the townscape of the valley side settlements. These areas have accommodated considerable change over the last 150 years to meet the changing needs of the population. The addition of wind turbines would simply reflect the evolving needs of the next generation.

There would be a ***moderate effect*** on the character of the valley side settlements surrounding the site including Spondon, Alvaston and Cherrytree Hill/Chaddesdon. However, the turbines would not prevent an appreciation or comprehension of the underlying townscape.

There would be no greater than a ***slight effect*** on any other landscape character areas surrounding Derby.

There are no national, regional or local landscape designations covering the site and therefore there would be no direct impact on any such designated landscapes. The proposed development would have no impact on the openness of the Green Belt north of Derby.

There would be no greater than a ***slight effect*** on Elvaston Country Park, Locko Park or Kedleston Country Park and there would be no greater than a ***slight effect*** on the World Heritage Site.

10.10.2 Summary of Effects on Visual Amenity

The ground level elements of the development would not be visible from surrounding areas. Therefore the effects on visual amenity relate primarily to the two turbine structures.

It is acknowledged that there are a large number of residential properties within 2km of the site and that where these properties have unrestricted views towards the site, the proposed turbines would be prominent in the view.

However it is also noted that very few of the properties within 2km of the site have unrestricted views of the turbines and the views experienced by most of the properties within 2km of the site are already heavily influenced by the presence of

existing urban features such as industry, major highways (including the A52, the A6 and Raynesway) and other buildings.

It is considered that there would be a medium magnitude of change and therefore a ***moderate effect*** on the private visual amenity of a relatively small proportion of the residential properties within Spondon, Alvaston, the Cherrytree Hill estate of Chaddesden and the new residential estate off Pride Parkway. When viewed from any of the above residential areas, the turbines would not obstruct the view in any direction and would not prevent an appreciation of the underlying and surrounding townscape.

There would however be no greater than a ***slight effect*** on the visual amenity of most of the properties within 2km of the site and no greater than a slight effect on the visual amenity of any properties beyond 2km from the site.

There would be a localised ***moderate effect*** on the visual amenity experienced along the Derwent Valley Heritage Way within 2km of the site but no greater than a ***slight effect*** on other sections of the route. There would be no greater than a ***slight effect*** on the visual amenity experienced by people using the Bonnie Prince Charlie Walk between Radbourne and Derby City Centre and there would be no greater than a ***slight effect*** on the visual amenity experienced by people using the Mid Shires Way between Duffield and Kegworth.

There would be a localised ***moderate effect*** on the visual amenity experienced along Regional Cycling Route 6 within 2km of the site but no greater than a ***slight effect*** on other sections of the route. There would be a ***slight effect*** on visual amenity experienced along National Cycle Route 54

At locations where there are unobstructed views of the turbines from public rights of way within approximately 2km of the site, there would be a ***moderate effect*** on visual amenity. Beyond approximately 2km from the site, there would be no greater than a ***slight effect*** on visual amenity.

There would be no greater than a ***slight effect*** on views from major trunk roads including the A50, A6, A5111 and A52.

Although the ZTVs and wirelines suggest that the Derby Wind Turbines would be visible from Elvaston Castle and its Grade II listed gardens, the turbines would be screened by mature tree belts that surround the parkland. Therefore, there would be a ***no effect*** on views experienced by people at Elvaston Castle.

Darley Abbey lies 5km to the north west of the site. At this distance the turbines would not be prominent and therefore there would be no greater than a ***slight effect*** on the visual amenity experienced by visitors to Darley Abbey.

It has been assessed that there would be no greater than a slight cumulative effect either simultaneously, successively or sequentially on visual amenity.

10.11 Final Conclusions

It is acknowledged that there would be some localised moderate effects on landscape and visual amenity. However, it must be noted that some landscape and visual effects

are inevitable when considering proposals for necessary energy generating infrastructure of this nature. Indeed, planning policy of the day requires that we look beyond such effects and consider how proposals have been sited and designed to reduce the impact of such effects. With this brief in mind this report finds that material landscape and visual effects arising from the proposal would be:

- **Minimised:** to no more than of a 'local' level of effect. This has been achieved through responsible site selection and considered site layout which placed minimisation at the core of the design process. Given the urban setting the effects of the proposal are considered to be less material than if they were located in a more rural location within the City of Derby

- **Contained:** within 2km of the proposed site. The site is adjacent to the River Derwent occupying a valley bottom location. Therefore, the proposal takes maximum advantage of what little natural geographic containment exists within the City of Derby. Of far more material importance is the blocking and screening effect of the surrounding man made built form which is unique to this site.

- **Temporary:** The visual effects of the proposal would last for a generation when effects would then be completely reversed upon decommissioning in 25 years time.

11 Residential Amenity

This chapter of the Environmental Report (ER) summarises the potential impacts on residential amenity from shadow flicker and noise. The shadow flicker and noise assessments were undertaken by TNEI Services Ltd. This chapter is separated into two sections. Section 1 assesses the potential impacts of shadow flicker occurring at nearby residential and Section 2 summarises the ETSU-R-97 Noise Assessment undertaken for the proposed development.

11.1 SHADOW FLICKER

11.2 Introduction

This section evaluates the effects of shadow flicker from the proposed wind turbine upon nearby residential properties. The full Shadow Flicker Assessment report is included in Appendix G.

11.3 Assessment Methodology

11.3.1 Guidance

Within the UK there is no standard for the assessment of shadow flicker and there are no guidelines which quantify what exposure levels would be acceptable. However, some information specific to shadow flicker may be found in Planning for Renewable Energy: A Companion Guide[6] to Planning Policy Statement PPS22 Renewable Energy which states:

'Although problems caused by shadow flicker are rare, for sites where existing development may be subject to this problem, applicants for planning permission for wind turbine installations should provide an analysis to quantify the effect.'

The Companion Guide to PPS22 states that flicker effects have been proven to occur only within ten rotor diameters of a turbine.

11.3.2 Background

Under certain combinations of geographical position, time of day and year, wind speed and wind direction, the sun may pass behind the rotor and cast a shadow over neighbouring buildings' windows. When the blades rotate, and the shadow passes a window, to a person within that room the shadow appears to flick on and off. This effect is known as shadow flicker. It occurs only within buildings where the flicker appears through a window aperture and only in buildings within 130 degrees either side of north relative to a turbine can be affected. Narrow windows are affected to a lesser degree than wider windows as the length of time a shadow falls across narrow windows is less than for wider windows.

[6] Department for Communities and Local Government (2004) *'Planning for Renewable Energy: A Companion Guide to PPS22'*

11.3.3 Identification of Potential Receptors

The potential area susceptible to shadow flicker was identified using the specialist computer software 'WindFarm'[7]. The candidate turbine modelled in this assessment has a rotor diameter of 104m, therefore a study area of 1040m radius of the turbine and 130 degrees either side of north was selected. All buildings within this area were then identified and formed the basis for the site survey which was undertaken to assess a representative sample of buildings. Where access was not permitted and aerial photography of the area did not show the number of windows present, the size and number of windows were estimated.

Buildings located outside of 130 degrees each side of north were excluded from the analysis as no path between the sun, the turbine and these buildings resulting in shadow flicker would occur. Buildings were also excluded if their windows did not face the turbine.

11.4 Baseline

The study area was surveyed and buildings susceptible to shadow flicker were identified. The immediate area surrounding the site is urban with a large number of residential and offices buildings. A desk based study determined buildings which would be theoretically susceptible to shadow flicker. The desktop study followed by a site survey identified eight buildings which were chosen to provide a representative sample of the buildings in the area. Some windows dimensions and orientations have been estimated. Details of the assessed buildings are provided in Table 11.1 below.

Table 11.1 Assessment Locations

Receptor	ID	Easting (m)	Northing (m)	Approximate Distance to Turbine (m)
Property on Holme Lane	H1	439467	335045	313
Office on Holme Lane	H2	439454	335010	276
New Flats off Station Road	H3	439610	335193	516
Scrap Yard Office on Megaloughton Lane	H4	439181	335330	274
Property on Derby Road	H5	439405	335673	684
Property on Gallway Avenue	H6	438833	335568	506
Office north-west of West Service Road	H7	438524	335145	506
Office south-west of West Service Road	H8	438297	334561	909

[7] ReSoft Ltd (1997-2009) *WindFarm Release 4.1.2.2.* WindFarm is an industry standard software package developed by ReSoft Ltd, which includes modules for the design of wind turbine locations, visual impact assessment, noise levels, shadow flicker and energy yield estimations.

In order to quantify the effect of shadow flicker, the results of the building survey were input into 'WindFarm'. The building survey results are included in the full Shadow Flicker Assessment Report (See Appendix G).

11.5 Impact Assessment

Table 11.2 details the shadow flicker modelling results and summarises the predicted frequency of occurrence of shadow flicker at the most affected window of each property.

Table 11.2 Maximum Theoretical Shadow Flicker Occurrence for each Building

Building	Most affected Window	Frequency of Shadow Occurrence (days/year)	Max Hours Shadow per Day	Mean Hours of Shadow per Day	Total Theoretical Hours per Year
Property on Holme Lane (H1)	W2	228	1.28	0.95	217.6
Office on Holme Lane (H2)	W2	266	1.43	0.98	261.3
New Flats off Station Road (H3)	W1	154	0.79	0.65	100.4
Scrap Yard Office on Megaloughton Lane (H4)	W1	155	1.43	1.22	189.6
Property on Derby Road (H5)	W1	59	0.58	0.48	28.4
Property on Gallway Avenue (H6)	W1	57	0.72	0.59	33.8
Office north-west of West Service Road (H7)	W1	109	0.82	0.54	58.6
Office south-west of West Service Road (H8)	W4	92	0.5	0.38	35

Figure 4.1 "Theoretical Shadow Flicker Contour Map" of the Shadow Flicker Assessment (Appendix G) shows predicted maximum shadow flicker hours at each point of the grid at 2m above ground level. This figure does not take into account orientation or window height and should be used as an indication only. It does however show the relative distribution of shadow flicker around the turbine.

Under worst case conditions, the maximum theoretical occurrence of shadow flicker amounts to 261.3 hours per year experienced at an office building on Holme Lane. However the instances of shadow flicker will always be less than that predicted by the model as these are based on a worst case scenario. The occurrence of shadow flicker is only possible during the operation of the wind turbine (i.e. when the rotor blades are

turning) and when the sky is clear enough to cast shadows. It is also important to the note that the assessment does not take account of visual barriers (i.e. trees and walls) or the rotor orientation. These parameters may prevent shadow flicker occurring.

11.6 Conclusions

A shadow flicker assessment has been undertaken for eight buildings within 1040m of the proposed turbine location. The turbine modelled in this assessment has a rotor diameter of 104m, which provides a worst case scenario in terms of the potential area susceptible to shadow flicker. It has been shown that under worst case conditions, the maximum theoretical occurrence of shadow flicker amounts to 261.3 hours per year experienced at an office building on Holme Lane. If shadow flicker is found to cause a nuisance, mitigation measures can be implemented in the form of a shadow Flicker Mitigation Protocol to be imposed as a planning condition in agreement with the local authority.

11.7 NOISE

11.8 Introduction

This section evaluates the effects of the operational wind turbine development on the existing noise environment at nearby noise sensitive receptors. The section summarises the findings of the ETSU-R-97 *'The Assessment and Rating of Noise from Wind Farms'*[8] (ETSU-R-97) noise assessment which evaluates the effects of the operational wind turbine. The full ETSU-R-97 noise report is included in Appendix H.

11.9 Assessment Methodology

11.9.1 Policy and Guidance

In assessing the potential noise effects of the development the following guidance and policy documents have been considered:

- ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms'
- ISO9613: 1996 'Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation'9
- Planning Policy Statement (PPS) 22 'Renewable Energy'
- Planning for Renewable Energy: A Companion Guide to PPS2210
- Institute of Acoustics Bulletin March/April 2009 'Prediction and assessment of wind turbine noise'11

ETSU-R-97 provides a robust basis for determining noise limits for wind turbine developments and these limits should not be breached. Consequently, the test applied to operational noise is whether or not the calculated wind turbine noise levels at nearby

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4 The Working Group on Noise from Wind Turbines, (1996) *ETSU-R-97 -The Assessment and Rating of Noise from Wind farms'*, ETSU for the DTI (Department of Trade and Industry)

9 International Standards Organisation, ISO9613: 1996 *'Acoustics - Attenuation of sound during propagation outdoors'* -Part 2: General method of calculation

10 Department for Communities and Local Government (2004) *'Planning for Renewable Energy: A Companion Guide to PPS22'*

11 Institute of Acoustic Bulletin March/April 2009 - *'Prediction and assessment of wind turbine noise'*

noise sensitive receptors lie below the noise limits derived in accordance with ETSU-R-97.

ETSU-R-97 noise limits differ between amenity hours and night-time periods. The amenity hours criteria apply to the 'quiet periods of the day' comprising:

- all evenings from 18:00 to 23:00; plus
- Saturday afternoons from 13:00 to 18:00; and
- all day Sunday 07:00 to 23:00.

Night-time periods are defined as 23:00 to 07:00 with no differentiation made between weekdays and weekends.

ETSU-R-97 recommends that wind turbine noise for amenity hours should be limited to 5 dB(A) above the prevailing background or a fixed minimum level within the range 35 - 40 dB $L_{A90,\ 10\ min}$, whichever is the higher. The precise choice of criterion level within the range 35 - 40 dB(A) depends on a number of factors, including the number of dwellings in the neighbourhood of the wind farm (relatively few suggests a figure towards the upper end), the effect of noise limits on the number of kWh generated (larger sites tend to suggest a higher figure) and the duration and level of exposure to any noise.

For night time periods the recommended limits are 5 dB(A) above prevailing background or a fixed minimum level of 43 dB $L_{A90,\ 10\ min}$, whichever is the higher. Properties with a direct financial interest in the project have a fixed minimum level of 45 dB $L_{A90,\ 10\ min}$ or the prevailing background noise L_{A90} plus a permissible margin, whichever is the greater for both amenity hours and night-time hours.

The aim of the noise assessment is therefore to determine whether the development can meet the recommended noise criteria.

Information regarding issues such as infrasound, low frequency noise, vibration, amplitude modulation, vibro-acoustics disease and wind shear can be found in Section 2 of Appendix H.

11.9.2 Identification of Potential Noise Receptors

Prior to the commencement of the noise survey, initial desktop noise modelling was undertaken using the 'WindFarm' software in order to optimise the turbine location in respect of noise immission levels at sensitive receptors and identify suitable locations at which to monitor background noise. An initial wind turbine layout was input into the 'WindFarm' software and using noise data for a turbine representative of the type that could be installed on the site, a noise contour plot was produced.

The noise contour plot predicted wind turbine noise in the region of the development with predicted turbine noise (measured in dB, L_{A90}) decreasing with distance from the turbine. Any property outside of the 35dB(A) contour was not considered in the assessment as protection of the amenity of those properties could be controlled through a noise condition as recommended in ETSU-R-97.

All properties or clusters of properties within the 35dB(A) contour were then identified and assessed to determine which properties would provide representative background noise data for others in the area. The properties identified for the noise assessment were the closest ones to the site, as it was assumed that if noise limits can be achieved

at these locations, the limits will also be achieved at other properties located at greater distance from the proposed turbine. The noise contour plot for a candidate wind turbine, the REpower 3.XM based on the final turbine layout is included in Figure 4.1 "Noise Contour Plan" of the full ETSU-R97 Noise Assessment. The REpower 3.XM wind turbine was chosen to provide a worst case, as it is one of the loudest wind turbines of its size, which would be suitable for the site.

11.9.3 Consultation

Prior to commencing the noise impact assessment for the proposed wind turbine development at Derby, consultation took place with the Environmental Health Officer (EHO) at Derby City Council in order to agree the approach to the noise assessment and the noise monitoring locations. In a phone conversation, the EHO at Derby City Council responded to the consultation and agreed with the methodology and noise monitoring locations.

11.10 Baseline

The development is located within an urban location where existing background noise levels are relatively high. The predominant noise sources in the area are factory noise, motorway road traffic noise and wind induced noise (wind passing through vegetation and around buildings).

11.10.1 Background Noise Survey

The noise survey to determine the existing background noise environment at dwellings neighbouring the proposed development followed the guidance contained within ETSU-R-97. Background noise monitoring was undertaken at five dwellings proximate to the development.

Assessment location H2 (New block of flats off Station Road) was in construction at the time of the noise monitoring period therefore noise measurement were undertaken at a proxy location judged to be representative.

The measurement locations were selected on the basis of the preliminary noise predictions, which indicated that for a wind condition of 10 ms^{-1} measured at 10 metres above ground level these properties would be the most sensitive. Details of the noise monitoring and assessment locations are included in Table 11.3 and are also shown in Figure 5.1 "Noise Assessment Locations" of the full ETSU-R97 Noise Assessment.

Background noise monitoring was undertaken over the period 22 October 2008 to 22 December 2008.

The sound level meters were set to log the L_{A90} and L_{Aeq} noise levels over the required ten minute intervals continuously over the deployment period. Concurrent wind speed/direction and rainfall data were recorded on a free standing anemometer mast at a height of 10m, located within the Sewage Treatment Work Derby site.

A rain gauge was also installed on the mast to monitor rainfall over the duration of the noise monitoring survey. All meteorological data was collected and provided by Peak Energy Limited.

The clocks on the sound level meters were set to the BT Talking Clock to ensure measurements were made over the same simultaneous 10 minute periods.

The noise meters were calibrated on deployment. Calibration and battery changes took place at approximately weekly intervals. No drifts greater than 0.2 dB(A) in calibration were found to have occurred on any of the noise meters.

Table 11.3 Noise Assessment Locations

Receptor	Easting (m)	Northing (m)	Elevation (m AOD)	Approximate Distance to Turbine (m)
H1 Property on Holme Lane	439457	335052	42	313
H2 New flats off Station Road	439525	335198	44	474
H3 Property on Derby Road	439454	335621	52	671
H4 Property on Galway Avenue	438836	335516	50	457
H5 Property on Manifold Drive	438987	333711	40	1114

Table 11.4 provides a summary of the range of background noise levels measured during the monitoring period. Background noise levels during periods of rainfall or when the vanes appeared to be frozen have been excluded from this data and the data has been separated for quiet daytime and night time periods as specified in ETSU-R-97.

Table 11.4 Summary of Background Noise Levels (dB(A))

Receptor	Quiet Daytime $L_{A90,\ 10\ min}$	Night-time $L_{A90,\ 10\ min}$
H1 Property on Holme Lane	46.1-56.2	45.4-61.6
H2 New flats off Station Road	38.5-60.3	34.9-56.0
H3 Property on Derby Road	37.0-56.6	22.9-54.8
H4 Property on Galway Avenue	37.2-56.9	29.1-56.2
H5 Property on Manifold Drive	37.5-58.6	33.6-58.3

Further information on the background noise assessment can be found in the full noise report contained in Appendix H.

11.11 Impact Assessment

11.11.1 Construction Noise

Construction noise is predictable. Its impacts on sensitive land uses, including residential, can be predicted and therefore managed. Whilst at this early stage it is not practical to prepare a detailed construction noise assessment, as responsibility for developing the programme of works will rest with the appointed contractor the applicant believes that effective control may be exercised by a relevant planning condition.

11.11.2 Operational Noise

Noise levels arising from the operation of the turbine were calculated using the propagation model contained within Part 2 of International Standard ISO 9613-2, '*Acoustics - Attenuation of Sound during Propagation Outdoors*'. The model uses as its acoustic input data the octave band sound power output of a specified turbine and calculates, on an octave band basis, attenuation due to geometric spreading, atmospheric absorption and ground effects.

The noise model was set up to provide worst case noise predictions, including hard ground attenuation, no barrier effects and an air absorption based on a temperature of 10°C and 70% relative humidity. The model also assumed that each house was downwind of the turbine noise, whereas in reality this will not always be the case for all properties at the same time.

Changes in wind shear between daytime and night-time periods were also included in the predicted turbine noise levels. Further information on wind shear predictions can be found in Section 4.4 of the Noise Assessment (Appendix H).

The assessment of wind turbine noise levels from the development is contained within Section 6 of the Noise Assessment (Appendix H). This provides an assessment of the wind turbine noise in accordance with the requirements of ETSU-R-97.

The final choice of turbine to be used on the site is still to be determined and will be subject to a competitive tendering process should the development receive planning permission. In the absence of a confirmed turbine model the noise assessment has considered a candidate turbine, the REpower 3.XM which is considered to be one of the loudest in its class. Noise data for the 3.XM turbine has been provided by the REpower. Further information on the turbine noise data can be found in the full noise report (Appendix H). Manufacturers' turbine data is subject to change without notice, however the final choice of turbine will be required to meet the ETSU-R-97 noise criterions which have been established for the development.

The Quiet Daytime and Night Time ETSU-R-97 derived noise criterion for each receptor are summarised in Table 11.5.

Table 11.5 ETSU-R-97 Noise Criterion at each receptor

Location	Wind Speed (m/s)									
	3	4	5	6	7	8	9	10	11	12
H1 Property on Holme Lane Quiet Daytime ETSU-R-97 Noise Criterion	56.0	56.3	56.5	56.7	57.0	57.3	57.7	58.3	-	-
H1 Property on Holme Lane Night Time ETSU-R-97 Noise Criterion	53.3	53.4	53.6	53.8	54.2	54.8	55.5	56.4	57.5	58.9
H2 New flats off Station Road Quiet Daytime ETSU-R-97 Noise Criterion	52.8	53.9	55.1	56.2	57.2	58.0	58.5	58.7	-	-
H2 New flats off Station Road Night Time ETSU-R-97 Noise Criterion	50.2	51.0	51.9	52.8	53.7	54.6	55.6	56.6	57.6	58.6
H3 Property on Derby Road Quiet Daytime ETSU-R-97 Noise Criterion	53.2	54.0	54.9	55.8	56.6	57.4	58.1	58.5	-	-

Location	Wind Speed (m/s)									
	3	4	5	6	7	8	9	10	11	12
H3 Property on Derby Road Night Time ETSU-R-97 Noise Criterion	44.6	45.4	46.2	47.2	48.3	49.4	50.7	52.1	53.5	55.1
H4 Property on Galway Avenue Quiet Daytime ETSU-R-97 Noise Criterion	53.6	54.4	55.3	56.3	57.2	58.2	59.2	60.2	-	-
H4 Property on Galway Avenue Night Time ETSU-R-97 Noise Criterion	45.0	45.7	46.5	47.4	48.3	49.3	50.4	51.5	52.8	54.0
H5 Property on Manifold Drive Quiet Daytime ETSU-R-97 Noise Criterion	55.8	55.9	55.7	55.5	55.2	55.3	55.7	56.6	-	-
H5 Property on Manifold Drive Night Time ETSU-R-97 Noise Criterion	49.1	49.1	49.1	49.3	49.5	49.9	50.3	50.9	51.5	52.2

The assessment results for each individual receptor based on a candidate wind turbine are summarised below in Table 11.6. The data marked with a * are based upon extrapolated predicted wind turbine noise and assumes that noise levels remain steady beyond the maximum given in the manufacturers relevant test report. A negative exceedence indicates that the predicted turbine noise levels are below the ETSU-R-97 derived noise levels by that value. More detailed results tables and figures can be found in Section 5 of the noise report (Appendix H).

Table 11.6 Exceedances of the ETSU-R-97 Derived Amenity Hours and Night-Time Criterion Curves by the Predicted L_{A90} Wind Turbine Noise Immission Levels at each receptor

Location	Wind Speed (m/s)									
	3	4	5	6	7	8	9	10	11	12
H1 Property on Holme Lane Quiet Daytime Exceedence Level	-	-11.7	-9.5	-9.6	-9.9	-10.2	-10.6*	-11.2*	-	-
H1 Property on Holme Lane Night Time Exceedence Level	-8.2	-6.3	-6.5	-6.7	-7.1*	-7.7*	-8.4*	-9.3*	-10.4*	-11.8*
H2 New flats off Station Road Quiet Daytime Exceedence Level	-	-12.2	-11.1	-12.0	-13.0	-13.8	-14.3*	-14.5*	-	-
H2 New flats off Station Road Night Time Exceedence Level	-8.0	-6.8	-7.7	-8.6	-9.5*	-10.4*	-11.4*	-12.4*	-13.4*	-14.4*
H3 Property on Derby Road Quiet Daytime Exceedence Level	-	-16.5	-15.0	-15.8	-16.6	-17.4	-18.1*	-18.5*	-	-
H3 Property on Derby Road Night Time Exceedence Level	-6.6	-5.4	-6.2	-7.2	-8.3*	-9.4*	-10.7*	-12.1*	-13.5*	-15.1*
H4 Property on Galway Avenue Quiet Daytime Exceedence Level	-	-14.2	-12.7	-13.5	-14.4	-15.4	-16.4*	-17.4*	-	-
H4 Property on Galway Avenue Night Time Exceedence Level	-4.3	-2.9	-3.7	-4.6	-5.5*	-6.5*	-7.6*	-8.7*	-10.0*	-11.2*
H5 Property on Manifold Drive Quiet Daytime Exceedence Level	-	-23.7	-21.1	-20.7	-20.4	-20.5	-20.9*	-21.8*	-	-
H5 Property on Manifold Drive Night Time Exceedence Level	- 16.4	-14.3	-14.3	-14.5	-14.7*	-15.1*	-15.5*	-16.1*	-16.7*	-17.4*

11.12 Conclusions

Predictions of wind turbine noise have been made, based upon sound power level data for the REpower 3.XM wind turbine and a noise propagation model procedure that can be considered to be worst-case.

Predicted turbine noise levels and measured background noise levels indicate that for dwellings neighbouring the proposed turbine, wind turbine noise will meet the quiet daytime and night-time Noise Criteria proposed within ETSU-R-97. Achievement of the noise limits derived in accordance with ETSU-R-97 will provide a reasonable standard of amenity that will therefore satisfy City of Derby Local Development Policy GD5 'Amenity'.

The manufacturer of the turbine selected for this site will be contractually required to guarantee compliance with the noise criterion levels that have been established for this site.

12 Traffic and Transport

12.1 Introduction

This chapter provides a Traffic Assessment, which identifies the potential road traffic effects anticipated as a result of the construction, operation and decommissioning of the Wind Turbine Development at Severn Trent Water Ltd's Sewage Treatment Works at Derby.

This chapter considers the operational and environmental impacts associated with the predicted development traffic. It concludes that there would be short-term increases in traffic levels on the delivery routes to the proposed development and that these increases would be most pronounced during the construction phase. However, the increases will have no discernible operational or environmental impacts.

The route to be used by the Abnormal Load Vehicle (ALV) delivering the turbine components has been agreed in principle with the relevant authorities. The deliveries would be timed to take place during off-peak periods to avoid creating delays or contribute to congestion on the surrounding road network. The logistics of this operation are considered in detail elsewhere in the planning application and copies of the associated reports are included at Appendix I.

12.2 Assessment Metholdology

The approach adopted to assess potential transport and traffic effects comprises:

- Consultation with both Derby City Council (DCC), as the local highway authority, and the Highways Agency, as the strategic trunk road and motorway network authority, regarding highway access and potential road works;
- The traffic study area was defined along the access routes to the site;
- The route of construction and ALVs was assessed to determine the stability of the road and suitability of the road network to accommodate the size of vehicles anticipated;
- Traffic flow information was acquired and reviewed to assess the traffic conditions and composition along the access routes;
- An outline construction programme and activity schedule was developed to predict the traffic that would be generated during the construction phase of the proposed development;
- National Assessment Guidelines were used as a base for the analysis of data and to establish the size of effect that would be considered to be significance;
- An appropriate mitigation strategy was developed to ensure that potential traffic effects are minimised; and
- The operational and future decommissioning effects were reviewed to establish the effect on the local road network.

The assessment significance referred to in this section is in relation to the "Guidance on Transport Assessment" and not on the "Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999.

12.3 Guidance and Policy

In undertaking the assessment of the potential transport and traffic effects on the surrounding road network, the following guidance and policy documents have been taken into account:

- Planning Policy Guidance 13: Department for Communities and Local Government, April 2001
- Derby City Local Plan, Saved Policies GD5 and T1
- The 'Guidance on Transport Assessment' by the Department for Transport (DfT); March 2007

PPG13 recognises the nuisance caused by lorry traffic. It urges local authorities and freight operators to work together to agree on lorry routes to enable a more efficient approach.

Derby City Council has published advisory lorry routes, which in the area surrounding the site includes the use of the A52, A5111 and the A6, roads that are included in the route agreed in principle for the abnormal loads associated with the construction and decommissioning of the wind turbines (Stages 1 and 5). It is also anticipated that the HGV traffic associated with the construction and decommissioning operations (Stages 2 and 4) will also use these routes.

Policy GD5 of the Derby City Council Local Plan states that planning permission will only be granted for development where it would not cause unacceptable harm to the amenity of nearby areas. In considering harm, the council will consider, among other things, traffic generation, access and parking. Policy T1 advises that the council will seek to ensure that the proposed development will not result in increased traffic congestion, have a detrimental effect on the local environment or lead to a reduction in road safety.

The information provided within this chapter demonstrates that the development will not give rise to unacceptable harm in relation to amenity and will not result in increased traffic congestion, have a detrimental effect on the local environment or lead to a reduction in road safety. The proposed development is therefore in compliance with policies GD5 and T1.

The 'Guidance on Transport Assessment' sets out the requirements for undertaking assessments principally related to developments that generate significant long-term increases in traffic, such as retail parks, employment and residential developments.

There is an existing employment use at the site but there are no proposals to change or intensify this use. In addition, the proposed development does not propose a visitor centre or any similar attractions and this chapter anticipates the proposed development to have no significant long-term traffic movements and therefore, a formal Transport Assessment is not required.

The information normally included within a Transport Assessment is provided within this Traffic Impact Assessment and it is considered sufficient to enable the assessment of traffic and transport effects associated with the development during the construction, operation and decommissioning phases.

Reference has also been made to the National Transport Model (Road Transport Forecasts 2008; Department for Transport; dated December 2008) in order to factor forward existing traffic flows to an assessment year.

12.4 Consultation

For the proposed development, it is the construction and decommissioning stages that will generate the most significant vehicle movements, including the movement of the abnormal loads, as opposed to the vehicle movements associated with the day-to-day operation of the development.

- Tarmesar Traffic Consultants Ltd and Donaldson Associates have undertaken pre-application consultation with;
- Derby City Council (DCC); as the highway authority responsible for the surrounding local road network.
- The Highways Agency (HA); as the highway authority responsible for the strategic trunk road and motorway network

S·A·J Transport Consultants Ltd has continued this pre-application consultation.

In particular, the pre-application consultation concerned the use of the road network during the construction and decommissioning phases of the development, including the movement of the abnormal loads associated with the component parts for the wind turbines.

The abnormal route takes account of the anticipated delivery of the wind turbine components to a port on the East Coast of England and the subsequent use of the M1, to junction 25, and the A52, A5111 and A6 to access the site, including the recent changes to the A5111/A6 Junction.

12.5 Access Routes

The road network surrounding the site is shown on Figure 12.1.

To define conditions for the proposed development in terms of access and transportation, a baseline study comprising a strategic route review and local delivery route assessment was undertaken for the construction and decommissioning phases of the development, including the movement of the abnormal loads associated with the component parts for the wind turbines.

12.5.1 Construction/Decommissioning Phases (excluding adnormal loads)

The site has direct access to the East Service Road via a simple priority T-junction. It is proposed to use the existing site access to serve the proposed development with ALV using the new access road adjacent to the existing entrance.

The East Service Road is a single carriageway road that, along with the West Service Road, provides a direct link to the A5111, which forms part of the strategic road network, including the A52 and A6, serving the wider area.

The A52 provides an east-west link to the M1 (Junction 25).

There is industrial development to the east and west of the A5111 between its junctions with the A52 to the north and the A6 to the south. The East and West Service Roads serve the industrial developments off the A5111.

The site has direct access to highway infrastructure that has been purpose built to accommodate HGV and employment traffic associated with industrial development; which is consistent with the normal activities that will occur during the construction and decommissioning phases of the proposed development.

12.5.2 Abnormal Loads

The component parts of the wind turbines are listed below:

- Turbine blades - 51 metres (m) in length and weighing approximately 7.5 tonnes;
- Tower sections - up to 22m long, 4.3 m wide and weighing up to 55 tonnes;
- Nacelles - 13m long, 4m wide and weighing 54 tonnes;
- Foundation sections - 4.7m diameter and weighing 18 tonnes; and
- Hub - 4.8m diameter and weighing 24 tonnes.

The length and/or weight of the turbine components is such that these loads would be considered as being abnormal.

In order to avoid undue disruption to the road network, the DfT advises that, where possible, abnormal loads should be directed to the nearest suitable port. Due to the inland location of the site, it is possible that one of several ports on the east coast of England could be used, the most likely being the Port of Goole, Humberside, which has an established history of accommodating the import of wind turbine components.

The abnormal loads delivery routes from the ports on the east coast of England would follows established routes to Junction 25 on the M1 at Sandiacre.

The route description between the M1 and the site is given below:

- From M1 Junction 25 at Sandiacre proceed westbound on the A52;
- Exit the A52 via the A5111, southbound off-slip road;
- Continue southbound on the A5111 and onto the A6, via the new grade separated Raynesway interchange (currently under construction);
- Continue southbound on the A6 to the at-grade A6/B5010, Thulston Roundabout, u-turn at the roundabout and travel northbound on the A6, using the southbound carriageway;

- Continue northbound on the A6 and onto the A5111, via the new grade separated Raynesway interchange (currently under construction);

- Turn right onto the East Service Road, continuing northbound as far as the access to Seven Trent Water works.

Having identified the abnormal load route, a strategic route review was undertaken by Tarmesar Traffic Consultants Ltd and included consultation with DCC and the HA. Following the establishment of the route Galliford Try/Colletts have undertaken further detailed assessment of the route to identify the offsite highway works required to accommodate the abnormal loads. Details of the selected route, the associated swept path assessments and offsite highway works are included in Appendix I/1.

It is anticipated that the Police will request that the ALVs would need an escort and should avoid the peak periods on the road network defined as Monday to Friday, 0700-0930 and 1630-1830.

The review concludes that the route is achievable, but that a detailed survey should be undertaken to establish the exact street furniture removal requirements.

12.5.3 Day-to-Day Operations

Access to the wind turbines will be required at all times for maintenance and generally using light vehicles. The access for maintenance will generally be infrequent and will not generate significant traffic movements on the surrounding road network. It is also noted that the site has an existing employment use and therefore generates traffic associated with its current use.

There is no intention to include a visitor centre or similar attractions associated with the wind turbines.

It is concluded that the day-to-day operation of the wind turbines will have no material impact on the surrounding road network.

12.6 Baseline Conditions

12.6.1 Existing Highway Network

The Department for Transport has traffic flow data available at selected locations across the strategic road network, including northbound and southbound flows on the A5111, between its junctions with the A52 and the A6, as well as on the A52, to the east of the A52/A5111 interchange.

The flow data has been obtained to establish 2009, baseline conditions for the A5111 and A52. The traffic flow data is included at Appendix I/3.

These flows have been factored forward to 2012, the anticipated construction period, using growth factors from the National Transport Model (Road Transport Forecasts 2008; Department for Transport; dated December 2008). The 2012 flows form a baseline scenario against which to assess the impact of the predicted development traffic.

The flows are summarised in Table 12.1.

Table 12.1: Baseline Traffic Flows

Trads Site Reference	Description	AM Peak Hour Flows		PM Peak Hour Flows	
		2009	2012	2009	2012
7/300013987	A5111 NB between A6 and A52	2261	2578	2407	2744
7/300013986	A5111 SB between A52 and A6	2026	2310	2452	2795

12.7 Predicted Development Traffic

12.7.1 Construction Phase

The worst-case scenarios for trip generation associated with the development of the site will be during the construction phase. The construction programme includes the export of excavated materials excavated during the preparation works for the development. The restoration of the site during the decommissioning phase will not require the import of earthworks fill material to replace the materials exported during the construction phase. In which case the construction phase will generate the highest level of vehicle movements and represents the worst-case scenario for the purposes of assessment.

Growth in traffic on the road network dilutes the environmental impacts associated with development traffic. This is further evidence supporting the case for the construction phase to be the worst-case assessment scenario, when compared with the decommissioning phase.

A preliminary, indicative construction programme has been prepared in an attempt to identify the key construction activities and the potential vehicle movements associated with the construction of the turbines. It is anticipated that the construction period will be in the order of 4-months.

It is assumed that the site operations will take place over a 5½-day working week and that there will be up to 10 site personnel present per day during the construction period.

The peak levels of activity will occur during months 2 and 3, with up to 94 HGV movements (2-way) per day, alongside 20 light vehicle movements (2-way) associated with the arrival and departure of the site personnel; giving total of 114 (2-way) vehicle movements per day during this peak period of activity.

The indicative, predicted trip generation is summarised in Table 12.2.

Table 12.2: Indicative, Predicted Worst-case Trip Generation - Construction Phase (Vehicles)

Activity	Month			
	1	2	3	4
Site establishment and plant mobilisation	19			
Construction access tracks	430			
Construction crane pads		312	312	
Excavate turbine base		330	330	
Construct turbine base		380	380	
Highway connection works		0	0	
Crane transportation to site (Abnormal Load)				(5)
Turbine components to site (Abnormal load)				(18)
Cabling works		6	6	
Waste from site	4	4	4	4
Service site welfare and ancillary deliveries	9	9	9	9
Demobilise site compound and restoration				19
TOTALS				
Total HGV/month	462	1041	1041	55
Number of Weeks	4	4	4	4
Number of Days	5.5	5.5	5.5	5.5
Total days/month	22	22	22	22
HGV/day (one-way)	21	47	47	3
HGV/day (two-way)	42	94	94	6
Staff/day (one-way)	10	10	10	10
Staff/day (two-way)	20	20	20	20

The daily trip generation figures have then been assigned to a 12-hour working day (0700-1900 hours) to provide a daily trip profile, Table 12.3.

An assumption has been made that the HGV trips will be distributed evenly over the working day, based on the key construction activities being the removal of excavated material and the import of concrete, which are likely to require a steady flow of vehicles to and from the site. For the purposes of assessing the operational impact of the development traffic the HGV trips have been adjusted to provide the equivalent passenger car unit (PCU).

It has also been assumed that the on-site personnel will arrive in the hour leading up to the start of the working day (07:00 to 08:00) and will depart in the hour after the end of the working day (18:00 to 19:00). An allowance has also been made for some additional trips being made in the anticipated period around lunchtime (11:00 to 13:00).

Table 12.3: Indicative Predicted Construction Daily Trip Profile (Vehicles and PCUs)

Time Period		Site Personnel			HGV's				Total
From	To	In	Out	2-way (PCUs)	In	Out	2-way	2-way (PCUs)	2-way PCUs
06:00	07:00			0	0	0	0	0	0
07:00	08:00	10		10	5	0	5	12	22
08:00	09:00			0	5	5	10	23	23
09:00	10:00			0	5	5	10	23	23
10:00	11:00			0	5	5	10	23	23
11:00	12:00		2	2	5	5	10	23	25
12:00	13:00	2		2	5	5	10	23	25
13:00	14:00			0	5	5	10	23	23
14:00	15:00			0	5	5	10	23	23
15:00	16:00			0	5	5	10	23	23
16:00	17:00			0	5	5	10	23	23
17:00	18:00			0	5	5	10	23	23
18:00	19:00		10	10	0	5	5	12	22
19:00	20:00			0	0	0	0	0	0

Based on the indicative construction programme, the results in Table 12.3 show that the construction phase of the development will generate the equivalent of between 22 and 25 vehicle movements (PCU's) per hour. This level of activity will occur during a 2-month period.

There is the potential for the trip figures to vary once the detailed construction programme is known. However, it is considered that the figures are realistic at this stage and robust enough for the assessment process.

12.8 Operational Capacity

The guidance suggests an indicative threshold of 30, 2-way movements above which consideration should be given to the operational impact of development traffic. The predicted trip generation is less than this threshold figure, with a peak of 15 vehicles or 25 PCU's, see Table 12.3.

The Department for Transport has traffic flow data available at selected locations across the strategic road network, including northbound and southbound flows on the A5111, between its junctions with the A52 and the A6. The section of the A5111 is applicable to the proposed development.

The 2009 recorded peak hour flows on the A5111 are shown in Table 12.3. These flows have been factored forward to 2012, the anticipated construction period, using the following growth factors generated from the National Trip End Model (NTEM) Dataset 5.4. The growth factors used are summarised in as follows:

- AM: 1.0533;
- PM: 1.0523;
- AADT: 1.0524.

An assessment of the operational capacity of the A5111 link road has been undertaken using the DMRB: Volume 5: Section 1: Part 3: TD79/99 Capacity of Urban Roads. The 5111, beyond the A5111 is the initial point of contact for the development traffic onto the Strategic Road Network; the traffic will be distributed and assigned to other parts of the network beyond the A5111 and the impacts will be less significant.

The predicted peak hour flows on the A5111, in the assessment year 2012, have been compared to the capacity of the link road and the results are summarised in Table 12.4.

Table 12.4: A5111 Operational Link Capacity

Link Road: A5111									
Trads Site Reference	Description	TD79/99 Road Type	TD79/99 Veh Capacity	AM Peak Hour Flow			PM Peak Hour Flow		
				2009	2012	RFC	2009	2012	RFC
7/300013987	A5111 NB between A6 and A52	UAP2	2950	2261	2382	81%	2407	2533	86%
7/300013986	A5111 SB between A52 and A6	UAP2	2950	2026	2134	72%	2452	2580	88%
				2-way	4516		2-way	5113	

The results in Table 12.4 show that in 2012, during the commuter, peak hours

- The A5111 will be operating at
- 81% capacity (RFC 0.81) in the AM peak (2-way) and
- 88% (RFC 0.88) in the PM Peak.

It is generally accepted that the ratio of flow to capacity (RFC) should be interpreted as follows:

- RFC 0.9 or below: Link road operating within capacity and with significant spare capacity;
- RFC 0.9 to 1.0: Link road operating within, but approaching, capacity;
- RFC 1.0 or above: Link Road operating above capacity.

The A5111 is operating within capacity and with significant spare capacity (RFC < 0.9).

The addition of 23 PCUs in the AM and PM peak periods to the 2012 baseline flows (2-way) on the A5111, see Table 12.4, will increase the flows by less than 1%.

Beyond the A5111 there is potential for the predicted development trips to be dispersed at the A6/A5111 interchange (under construction) to the south and the A52/A5111 interchange to the north. Therefore, the impacts on the A5111 are considered to represent a worst case assessment scenario on the surrounding road network.

Given the predicted level of trip generation associated with the proposed development and that the A5111 will be operating with significant spare capacity in 2012, it is considered that there will be no material impact on the operational capacity of the surrounding road network.

12.9 Decommissioning Phase

The most material effects occur during the construction phase, when the trip generation will be higher (due to the export of excavated materials during the construction phase, trips not replicated during the decommissioning phase). The natural growth in traffic on the road network will also dilute any impacts associated with development traffic during the decommissioning stage.

The construction phase represents the worst-case assessment scenario.

12.10 Accidents and Safety

In order to evaluate the highway safety issues on the surrounding road network, the personal injury accident (PIA) records, within the study area (see Figure 12.2) were obtained from Derbyshire Constabulary (DC) for the latest available 5-year period between 1st November 2004 and 30th November 2009.

The details of the PIA records are included at Appendix I/2.

Table 12.5 provides an overall summary of the PIA's occurring over the assessment period.

Table 12.5: PIA's over the 5-year study period (01/11/2004 to 30/11/2009)

Year	Tot	Severity			Vehicle Type							Location	
		Fatal	Ser	Slight	Car	Gds < 7.5t	HGV> 7.5t	PSV	M/C	Cyc	Ped	Jun	Link
2004	1	0	0	1	4	0	0	0	0	0	0	1	0
2005	40	0	10	30	58	7	2	1	3	0	0	21	19
2006	34	1	7	26	57	1	3	0	2	0	0	17	17
2007	39	0	5	34	68	5	0	1	3	0	0	21	18
2008	30	2	5	23	42	1	0	0	1	0	0	11	19
2009	38	0	4	34	55	2	2	0	3	0	0	16	22
Total	182	3	31	148	284	16	7	2	12	0	0	87	95

Table 12.5 shows that of the 182 accidents recorded over the 5 year period; 148 were classified as slight, 31 as serious and 3 as fatal.

Of the 182 recorded accidents, only 7 involved HGV's. The accidents were classified as follows; 6 slight and 1 serious.

The location of the PIA's which involved HGV's are described below;

- 1 serious accident occurred on Wyvern Way;
- 1 slight accident occurred on the A52 at the junction with A5111 northbound on slip;
- 1 Slight accident occurred on the A52, Brian Clough Way west of the junction with Wyvern Way.
- 1 slight accident occurred on the A52 westbound near Spondon.
- 1 slight accident occurred on the A52 westbound near Spondon approximately 400m west of East Derby Road.
- 1 slight accident occurred in the A5111 at the junction with the A6.
- 1 slight accident occurred A52 approximately 1,000m east of Pentagon Roundabout.

Figure 12.3 shows the location of the TRADS traffic counters. The results from these stations are summarised in Table 12.6 and indicate that, in 2009, the 2-way, Annual Average Daily Traffic (AADT) flow on the A52 was in the order of 43k vehicles and on the A5111 was in the order of 44k vehicles.

Table 12.6: Annual Average Traffic Flows from TRADS Data (2009)

Trads Site Reference	Link Road Description	No. Lanes	TD79/99		*AADT (2009)		** AM Peak Hour Flow (PHF)		** PM Peak Hour Flow (PHF)	
			Road Type	Cap	24 hour	12 hour	PHF	Stress (PHF/Cap)	PHF	Stress (PHF/Cap)
A52, Brian Clough Way										
7/300013989	A52 EB between A511 & M1	2	UAP1	3350	23554	19191	2208	66%	2716	81%
7/300013988	A52 WB between A5111 & M1	2	UAP1	3350	19399	15703	2225	66%	1804	54%
A5111										
7/300013987	A5111 NB between A6 and A52	2	UAP2	2950	23084	19001	2261	77%	2407	82%
7/300013986	A5111 SB between A6 and A52	2	UAP2	2950	21338	17220	2026	69%	2452	83%

Notes
* Taken From Trads Website Jan 09-Dec 09
** Taken From Trads Website 7th Sept 09 - 14th Sept 09
*** Works currently underway to create a new junction to serve the Raynesway development

The extent of the PIA road safety study area is shown on Figure 12.2 and includes 3.6km of the A52 and 4km of the A5111.

It is assumed that within the PIA study area, that the 2009, AADT flow (2-way) is typically 43,000 vehicles.

The most recent Reported Road Casualties Report: 2008, was published by the Department for Transport in September 2009. Table 3 in the report shows the typical accident rates for various road types. In this instance, it is assumed that the A52 and A5111 are urban A roads. This would give a national accident rate of 58 accidents per 100 million vehicle kilometres.

Applying a factor from TEMPRO of 1.0076 to convert/regress the 2009, AADT flow (2-way) to a 2008, AADT flow gives a value of 43,000/1.0076=42,675

The 2008 accident rate within the PIA study area is:

- Accident Rate = 42675 x 365 x 7.6 x 38 /100^6 = 45.

The accident rate is less than the national average figure of 58.

The increase in the total traffic flow and the composition of the HGV content of the flow will be less than 0.5% and 6% respectively, see Table 12.7. Given that there are no inherent road safety issues associated with the surrounding road network relating to HGV traffic and that the accident rate is below the national average, the changes in the traffic flows will not have a material impact on road safety on the surrounding road network.

12.11 Visual Distraction

Visual distraction is the result of something close to the highway which detracts the attention of the driver away from the road ahead and as a consequence may result in a highway safety issue.

The Highway Agency Spatial Planning Note SP 04/07 provides guidance on the considerations for the siting of wind turbines near the Strategic Road Network (SRN), addressing the main issue of Visual Distraction.

A detailed assessment of the proposed development on visual distraction was undertaken (Appendix I/4) and concluded that the accident rate within the surrounding road network is below the national average, that the road network is operating below critical stress/capacity levels and that generally drivers will have prolonged visual exposure to the turbines, particularly in the key decision making locations.

It is widely accepted that drivers are faced with any number of varied and competing distractions during any normal journey, including advertising hoardings, which are deliberately designed to attract attention. At all times drivers are required to take reasonable care to ensure their own and others safety. Wind turbines should therefore not be treated any differently from other distractions a driver must face and should not be considered particularly hazardous.

Based upon this analysis within this report it is concluded that the driver distraction associated with the proposed wind turbines will no adverse impact on the Strategic Road Network within the study area.

12.12 Impact Assessment

The predicted development related vehicle trip generation and its distribution/assignment onto the highway and the associated operational impacts have been described in Section 12.7 and 12.8, respectively.

When assessing environmental impacts, the guidance on Transport Assessment requires the assessment to determine both the change in the total flows along the link roads within the study area and also the change in the composition of the flow to show the effects of heavy goods vehicle (HGV) traffic.

The impacts have been assessed by comparing the 12-hour flows, over the period 0700-1900, to coincide with the operational periods associated with the import and export of materials at the proposed development. This represents a worst-case assessment scenario; using an 18-hour or 24-hour assessment period would clearly dilute the impact of the development traffic.

The natural growth of traffic on the road network over the life of a project will have the effect of diluting the impact of the development traffic. In this instance the assessment of the environmental impacts has been assessed against a base year of 2009, which represents a worst case scenario.

12.13 Prediction of Impact Magnitude

An assessment of the scale of the potential change has been determined, based on the guidance provided in the (former) Department of Transport's Manual of Environmental Appraisal, based on the proportional increase or decrease compared to the baseline condition, for both the total traffic flow and the HGV content.

- Substantial Impact (>90% change): Total loss or major/substantial alteration to key elements/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed;

- Moderate Impact (60% to 89% change): Loss or alteration to one or more key elements/features of the baseline conditions such that the post development character/composition/ attributes of the baseline will be materially changed.

- Slight Impact (30% to 59% change): A slight shift away from the baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation.

- Negligible Impact (<30% change): Very little change from the baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

- No Discernible Impact (<10% change): Generally recognised that projected changes in traffic flows of less than 10% will create no discernible environmental impact.

The assessment has been undertaken on both the A5111 and the A52, assuming that the development related traffic flows do not disperse and that the 2-way flow is maintained on both roads. The results are summarised in Table 12.7 and show that the increase in the total traffic flow and the composition of the HGV content of the flow will be less than 0.5% and 6%, respectively.

There will be no discernible environmental impact on the surrounding road network associated with the proposed development related traffic.

Table 12.7: Summary of 12-hour flow assessment (vehicles)

Description	2009, Do Ex			Peak Construction Traffic		% Change/Impact			
	All	HGV	%HGV	All	HGV	All		HGV	
A5111 Northbound	19001	779	4%	57	47	0.3%	No Discernible Impact	6%	No Discernible Impact
A5111 Southbound	17220	689	4%	57	47	0.3%	No Discernible Impact	7%	No Discernible Impact
A52 Eastbound	19191	979	5%	57	47	0.3%	No Discernible Impact	5%	No Discernible Impact
A52 Westbound	15703	895	6%	57	47	0.3%	No Discernible Impact	5%	No Discernible Impact

There is no traffic flow data available on the East and West Service Roads. However, these roads are part of the highway infrastructure purpose built to serve the existing industrial development to the east and west of the A5111. There are no sensitive receptors along either road where it would not be anticipated that traffic associated with industrial development would take place. An increase of 94 HGV movements over a 12 hour day equates to an average of 8 per hour (one every 7½ minutes). The traffic movements relating to the site personnel take place during the arrival and departure peaks, equating to 10 vehicle movements in an hour. Given the nature of the development surrounding the East and West Service Roads, it is not anticipated that the proposed development traffic will have a material impact on the local road network.

12.14 Conclusion

The potential impacts have been assessed during the construction and decommissioning phases of the development, the worst case scenario in terms of sustained development related trip generation.

The abnormal loads are few in number and the associated impacts are considered to be operational rather than environmental.

The most significant operational impacts will occur during the construction phase, when the highest number of vehicle trip movements will be generated. During the operation of the wind farm, HGVs may visit the site for maintenance purposes but this would not be a regular occurrence.
The increase in the total traffic flow and the composition of the HGV content of the flow will be less than 0.5% and 7% respectively, see Table 12.7. Given that there are no inherent road safety issues associated with the surrounding road network relating to HGV

traffic and that the accident rate is below the national average, the predicted changes in the traffic flows will not have a material impact on road safety on the surrounding road network.

The number of total vehicles and HGVs on the network will increase during the construction phase, but there will be no discernible impact on the local highway network, in terms of operational and environmental impacts or in terms of road safety. It is also noted that the impacts that do occur will be for relatively short periods (2 months) and will be short lived.

The Abnormal Load Vehicles (ALVs) delivering the wind turbines will have no discernible impacts and the operational impacts will be mitigated by escorting the vehicles along designated routes and at times planned to avoid the peak hours on the surrounding road.

The operation of the proposed development of the wind turbine development will have no discernible impact relating to transport movements.

13 Aviation

13.1 Introduction

There are two main areas of concern relating to the interaction of wind turbines and aviation operations (civil and military aerodromes and other air navigation service providers):

- Turbines can present a physical obstruction to safe operations at a given civil or military aerodrome or within the UK Low Flying System (UKLFS); and
- Turbines can impact on the radar services provided by an air navigation service provider (e.g. NATS EN-Route Ltd, MOD and civil airports).

The impact of the proposed turbine on nearby aviation stakeholders has been assessed by Osprey Consulting Services Ltd (Osprey). This Chapter presents a summary of the assessment undertaken and the conclusions drawn. The full report of the assessment is contained in Appendix J.

Following completion of the report by Osprey, an objection to the development was received from East Midlands Airport (EMA). In the light of this objection, the developer commissioned a further aviation assessment from Spaven Consulting in order to test Osprey's conclusions and address the points raised in the consultation response from EMA. The Spaven Consulting assessment, which was conducted without site of the Osprey report, confirmed the key Osprey finding that the Derby development would not have a significant impact on the provision of air traffic radar services by EMA. This chapter summarises the findings of the Spaven Consulting assessment in addition to the Osprey report.

13.2 Consultation

The first stage of the assessment was to identify and consult the following relevant aviation stakeholders:

- Ministry of Defence (MOD);
- The Civil Aviation Authority;
- National Air Traffic Services En-Route Ltd who operate the Clee Hill radar station; and
- East Midlands Airport.

On the basis of the above assessment, these bodies were identified as having the potential to be affected by the proposal and therefore worthy of further assessment.

- The Ministry of Defence (MOD);
  In their letter dated 14th December 2009 the MOD confirmed they had no objection to the proposal but requested that the turbines are fitted with aviation lighting.
- The Civil Aviation Authority (CAA):

In their email dated 20th October 2009 the CAA did not object to the proposal but advised that the East Midlands Airport and NERL should be consulted.

- National Air Traffic Services En Route Ltd (NERL):
  NERL were consulted but to date no response has been received.

- East Midlands Airport (EMA):
-

  At the first stage of assessment EMA were consulted but no response was received. Following the completion and submission of the Aviation Impact Assessment to EMA a response was received dated 7th December 2009. In this letter EMA confirmed that they were minded to object to the proposal. This objection was based on the grounds that due to the sites location the development could not be accommodated without materially impacting upon the continued efficient operation of aircraft at EMA.

  Over the course of 2010 there have been numerous exchanges of correspondence (see Appendix J of the ER Appendicies) and two meetings between the applicant and EMA. The guidance contained in the relevant national Planning Policy Statement obliges applicants to address[12] any potential effects upon recognized aviation interests. The position at the time of submission is that EMA maintain their objection to this proposal.

  The applicant regrets that an objection appears likely to be submitted by EMA. The applicant has repeatedly requested EMA to justify or substantiate their objection but (as demonstrated in the audit trail of correspondence at Appendix J of the ER Appendicies) to date no evidence has been forthcoming. In the absence of evidence the applicant will go on to demonstrate that the potential effects of the proposal have been addressed and on this basis the proposal would comply with the relevant national Planning Policy Statement.

Copies of all the correspondence referred to above are attached at Appendix J.

13.3 Assessment

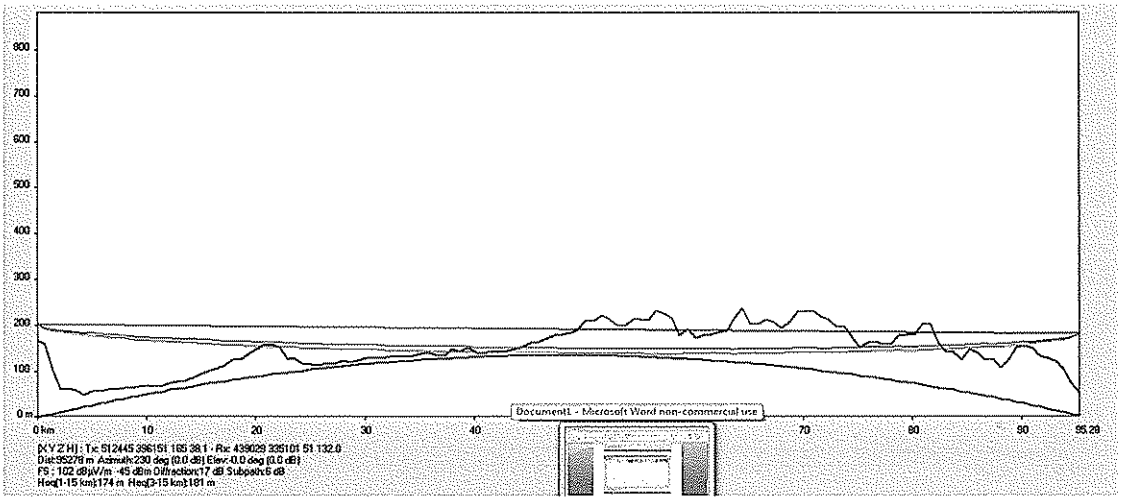
13.3.1 NATS En-Route Ltd Radar

NATS En-Route Ltd (NERL) provide air traffic services to traffic en-route within UK airspace. NERL operate a number of long range primary and secondary radars positioned to provide maximum coverage of UK airspace.

The nearest NERL radar to the Derby site is the Claxby radar which is approximately 95.3km from the proposed turbine locations. The Derby turbines are shielded by terrain from the NERL Claxby radar antennae, as shown in the line of sight analysis at Figure 13.1.

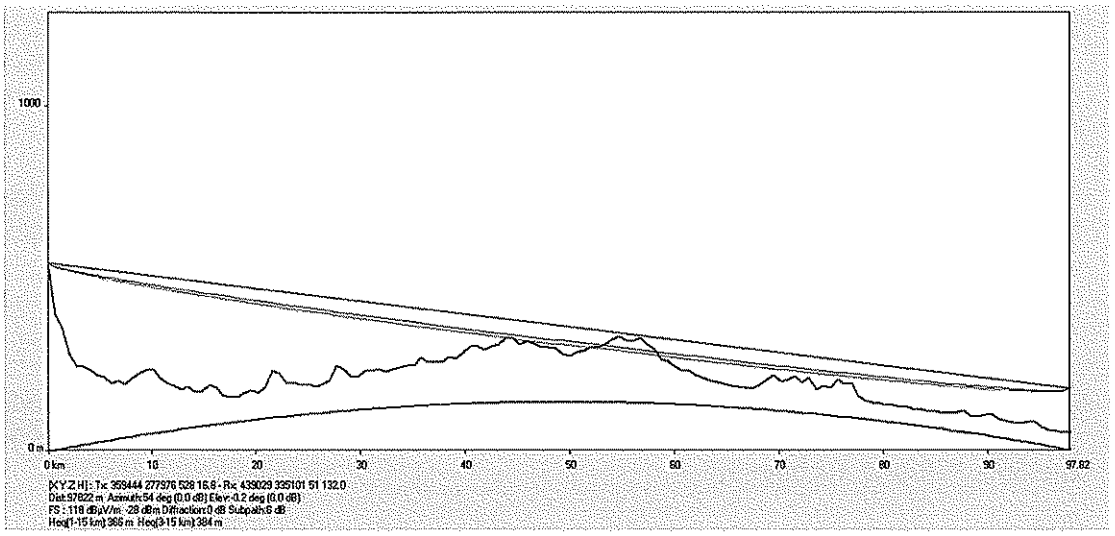
[12] Planning Policy Statement 22: Renewable Energy, para 25

Figure 13.1: NERL Claxby PSR to Derby turbine 1



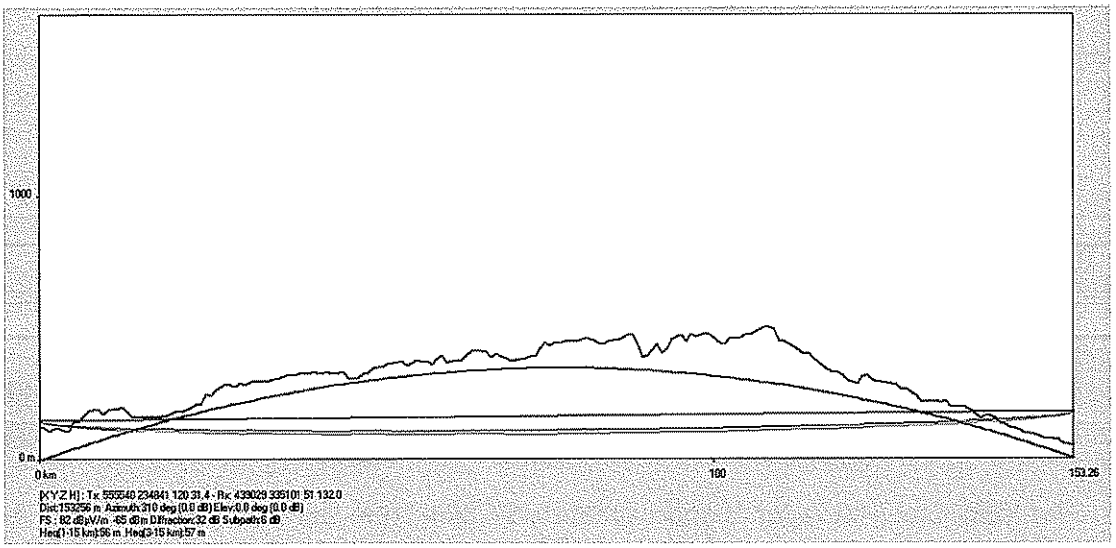
The NERL Clee Hill radar is approximately 97.8km from the turbines at Derby. The Derby turbines, at the maximum height of 132 metres, will be marginally visible to the Clee Hill radar, as shown in Figure 13.2.

Figure 13.2: NERL Clee Hill PSR to Derby turbine 1



The NERL radar at Debden is approximately 153.3km from the Derby site. As shown in Figure 13.3 below, the turbines are shielded by terrain from the radar antennae.

Figure 13.3: NERL Debden PSR to Derby turbine 1



Beyond Clee Hill there are no other NATS radar installations with the potential to be affected by the Derby proposal.

13.3.2 Impact on NATS En-Route Ltd Radar

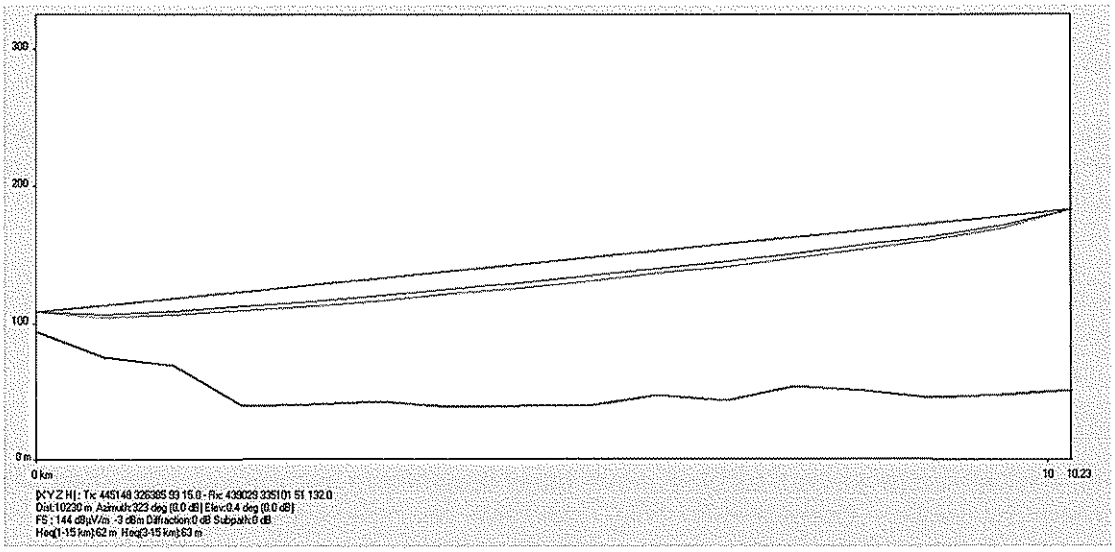
NERL provide services in the Class A and Class C airspace above the proposed site. This is controlled airspace which constitutes a known traffic environment; therefore it is extremely unlikely that any associated radar clutter could shield unknown aircraft from the radar.

Owing to the small size of the site and the marginal visibility of the turbines, it is considered unlikely that the proposal would have an adverse effect on the operational efficiency of the NERL air traffic control service.

13.3.3 East Midlands Airport

Osprey carried out an assessment of the line of sight between the EMA PSR and both of the Derby turbines. Figure 13.4 shows the line of sight terrain elevation profile between the EMA PSR and Turbine 1.

Figure 13.4: EMA PSR to Derby Turbine 1



The line of sight profile shows that the turbine will be within line of sight of the radar antenna at EMA as there is no intervening terrain to shield the turbine from the radar.

A full complement of line of sight profiles are attached in the full report in Appendix J.

13.3.4 Impact on Operations at East Midlands Airport

Osprey CSL carried out an assessment of any potential impact of the proposed wind turbine on the operations at East Midlands Airport. The report produced by Osprey is included in Appendix J. The key findings of the Osprey report, and further assessment by Spaven Consulting, are as follows:

- The turbines at Derby are likely to be shown on the radar display at EMA. However, the airspace in which the returns may be seen is a known traffic environment. The nature of this airspace means that the likelihood of unknown aircraft being hidden is much reduced as EMA should be aware of all aircraft in their control zone. The site is not close to any routes for Visual Flight Rules (VFR) traffic, and is not under the main swathes of flight paths flown by Instrument Flight Rules (IFR) traffic.

- In the absence of any other information, radar returns from the turbines are unlikely to be regarded by EMA controllers as representing unknown aircraft infringing the EMA Control Zone. Available infringement data do not show evidence of unidentified radar returns or infringements in the Derby area as being particular problems and the probability of actual infringing aircraft being detected on radar before reaching the Control Zone boundary is high. The turbines are likely to reduce the likelihood of airspace infringements since they will be a visual cue to pilots of the boundary of controlled airspace.

- The turbines will not create a physical obstacle hazard to aircraft because they are clear of the EMA protected surfaces by at least 58 metres.

Based on the above assessment we conclude that the development will not have a significant adverse effect on the operational efficiency of East Midlands Airport air traffic control service and will not present an obstacle hazard to aircraft in the vicinity.

13.4 Cumulative Impact

There are currently no operational wind turbines in proximity to East Midlands Airport. There are five projects which are either consented and yet to be constructed or in the planning process at this time in the vicinity of East Midlands Airport:

- East Midlands Airport (4 x 45m turbines);
- Dalby (9 x 79m turbines);
- Wymeswold (1 x 79m turbine);
- Queniborough (4 x 126.5m turbines);
- Wanlip (1 x 132m turbine).

The East Midlands Airport turbines have been designed in such a way that they will not appear on radar. Consequently they can have no cumulative radar impact with the Spondon turbines. The Dalby, Wymeswold, Queniborough and Wanlip turbines will all be visible to the EMA radar but all of them have received letters of no objection from EMA. The closest of these developments will be 13.9 nm (25.7 km) from the closest Derby turbine. Any aircraft overflying the Dalby, Wymeswold, Queniborough and Wanlip developments while inbound to or outbound from EMA would not also overfly the Spondon area and in the event of controllers vectoring aircraft around the Dalby, Wymeswold, Queniborough and Wanlip turbines there would be no risk of the aircraft then having to fly over or in the vicinity of the Derby turbines. Consequently there is assessed t be no cumulative aviation impact from the Derby turbines.

13.5 Conclusions

The Ministry of Defence, the Civil Aviation Authority, National Air Traffic Service En-Route Ltd have all been consulted and have not brought forward any objections to the proposed development to date.

East Midlands have raised an objection to the development. However the developer has considered the effects of the proposal on EMA and based on the findings of two aviation assessments we conclude that the proposal, either in isolation or cumulatively, would not compromise the operational efficiency of air traffic services at EMA and on this basis the proposal should be considered acceptable in aviation terms.

14 Radio and Telecommunications

14.1 Introduction

This chapter considers potential impacts on radio and telecommunication links associated with the proposal. Wind turbines can cause Electronic Magnetic Interference (EMI) by way of:

- physical interference, where blades cut across a signal causing a 'ghosting' effect or by way of,
- electrical interference caused by the operation of the generator within the nacelle of the turbine.

Both scenarios may effect communication equipment in close proximity to the turbine. Microwave links are less susceptible to EMI due to their directional nature. Siting the turbine away from the 'line of sight' transmission paths will avoid any problem.

14.2 Methodology and Analysis

14.2.1 Radiocommunication Links

The Office of Communications (Ofcom) is responsible for the licensing of two-way radio transmitters and holds a register of most microwave links. Ofcom identified a total of sixteen microwave links in the vicinity that had potential to be affected by the turbines. The five link operators (Vodafone, T-mobile, H3G, BT and Central Networks) owning these links were consulted to establish the potential for conflict. Following these consultations no objections were received from Vodafone, T-mobile, H3G and BT (Appendix K). The Central Networks link was assessed and responsed to by JRC (see paragraph below).

In addition to the individual link operators identified by Ofcom both the Joint Radio Company (JRC) and CSS Spectrum Mangagement Services (CSS) were consulted on behalf of the organisations whose telecommunication links they maintain. In September 2009 JRC initially raised an objection as the proposed development was within 1km of a link operated by an Energy Industry Company (Central Networks link) and as such a detailed coordination was required. In December 2009 an investigation into the effect of the development on the link operated by Central Networks was undertaken (Appendix K) and concluded that providing the turbine 2 does not move any closer to the link then the proposed development will not degrade the availability of the Central Networks link below operational requirements. As such no objection to the scheme is raised by JRC or Central Networks and the previous objection is withdrawn.

CSS requested that Severn Trent Water Limited were contacted and no objection to the proposal was raised.

14.2.2 Television

Terrestrial television transmissions for domestic reception within the UK are the joint responsibility of the BBC and Ofcom. The BBC was therefore consulted regarding the potential effects of the proposed turbine on television reception via their online

assessment facility[13]. This indicated that the development would be likely to affect 1 home for whom there is no alternative off-air service and a further 53,607 homes who may have access to an alternative off-air service.

14.3 Mitigation

14.3.1 Radiocommunications

In response to the objection regarding the Central Networks link, JRC conducted investigations into the potential for conflict in December 2009. As a result the potential conflict has been resolved and the initial objection to the proposal withdrawn. No further mitigation regarding radiocommunication links is required.

14.3.2 Television

The extent of interference on television reception will only become apparent during operation of the turbines. Wind turbines blades potentially effect analogue signals considerably more than digital signals. The switchover from analogue to digital service is due to take place in the area in 2011. Should unacceptable levels of interference be experienced following construction various mitigation measures are available including:

- Reorientation of an aerial to an alternative transmitter;
- Re-siting an aerial;
- Installation of a higher quality aerial; or
- Switch to a digital or cable service.

The applicant will commit, by way of a standard planning condition, to undertake appropriate mitigation to restore reception to pre development levels should the proposed turbines result in unacceptable levels of interference.

14.4 Conclusions

The link operators, JRC and CSS have all been consulted and they have not brought forward any objections to the proposed development to date.

The developer has considered the effects of the proposal on radio and telecommunication links with relevant stakeholders consulted. Based on the responses received we conclude that the proposal would not compromise their existing operational efficiency and on this basis the proposal should be considered acceptable in radio and telecommunication terms.

[13] BBC Windfarms Assessment Tool (accessed 4.1.10) available online at http://www.bbc.co.uk/reception/info/windfarm_tool.shtml

15 Health and Safety

15.1 Introduction

The wind industry has a good safety record. The Health and Safety Executive have combined with the British Wind Energy Association to produce industry guidelines with which this proposal would be in full compliance. Throughout the construction, operation and decommissioning phases of this proposal the risk of compromising public health and safety will be constantly monitored and managed to ensure it is minimised.

This Chapter outlines the processes and procedures that would be followed to ensure that health and safety risks are minimised. It will demonstrate how the proposal would be constructed in line with relevant legislation and good practice guidance relating to the energy industry. Severn Trent Water Ltd are committed to effective site management as a core business principle with health and safety as a key element of this.

15.2 General Approach

During construction, operation and decommissioning, the proposal would be in full compliance with:

- The Health and Safety at Work Act 1974 and its supporting legislation;
- The Construction Design and Management Regulations 1994[14]; and
- British Wind Energy Association Health & Safety in the Wind Energy Industry guidelines 2005.

15.3 The Construction Phase

Prior to the commencement of the construction phase an Environmental Management Plan (EMP) would be agreed with the relevant health and safety authorities. The EMP would demonstrate how the site is to be operated and controlled to ensure the health and safety of the general public and the active workforce.

All work activity would be planned in advance and risk assessments carried out to anticipate and mitigate adverse effects. The scope of the EMP would provide for the investigation of incidents (and near-miss incidents), the training of the work force and the monitoring of adopted work practices to ensure EMP compliance.

A properly experienced, trained and motivated workforce is essential for the successful implementation of the EMP. Therefore, a Safety, Health and Environment Manager would be appointed prior to the commencement of construction to ensure the EMP is properly monitored, managed and resourced and that the workforce is properly trained to provide an emergency response where required.

[14] Statutory Instrument 1994 No.3140 The Construction (Design and Management) Regulations 1994

All components and construction equipment employed would comply with international engineering design and manufacturing safety standards. All electrical equipment installed would comply with relevant UK and European Union electrical safety standards. Issues of highway safety are considered in Chapter 11 Traffic and Transport. This concludes that impacts could be minimised through the adoption of a Traffic Management Plan prior to the commencement of construction to control access to the site during the construction phase.

The kiosks will be designed and constructed with systems that protect site personnel and minimise potential risks associated with accidental exposure to high voltage electrical equipment. A robust earthing grid would be installed that would divert stray surges and faults. This would consist of a heavy gauge bare copper conductor buried in a grid fashion and welded to a series of multiple earthing rods. The kiosks would at all times be padlocked. Standard danger signs would identify the nature of the contents of the substation.

The proposal has been designed to minimise the scope for adverse effects. Activity throughout the construction phase will be continuously monitored and managed. All of the actions and activity described above will be captured with an agreed EMP and implemented by an experienced and qualified Principal Main Contractor. On this basis, significant effects are not anticipated.

15.4 The Operational Phase

Wind turbines have a proven track record for safety. There have been incidents of turbine failure, however these remain the exception. In all cases response times have been immediate with no risk to the general public. There has been no record of a member of the public being injured by a wind turbine. Given that this proposal is located in an area where public access is limited and therefore public safety would not be compromised.

All turbine components would comply with international engineering design and manufacturing safety standards including the British Standard BS EN 50308: 2004 'Wind Turbines Protective Measures; Requirements for Design, Operation and Maintenance'.

Most wind turbines undergo test certification procedures, which must conform to the guidelines laid down by the International Electro-technical Commission (IEC). Once operational the turbine would be continuously monitored and controlled by on board pressure and temperature sensors that would ensure instant shut down should a fault be detected.

While instances of interruption remain rare, an assessment of past failures would point to three areas of risk worthy of further assessment, namely infrasound, icing and lightning strike.

15.4.1 Infrasound

The levels of infrasound (1 Hz to 20 Hz) emitted by wind turbines are well below the levels which are known to cause problems within the range of human hearing from other technologies.

15.4.2 Icing

Under certain atmospheric conditions, temperature and humidity, it is possible for ice to form on the blades of a wind turbine which can either fall to ground when the blades are stationery (ice sheer) or be thrown from the blades when operational (ice throw). The number of days per year where such conditions exist is very low.

When a turbine is stationery the risk of ice building up on its surface is no greater than for any other tall structure such as a building, tree or overhead power line. When a turbine is operating ice may build up on the blades if atmospheric conditions are appropriate. While the velocity of the blades can increase the rate of ice build up, flexing of the blades in operation will act to retard the build up of ice. Any ice fragments that detach from the blades will be thrown from the turbine to land in the plane of the rotor or downwind.

Where a risk of icing occurs appropriate mitigation measures may be adopted consisting of:

- Shut down of the turbines as the risk of icing is far lower for a stationery turbine;
- Restricting access to areas where there is a possibility that ice fragments from a turbine may come to rest; or
- Implementing turbine features that prevent the build up of ice.

Probabilities of ice fragments posing a risk to human health need to take into account the low probability of an ice fragment striking a given area in proximity to a turbine along with the probability of a member of the public being present within this area. Given that there will be no public access to the turbines or surrounding area significant effects are not anticipated. However, to ensure this remains the case moving forward, the turbine would be monitored during its operational life and a regular risk assessment performed. Should ongoing assessment find that an unacceptable risk exists an appropriate control system would be installed to shut the turbine down in certain atmospheric conditions.

15.4.3 Lightning Strike

The proposed turbine will be fitted with a lightning conductor that protects the turbine from lightning strike.

15.5 The Decommissioning Phase

Risks associated with the decommissioning phase would be similar to those associated with the construction phase. Compliance and the application of relevant regulations would ensure that risks are minimised.

16 Wider Environmental, Social and Economic Benefits

16.1 Introduction

Our nation's biodiversity, coast lines and landscapes are a source of enormous environmental, economic, and cultural value. All are threatened by Climate Change. Renewable energy generation is recognised as being part of a solution to address the adverse effects of Climate Change.

The promotion of renewable energy, of which on-shore wind is just one technology, will have a beneficial impact for the wider environment, economy and society.

16.2 Emissions Savings

Every unit (kWh) of electricity produced through wind power can displace a unit of electricity which might otherwise have been produced by a power station burning fossil fuel. Nuclear power stations operate constantly at base-load such that the output from mainly coal-fired and, increasingly over time gas-fired plant, is adjusted to meet the increases in electricity demand above this base load on the system. As such, the electricity generated by wind turbines could effectively replace the output of coal-fired or gas-fired power stations, unit for unit.

The amount of gaseous emissions that wind energy can directly prevent being emitted from fossil fuel fired plant can be estimated on the basis of the figure provided by the British Wind Energy Association (following its discussions with the Advertising Standard Authority), of 430g CO_2/kWh. Given the complexities of the UK electricity generation mix and the state of the UK energy market, the Advertising Standard Authority has acknowledged that it is likely that the agreed figure understates the actual displacement figure.

Based on the results of the initial 6 months wind monitoring the applicant has undertaken preliminary yield calculations for a range of turbines. These calculations have predicted that the Derby wind turbines will generate between 8,195MWh and 12,299 MWh per annum. These figures are dependent on the chosen turbine but would be of dimensions that are proposed in this application.

On this basis, the CO_2 reduction of the proposed Derby wind turbines is estimated to be between approximately 3,524 tonnes and 5,289 tonnes annually[15]. Based on an operational lifespan of 24 years (1 year discounted for construction and decommissioning) it can be estimated that the Derby wind turbines could offset between 84,572 and 126,926 tonnes of CO_2 over the proposed 24-year lifetime of the development[16].

16.3 Households Powered

The electricity generated annually from the proposed development is predicted to be equivalent to the annual domestic needs of approximately 2617 average households in Britain. This equates to the electricity needs of 51% of the households within the

[15] Based on fuel generating mix which may change over time.

[16] Included as per advice from the ASA to the BWEA (September 2008). The CO2 estimate for the lifetime of the development is an estimate and is subject to an approximate margin of error (5%).

Spondon Ward[17]. The calculation has been based on the largest candidate turbine possible at the site (dimensions as per this application) and the calculation has been based on the BWEA recommended average annual UK household electricity consumption of 4,700KWh. This figure is viewed as conservative as the latest DECC regional and local electricity statistics indicate that the average UK household electricity consumption is 4,478 KWh[18].

If using the DECC figure, the electricity generated annually from the turbine would be predicted to be equivalent to the approximate annual domestic needs of approximately 2,747 households. It must be noted that the energy capture, capacity factor and, therefore, the figure for the equivalent number of households whose domestic needs would be met by the proposed turbine may change as further site specific information is gathered and advances in wind turbine technology are made.

16.4 Wider Environmental, Social and Economic Benefits

Wind is an inexhaustible and indigenous energy source and the UK is the windiest country in Western Europe. As such, wind is widely recognised as the most promising and economically viable source of green electricity in the UK.

In addition to playing a major role in tackling Climate Change and achieving the Government's targets for renewable energy generation, wind energy generates wider benefits for the environment, the economy and the wider society.

16.4.1 Environmental Benefits

Combating the Effects of Climate Change

A broad consensus of scientific opinion exists regarding the reality of man-made climate change and the impact this will have on the environment. The Intergovernmental Panel on Climate Change (IPCC) in it's 4th Assessment Report (Climate Change 2007) confirms that:

> *'Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.'*

Climate change is predicted to have severe negative impacts on habitats and species around the globe. The composition and geographic distribution of ecosystems will change as individual species respond to new conditions created by climate change. At the same time, habitats may degrade and fragment in response to secondary human pressures. Species that cannot adapt quickly enough may become extinct; an irreversible loss. In the UK the RSPB in March 2009 called for an increase in the number of wind turbines in an effort to reduce the impacts of climate change which it said threatened large numbers of species with extinction.

Electricity generation is a major contributor to climate change releasing large volumes of CO_2 and other greenhouse gases into the atmosphere. Replacing electricity generated by burning fossil fuels with electricity from renewable sources reduces carbon emissions.

[17] Based on data from the Office of National Statistics states there are 5104 households in Spondon Ward.

[18] 4,478 KWh is the average UK household electricity consumption (Regional and Local Authority Electricity Statistics 2008, Department of Energy and Climate Change).

Approximate emission reductions relating to this proposed development are provided in Section 16.2 above.

Natural Resource Depletion

Beyond the issues of man-made climate change the fact remains that the vast majority of the electricity we use is generated form fossil fuels that are non-renewable on a human timescale. It is therefore important to utilise renewable forms of energy to prolong the use of our remaining fossil fuels.

16.4.2 Social Benefits

Access to an Affordable Energy Supply

The concepts of supply discussed above raise concerns over the future affordability of energy. Everyone has the right to affordable and accessible energy from which to drive heat, light and warmth. Restrictions will impact on the most vulnerable within our society first, namely the elderly, young and low income families.

A modern and advanced society should recognise this right and manage the issues of supply and affordability. Diversification of our energy base should be encouraged to help diversify our energy options and thereby improve access and affordability.

Implications for Future Energy Supply

Issues of national security are now a factor in the planning of future power generating installations. In 2006 the UK became a net importer of gas with the majority of our supply coming from Eastern European Countries.

Any interruption in supply could expose our country to power shortages the implications of which would be serious for our hospitals, public buildings, places of work, transport system and homes.

The concerns of over-dependence can be redressed by diversification. Renewable energy is a technology that we can exploit. Many other forms of renewable energy generation are still at their concept stage (tidal power or geo-thermal heat) but wind turbines are a proven technology delivering significant mega-watts of power in the short term.

Implications for Food Security

Global and local agriculture will face many challenges over the coming decades. Higher temperatures will influence production patterns. Soil moisture will be affected by changing precipitation patterns. More carbon dioxide in the atmosphere could boost productivity but these beneficial effects could be reduced by accompanying changes in temperature, precipitation, pests, and the availability of nutrients.

Farming communities would need to adapt and adopt new methods and technologies. This transition may not be easy and productivity and quality of the land, livestock and crops may become degraded.

Implications for Human Health

Public health depends on sufficient food, safe drinking water, secure shelter, good social conditions, and a suitable environmental and social setting for controlling infectious diseases. All of these factors are affected by climate change.

30,000 people died across Europe at the start of this decade due to an unpredictable heat wave. Any increase in the frequency or intensity of extreme weather events would pose a similar threat.

Implications for Infrastructure, Industry, and Human Settlements

Climate change will affect human settlements:

- Infrastructure will become more vulnerable to flooding and landslides;
- Drought and flooding could undermine water supplies;
- The danger of fire could increase; and
- Heat waves would become a greater threat to human health and productivity.

All 4 of these events have occurred across Europe since the turn of the millennium most notably the heat wave of 2003, the forest fires across Portugal in 2005 and Greece in 2007 and the flooding that has affected every nation state. Climate change is considered to be a contributory factor.

Redress the Balance between Cost and Benefits of Energy Supply

Every community can and should make a contribution. Our current means of generating energy within the UK is fundamentally not fair. We rely heavily on a few communities to bear the costs of the generation process. Every community has renewable energy to harness, be it wind, wave or solar. Renewables represent a socially equitable way of generating energy.

16.4.3 Economic Benefits

Income, Employment and Expenditure

This proposal has the potential to create a number of employment opportunities during the construction period and sustain existing jobs within the supply chain.

During the construction period contractors will be encouraged to use local businesses for all materials and services. This will, albeit for a relatively short length of time, provide a boost to the local economy.

Security of Energy Supply

The proposal will assist with the UK Government's aim of encouraging indigenous supply to give security of supply. The UK's dependency on external energy continues to increase. Such dependency and the accompanying lack of control over supply and price places the UK in an increasingly vulnerable position.

Education and Marketing Benefits

A wind turbine would be a symbol in the landscape serving to increase awareness of sustainability and the wider issues of climate change. Furthermore, the turbine could present marketing opportunities when attracting new inward investment to the area.

16.4.4 Customer Benefits

Severn Trent Water Ltd is the world's fourth largest privately-owned water company serving over 8 million customers across the English Midlands and Wales. Their core function is to provide a safe and clean water supply and water treatment service. This function is threatened by climate change and the onset of extreme weather events.

An example of the problems faced by the applicant can be summarised in their response to climatic change since 2000:

- Leading up to 2006 the applicant was forced to prepare for the threat of drought following season after season of low rainfall and dry winters;
- Since 2007 the applicant has been forced to prepare for the threat of flooding following the severe rainfall that brought the City of Gloucester and other parts of the region to a stand still.

This uncertainty brought by extreme weather events is a threat to service provision and it is set to continue if nothing is done. To neutralise this threat Severn Trent Water Ltd regard renewable energy as part of the solution. By:

- being more efficient with energy use across the whole company;
- generating renewable energy from its own systems such as energy from waste, hydro sources, energy crops and anaerobic digestion; and
- off-setting the energy traditionally drawn in from fossil fuel burning power stations with new forms of renewable energy generated from zero emission technologies such as wind turbines,

Severn Trent Water Ltd believe they can make a meaningful contribution in reducing the amount of carbon released into the atmosphere which in turn would help stabilise climatic conditions and help secure a safer future for both water supply and treatment services.

Only with a concerted effort across many fronts (namely energy efficiency, reduced demand for travel and more renewable generation) and over many years would we adapt safely and securely to climate change. This proposal is part of the solution to climate change and as such its contribution should be recognised as a benefit and given significant weight in line with the UK Governments PPS 22: Renewable Energy.

APPENDIX B

TRADS SURVEY INFORMATION

Yearly classified during 2009 for site 7/30013989

EB, A52, TMU site 8277/1 on A52 eastbound between A5111 and M1(E441377, N335422) view site location on map

Month	24hr				18hr				16hr				12hr				ATC
	ADT	%>6.6m	AWT	%>6.6m	ADT	%>6.6m	AWT	%6.6m	ADT	%>6.6m	AWT	%>6.6m	ADT	%>6.6m	AWT	%>6.6m	DAY
bao Jan	22791	4.9	25252	5.6	22113	4.6	24591	5.3	21422	4.7	23844	5.3	18741	4.8	20815	5.6	31
wo Feb	23245	5.2	25629	6	22548	5	24971	5.7	21907	5	24298	5.7	19113	5.2	21168	6	28
tro Mar	24365	5.3	26850	6	23692	5	26214	5.7	23098	5.1	25618	5.8	20176	5.2	22342	6	29
bo Apr	23331	5.2	25761	5.9	22616	4.9	25069	5.6	21932	5	24354	5.7	19005	5.2	21094	5.9	30
b May	23332	5.3	25717	6	22601	5	25026	5.7	21912	5.1	24321	5.7	18983	5.2	21052	6	31
Jun	24082	5.2	26607	5.9	23315	5	25875	5.6	22607	5	25156	5.6	19532	5.2	21710	5.9	30
Jul	23679	5.4	26038	6.1	22892	5.1	25288	5.8	22198	5.1	24577	5.8	19139	5.3	21172	6.1	29
b Aug	22956	5.3	25200	5.9	22197	5	24472	5.6	21555	5.1	23812	5.7	18606	5.3	20537	6	25
Sep	24404	5.3	26758	5.9	23629	5	26026	5.6	22918	5	25323	5.7	19796	5.2	21847	6	27
t Oct	24357	5.2	26832	5.9	23590	4.9	26093	5.5	22900	4.9	25388	5.6	19777	5.1	21880	5.8	30
Nov	24322	5.1	26855	5.8	23548	4.8	26115	5.5	22838	4.9	25379	5.5	19790	5	21895	5.8	29
b Dec	21781	4.7	23780	5.3	21041	4.4	23083	5	20365	4.5	22378	5.1	17638	4.6	19282	5.3	31
Avg	23554	5.2	25940	5.9	22815	4.9	25235	5.6	22138	4.9	24537	5.6	19191	5.1	21233	5.8	350

b Bank Holiday w Weather a Accident t Time change r Road Works s Sporting Event o Other

Showing only complete days. No estimated data. Not including hidden data.

Yearly classified during 2009 for site 7/30013988

WB, A52, TMU site 8278/1 on A52 westbound between M1 and A5111(E443424, N335097) view site location on map

Month	24hr				18hr				16hr				12hr				ATC
	ADT	%>6.6m	AWT	%>6.6m	ADT	%>6.6m	AWT	%6.6m	ADT	%>6.6m	AWT	%>6.6m	ADT	%>6.6m	AWT	%>6.6m	DAY
b Jan	18772	5.4	20864	6.1	18177	5.2	20291	5.9	17591	5.2	19695	6	15370	5.4	17188	6.1	31
w Feb	19093	5.7	21091	6.5	18462	5.5	20499	6.3	17824	5.5	19852	6.3	15533	5.7	17278	6.5	28
bro Mar	19998	5.7	22020	6.5	19413	5.5	21488	6.3	18807	5.6	20878	6.3	16396	5.7	18191	6.6	29
b Apr	19156	5.8	21131	6.6	18546	5.6	20556	6.4	17899	5.7	19896	6.5	15530	5.9	17279	6.7	30
b May	19126	5.7	21003	6.5	18476	5.5	20397	6.2	17834	5.6	19741	6.3	15398	5.8	17043	6.5	31
o Jun	19841	5.9	21894	6.6	19171	5.6	21244	6.3	18537	5.7	20622	6.4	15962	5.9	17767	6.7	29
Jul	19348	5.9	21236	6.7	18690	5.7	20624	6.4	18043	5.7	19983	6.5	15525	5.9	17231	6.7	30
b Aug	18903	6	20841	6.6	18259	5.7	20239	6.4	17632	5.8	19602	6.4	15215	6	16942	6.7	24
Sep	20333	5.8	22334	6.5	19678	5.6	21727	6.3	19012	5.6	21063	6.4	16452	5.8	18236	6.6	27
f Oct	20139	5.6	22180	6.4	19474	5.4	21556	6.1	18805	5.5	20887	6.2	16313	5.6	18111	6.4	30
Nov	20126	5.5	22230	6.2	19450	5.3	21592	6	18752	5.3	20879	6	16259	5.5	18065	6.2	29
b Dec	17952	5.1	19675	5.7	17307	4.8	19070	5.5	16668	4.9	18414	5.6	14482	5	15994	5.7	31
Avg	19399	5.7	21375	6.4	18759	5.4	20774	6.2	18117	5.5	20126	6.2	15703	5.7	17444	6.5	349

b Bank Holiday w Weather a Accident f Time change r Road Works s Sporting Event o Other

Showing only complete days. No estimated data. Not including hidden data.

Yearly classified during 2009 for site 7/30013987

NB, A5111, TMU site 8275/1 on A5111 northbound between A6 near Derby (north) and A52(E438381, N334353) view site location on map

Month	24hr				18hr				16hr				12hr				ATC
	ADT	%>6.6m	AWT	%>6.6m	ADT	%>6.6m	AWT	%6.6m	ADT	%>6.6m	AWT	%>6.6m	ADT	%>6.6m	AWT	%>6.6m	DAY
b Jan	22340	3.8	24703	4.4	21759	3.6	24111	4.3	21179	3.7	23499	4.3	18620	3.9	20632	4.6	31
w Feb	22877	4	25126	4.6	22293	3.8	24542	4.5	21715	3.9	23936	4.5	19044	4.1	20931	4.8	28
t Mar	24201	3.9	26593	4.5	23605	3.8	25993	4.4	22994	3.8	25350	4.5	20104	4	22105	4.8	29
b Apr	23399	4	25724	4.7	22810	3.9	25124	4.5	22183	3.9	24472	4.6	19257	4.2	21234	4.9	30
b May	23229	3.9	25425	4.6	22625	3.8	24821	4.5	21996	3.9	24175	4.6	19068	4.2	20932	4.9	28
o Jun	24142	4	26662	4.6	23500	3.9	26017	4.5	22825	3.9	25323	4.6	19709	4.2	21848	4.9	30
Jul	23682	4	26130	4.7	23048	3.9	25493	4.5	22391	4	24821	4.6	19247	4.2	21338	4.9	30
b Aug	22713	4	24922	4.6	22100	3.9	24304	4.5	21484	4	23674	4.6	18528	4.2	20395	4.9	30
Sep	23921	4	26123	4.6	23302	3.9	25504	4.5	22668	3.9	24883	4.6	19633	4.1	21528	4.9	30
t Oct	23340	4	25710	4.6	22750	3.9	25099	4.5	22160	3.9	24487	4.6	19295	4.1	21242	4.8	30
Nov	22562	3.9	24942	4.6	21966	3.8	24339	4.4	21373	3.9	23718	4.5	18570	4.1	20506	4.8	29
b Dec	20598	3.5	22573	4.1	20030	3.4	21997	3.9	19438	3.4	21382	4	16931	3.6	18559	4.2	31
Avg	23084	3.9	25386	4.6	22482	3.8	24779	4.4	21867	3.9	24143	4.5	19001	4.1	20938	4.8	356

b Bank Holiday w Weather a Accident t Time change r Road Works s Sporting Event o Other

Showing only complete days. No estimated data. Not including hidden data.

Yearly classified during 2009 for site 7/30013986

SB, A5111, TMU site 8276/1 on A5111 southbound between A52 and A6 near Derby (north)(E438392, N334375) view site location on map

Month	24hr				18hr				16hr				12hr				ATC
	ADT	%>6.6m	AWT	%>6.6m	ADT	%>6.6m	AWT	%6.6m	ADT	%>6.6m	AWT	%>6.6m	ADT	%>6.6m	AWT	%>6.6m	DAY
b Jan	20022	3.5	22065	4.1	19365	3.4	21367	4	18798	3.5	20763	4.1	16235	3.7	17820	4.4	20
w Feb	20238	3.7	22101	4.3	19595	3.6	21435	4.2	19042	3.6	20860	4.3	16453	3.9	17889	4.6	14
t Mar																	0
b Apr	20926	3.8	22948	4.5	20293	3.8	22287	4.4	19708	3.8	21675	4.5	16863	4.1	18450	4.9	24
b May																	0
Jun																	0
Jul	22076	3.9	24405	4.5	21367	3.9	23665	4.5	20711	3.9	22972	4.5	17613	4.2	19451	4.9	24
b Aug	21470	3.8	23553	4.4	20790	3.8	22846	4.4	20180	3.8	22204	4.5	17197	4.1	18840	4.8	30
Sep	22706	3.8	24897	4.5	21988	3.8	24143	4.4	21381	3.8	23509	4.5	18309	4.1	20014	4.9	30
t Oct	22479	3.8	24815	4.4	21764	3.7	24046	4.3	21168	3.8	23422	4.4	18273	4	20097	4.7	30
Nov	22120	3.7	24549	4.3	21395	3.6	23777	4.2	20766	3.7	23106	4.2	17877	3.9	19744	4.6	28
b Dec	20003	3.3	22052	3.8	19343	3.2	21355	3.8	18720	3.3	20689	3.8	16158	3.5	17748	4.1	31
Avg	21338	3.7	23487	4.3	20656	3.6	22769	4.3	20053	3.7	22133	4.3	17220	4	18895	4.7	231

b Bank Holiday w Weather a Accident t Time change r Road Works s Sporting Event o Other

Showing only complete days. No estimated data. Not including hidden data.

APPENDIX C

Personal Injury Collision Records (01/12/2004 to 30/11/2009)

(PLEASE REFER TO DATA CONTAINED IN APPENDIX I/2 OF MAIN ES CHAPTER)

Appendix J

Aviation

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Subject: Derby Sewage Treatment Works WindFarm
From: [redacted]
Date: Tue, 20 Oct 2009 11:20:58 +0100
To: [redacted]

Our Ref: DAP/Wind/Derby Sewage Treatment Works\1412
Your Ref: 5581 - Derby

Dear [redacted]

Wind Farm Proposal – Derby Sewage Treatment Works

Thank you for notification of the title proposal. This Directorate has the following observation(s):

This development might affect the following aeronautical site(s), the licensee/operator of which should be consulted:

East Midlands Airport
[redacted]
Safeguarding Officer
Building 34
East Midlands Airport
Castle Donnington
Derby
DE74 2SA
Phone Number: [redacted]
Email: safeguarding@eastmidlandsairport.com

It is in your interests to contact the persons or organisations identified above, as recommended in the Wind Energy and Aviation Interim Guidelines. By so doing you should ensure that there are no unexpected aviation objections when you reach the stage of applying for planning permission. You are also advised that the appropriate Local Planning Authority should be able to provide information relating to safeguarding requirements of local aerodromes.

There may be issues related to en route navigational facilities. Accordingly details of your proposal have been copied to National Air Traffic Services for any comment. If you do not hear from NATS or wish to contact them, they can be contacted at:

National Air Traffic Services Ltd
Navigation Spectrum & Surveillance
Corporate and Technical Centre
4000 Parkway, Whiteley
Fareham
Hampshire, PO15 7FL
Email: nerlsafeguarding@nats.co.uk
For completeness it would also be sensible to establish the related viewpoint of local emergency services air support units. This is because of the unique nature of their operations in respect of operating altitudes and potentially unusual landing sites.

In respect of any aviation need to increase the conspicuity of the turbines, developers should be aware that there may be a need to install aviation obstruction lighting to some or all of the associated wind turbines should this development be progressed. This comment is made specifically if there were concerns expressed by other elements of the aviation industry; ie the operators. For example, if the Ministry of Defence or a local aerodrome had suggested such a need, we the Civil Aviation Authority (sponsor of policy for aviation obstruction lighting) would wish, in generic terms, to support such a claim. We would do so if it could reasonably be argued that the structure(s), by virtue of their location and nature, could be considered a significant navigational hazard. That said, if the claim was clearly outside credible limits (ie the proposed turbine(s) was/were many miles away from an any aerodrome or it/they were of a height that was unlikely to effect even military low flying) the Authority would play an 'honest-broker' role.

All parties should be aware that international aviation regulatory documentation requires that the rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines that are deemed to be an aviation obstruction should be painted white, unless otherwise indicated by an aeronautical study. It follows that the CAA advice on the colour of wind turbines would align with these international criteria.

The number of pre-planning enquiries associated with windfarm developments has been significant. It is possible that the proliferation of wind turbines in any particular area might potentially result in difficulties for aviation that a single development

would not have generated. It is, therefore, not necessarily the case that, because a generic area was not objected to by the aviation industry, future, similarly located potential developments would receive the same positive response.

Developers are advised that there is a civil aviation requirement in the UK for all structures over 300 feet high to be charted on civil aviation maps (I understand that the ministry of defence utilises a lower threshold height). Should this proposed wind turbine development progress and the 300 feet height be breached, to achieve this civil aviation charting requirement, developers will need to provide details of the development to:

Defence Geographic Centre
AIS Information Centre
Jervis Building
Elmwood Avenue
Feltham
Middlesex
TW13 7AH
Telephone: 020 8818 2708 (This number is for Defence Geographic, not the undersigned.)

An amendable version of the proforma is available electronically at http://www.bwea.com/docs/developers_proforma.doc and can be E-mailed to windfarms@caa.co.uk when submitting preplanning information.

Please be aware that due to the rationalisation of CAA Email addresses the windfarms Email address is now windfarms@caa.co.uk, the previous address windfarms@dap.caa.co.uk will no longer work.

Regards

[redacted]

[redacted]
S&SM Administration Officer
Civil Aviation Authority
Surveillance and Spectrum Management, K6G6, CAA House, 45-59 Kingsway, London, WC2B 6TE
Tel [redacted] Fax 020 7543 6556 Email [redacted]

****

Before printing consider the environment.

MINISTRY OF DEFENCE

[redacted]
Safeguarding Assistant

Safeguarding - Wind Energy
Defence Estates
Kingston Road
Sutton Coldfield
West Midlands
B75 7RL

[redacted]
Facsimile: 0121 311 2218
E-mail: [redacted]
Internet Site: www.defence-estates.MOD.uk

[redacted]
TNEI
Milburn House
Dean Street
Newcastle upon Tyne
NE1 1LE

Your Reference:
Our Reference: DE/C/SUT/43/10/1/7182

14 December 2009

Dear [redacted]

DE Reference Number: 7182

Site Name: Seven Trent - Derby Spondon

I am writing to tell you that the Ministry of Defence (MOD) has no concerns with the proposal as set out in your email dated 17 September 2009.

The application is for 2 turbines at 132 metres to blade tip. This has been assessed using the grid references below as submitted in your pro-forma.

Turbine	100km Square Letter	Easting	Northing
1	SK	39029	35101
2	SK	39297	34782

In the interests of air safety, the MOD requests that the turbines are fitted with aviation lighting. All turbines should be fitted with 25 candela omni-directional red lighting at the highest practicable point.

If the application is altered in any way we must be consulted again as even the slightest change could unacceptably affect us.

If you apply for planning permission you must ensure that the relevant planning authority consults this office to ensure that no concerns have arisen since the date of this letter.

DE
DEFENCE ESTATES
Delivering Estate Solutions to Defence Needs

If planning permission is granted you must tell us;

- the date construction starts and ends;
- the maximum height of construction equipment;
- the latitude and longitude of every turbine.

This information is vital as it will be plotted on flying charts to make sure that military aircraft avoid this area.

It should be noted that this response is based on current levels of wind farm development in the area. If additional wind farms are consented or built prior to this development being submitted for planning consent, our position may change.

Defence Estates Safeguarding wishes to be consulted and notified of the progression of planning applications and submissions relating to this proposal to verify that it will not adversely affect defence interests.

I hope this adequately explains our position on this matter. If you require further information or would like to discuss this matter further please do not hesitate to contact me.

Yours sincerely

[redacted]

[redacted]
Safeguarding Assistant – Wind Energy
Defence Estates

SAFEGUARDING SOLUTIONS TO DEFENCE NEEDS

DEFENCE ESTATES
Delivering Estate Solutions to Defence Needs

east midlands airport
Nottingham • Leicester • Derby

East Midlands Airport
Castle Donington, Derby, East Midlands DE74 2SA United Kingdom
t: + 44 (0) 871 919 9000 f: + 44 (0) 1332 850 393
www.eastmidlandsairport.com

Our reference: EMA-302-W-2009-Pre
Your ref: 5581-17 (Derby)

7th December 2009

[redacted]
TNEI Services Ltd.
Milburn House
Dean Street
Newcastle upon Tyne
NE1 1LE

Dear [redacted]

Proposal: **2 No. wind turbines (132 m AGL)**

Location: **Severn Trent Water – Derby Sewage Treatment Works**

I refer to your BWEA Wind Farm Developers Application Proforma for the above proposal and the related Osprey Aviation Impact Assessment. Thank you for consulting the Airport on this matter.

The proposed development has been examined from an aerodrome safeguarding aspect. Due to the site's location in an operationally sensitive area, we have concluded that this development could not be accommodated without materially impacting upon the continued safe operation of aircraft at East Midlands Airport. The risk that would result from your proposed development is not tolerable and we would therefore be minded to object to this proposal.

Assessing the impact on aircraft safety is complex and I would wish to make clear that in reaching this position our assessment has been based on the number, location and size of turbines that you have presented to us.

If we can provide any further information to support your further work, please do not hesitate to contact me directly on [redacted] or via email using safeguarding@eastmidlandsairport.com

Yours sincerely

[redacted]

Environment and Safeguarding Adviser

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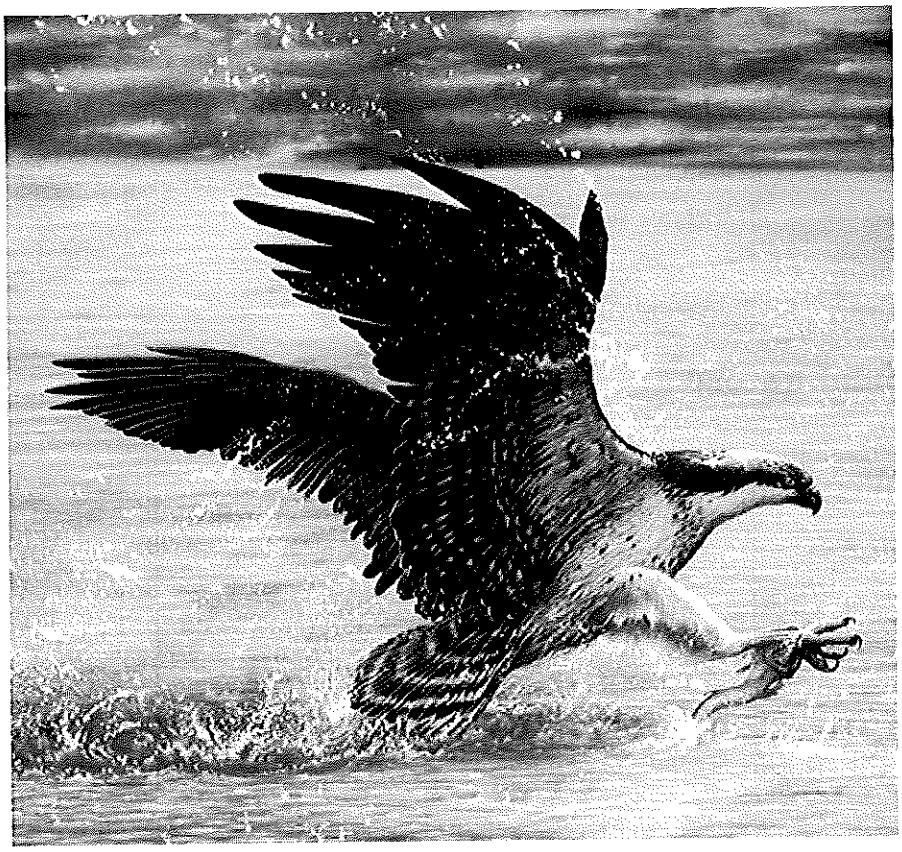
Osprey
Consulting Services Ltd



Derby Spondon Wind Farm: Aviation Impact Assessment

Ref: Wind/TNEI/7059/01 Issue 3

Date: 28th July 2010

Osprey Consulting Services Ltd, Suite 4, Mead House, Bentley Business Park, Bentley, Hampshire. GU10 5HY

Main Telephone No. 01420 520200 Fax No. 01420 520649 / enquiries@ospreycsl.co.uk

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Document Details

Document Title	Derby Spondon Wind Farm: Aviation Impact Assessment
Issue	Issue 3
Date	28th July 2010
Author	Annaliza Willis
Approved by	Lindsay Perks
Distribution	Rachel Allum

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Approvals

Approval Level	Authority	Name	Signature
Author	Osprey CSL	Annaliza Willis	
Internal Approval	Osprey CSL	Lindsay Perks	
Client 1 Approval	TNEI Services Ltd	Rachel Allum	

MANAGEMENT SUMMARY

TNEI Services Ltd is planning the development of a wind farm known as Derby Spondon at a water treatment plant near Spondon, East Derby. There are currently two turbines proposed for the site.

TNEI has tasked Osprey to conduct an Aviation Impact Assessment of the turbines with respect to operations at East Midlands Airport and any other aviation stakeholders in the area.

East Midlands Airport Conclusions

The proposed turbines at the Derby Spondon site do not infringe the EMA protected surfaces. The turbines are theoretically visible to the EMA PSR and may be shown on the radar display; however, the locations of the turbines and the anticipated small size of any associated radar clutter are not expected to significantly affect EMA operations.

A number of standard arrival and departure profiles, and a holding pattern, may cause aircraft to routinely route within 5nm of the potential turbine clutter at Derby Spondon. However, at only two turbines, the area of potential clutter will be relatively small. The site is also located in an area of controlled airspace which is a known traffic environment. This indicates that there is a much reduced risk of unknown traffic being obscured by any radar clutter in the area.

The site is not close to any standard published EMA VFR arrival and departure routes; however, there is a large road junction and a main road immediately to the north of the proposed turbine locations. Such features are easily used for navigation purposes so aircraft may fly over the area, with permission from EMA, following the "right hand rule". This aviation rule states that aircraft must fly to the right hand side of major navigational features (and potentially overhead the turbines).

NERL Conclusions

The turbines at the Derby Spondon site are theoretically visible to the NERL Clee Hill radar. There is intervening terrain which shields the turbines from the NERL Claxby and Debden radars.

NERL provide services in the Class A and Class C airspace above the proposed site. This is controlled airspace which constitutes a known traffic environment; therefore it is extremely unlikely that any associated radar clutter could shield unknown aircraft from the radar.

The airspace above the turbines is relatively busy and controller radar displays will be full of information such as primary radar and aircraft specific data. However, owing to the small size of the site and its associated clutter, it is unlikely that NATS will insist on some form of mitigation.

MOD Conclusions

The Derby Spondon site is clear of MOD aerodromes, AIAAs and is situated in the Derby/Nottingham low level avoidance area. The MOD would have no sustainable

reason to object to the development or insist on the installation of obstruction lighting.

General Aviation Conclusions

The Derby Spondon site is located beneath an area of Class D airspace extending from surface-FL55. The site is 5km west of the boundary of the Long Eaton entry and exit lane used for transiting East Midlands airspace. There are no other recommended routes for VFR traffic in the vicinity. Any aircraft wishing to transit overhead the Derby Spondon site would first have needed to gain permission to transit from EMA.

The GA community may request the installation of obstruction lighting on the turbines in the interest of aviation safety; however, this lighting may be 18-25 Candelas.

Recommendations

Osprey recommends that TNEI undertake the following:

- Submit the standard pro forma to the MOD with the expectation that there will be no objection;
- Ensure that information on the location of the turbines is promulgated throughout the UK Aeronautical Information Service (AIS) such that it can be depicted on appropriate aviation charts;
- Liaise with EMA to ascertain the likelihood of an objection based on the visibility of the turbines to the EMA PSR;
- Liaise with NATS to discuss the likelihood of an objection based on the visibility of the turbines to the Clee Hill radar;
- Anticipate that the general aviation community may request suitable aviation lighting to be installed on some of the turbines; however, recent discussions have centred upon the use of low visibility (18-25 Candela) lighting.

TABLE OF CONTENTS

1. INTRODUCTION

1.1. General

TNEI Services Ltd (TNEI) is planning the development of a two turbine wind farm, known as Derby Spondon, at a water treatment plant near Spondon, East Derby. TNEI has tasked Osprey to conduct an Aviation Impact Assessment of the turbines with respect to operations at East Midlands Airport and any other aviation stakeholders in the area.

The work presented in this document represents the aviation impact assessment and has been carried out by Osprey on behalf of TNEI.

1.2. Background

The Derby Spondon site will be assessed for its impact on operations at East Midlands Airport and any other neighbouring aviation stakeholders.

The assessment considers the impact of the turbines once they are fully installed and excludes any safety or operational issues relating to the construction, through life support or decommissioning of the turbines on the site. However, Osprey assumes that TNEI will follow the well established method for ensuring the safety of the construction, through life support and decommissioning phases of a wind development. Osprey recommends that particular attention should be given to the following:

Tall slender constructions such as wind turbines, despite their size, can be difficult to see from the air in certain weather conditions; therefore, it is recommended that to facilitate safe visual flight in the vicinity of the turbine:

- Appropriate information about the construction and any associated lighting (where applicable) should be promulgated in the UK Aeronautical Information Service (NATS AIS), for example the height and temporary location of construction cranes.

Other relevant existing legislation regarding land-based obstacles to air navigation includes the following:

- Obstacles close to licensed aerodromes: Section 47, Civil Aviation Act 1982;
- Obstacles close to government aerodromes: Town and Country Act, (Government permitted development) Order 2000;
- Lighting of land-based tall structures (outside of aerodrome safeguarded areas): Article 133, Air Navigation Order 2005 (CAP 393).

1.3. Aviation and Wind Energy Development Conflict

There are two main areas of concern relating to the interaction of wind turbines and aviation operations (civil and military aerodromes and other air navigation service providers):

- Turbines can present a physical obstruction to safe operations at a given civil or military aerodrome or within the UK Low Flying System (UKLFS);

- Turbines can impact on the radar services provided by an air navigation service provider (e.g. NATS EN-Route Ltd, MOD).

Sections 1.4 and 1.5 provide some background information relating to the above areas of concern and seek to explain the reasons behind aviation stakeholder objection.

1.4. Notes on Radar Operation

In simple terms, radar operates by alternately transmitting a stream of high power radio frequency pulses and 'listening' to receive echoes back from targets within its line of sight. Generally air surveillance radars employ a rotating antenna that provides 360° coverage in azimuth; typical scan rate is 15rpm thus illuminating a given target every four seconds.

Primary Surveillance Radar (PSR) operates in two dimensions: target range is measured based on the time for the transmitted signal to arrive back at the receiver and the direction of the beam provides the position of the target in azimuth. A PSR such as the type in use across the UK has no height finding capability and as such the Air Traffic Controller relies on Secondary Surveillance Radar (SSR).

PSR can distinguish between moving and static targets: the echoes received from a moving target change in electrical phase between pulses; the Doppler shift. In principle this only works when the target is travelling towards or away from the radar. Signal processing techniques such as 'Moving Target Indication' (MTI) processing are used to determine targets moving tangential to the radar beam.

Secondary Surveillance Radar (SSR) is a collaborative radar system that does not rely on reflections from objects for detection. Instead, aircraft to be detected are required to carry a transponder, an electronic device which produces a response indicating heading, identification and altitude when it receives radar interrogations. Therefore, although clutter will not be generated, the propagation of the signal in space can be affected.

SSR Mode S relies on a unique 24-bit aircraft address for selective interrogation of an individual aircraft. A Mode S sensor can interrogate by transmitting regularly at a steady rate in a similar way to conventional SRR, this is known as All-Call. It can also selectively interrogate, by sending out interrogations to a specific 24-bit aircraft address close to the azimuth of where the aircraft is expected to be.

1.5. Notes on Turbine Effects on Radar

Wind Turbines are a significant cause of PSR false plots as the rotating blades can trigger the Doppler threshold of the Radar Data Processor and therefore may be interpreted as aircraft movements. Significant effects have been observed on Radar sensitivity caused by the substantial Radar Cross Section (RCS) of the turbine structural components (blades, tower and nacelle) which can exceed that of a large aircraft; the effect 'blinds' the radar (or the operator) to wanted targets in the immediate vicinity. False plots and reduced radar sensitivity may reduce the effectiveness of radar to an unacceptable level and compromise the provision of a safe radar service to participating aircraft.

Wind turbines, like any other large obstacle, can cause reflections if they are sufficiently close to the SSR facility and are within 'Radar Line of Sight'. In general terms, SSR energy may be reflected off the structures, this can result in aircraft replying through the reflector and tricking the radar into outputting a false target in the direction where the radar is pointing i.e. at the obstruction. Traditional SSR (Mode A and C) is susceptible to this, but employs reflection processing and gain-time control to try to eliminate the reflections. However, these techniques are not always successful in eliminating high power reflections. Moreover, most reflection processing assumes a fixed-reflector orientation, as turbines swing to face the wind their orientation changes. If the wind turbines are within 'Radar Line of Sight' and aircraft are required to be detected at longer range behind the wind turbines, then effects similar to those described for Primary Radar can occur.

The selective and predictive tracking used by Mode Select (Mode S) radars makes them less susceptible to the effects of reflections (i.e. the reflection is not in the predicted location where the aircraft should be, so the selective interrogation will not be directed there).

1.6. Document Structure

Section 1 is the Introduction to the report and Section 2 introduces the Derby Spondon development. Section 3 focuses on the impact on operations at East Midlands Airport. Sections 4 and 5 present an assessment of the development relative to NERL Operations and other aviation stakeholders respectively. Section 6 presents the conclusions and recommendations. References are at Section 7 and Annex A shows the line of sight profiles.

2. DERBY SPONDON WIND FARM

2.1. Overview

TNEI is planning the development of a two turbine wind farm, known as Derby Spondon, at a water treatment plant near Spondon, East Derby.

2.2. Map of Location

Figure 1, overleaf, shows a map of the proposed site location in relation to EMA, illustrating the provisional layout of the turbines as advised by TNEI, July 2009. The boundary and heights of the East Midlands control zone (CTR) are also displayed.

2.3. Turbine Coordinates

Table 1 shows the OS reference and Lat/Long coordinates for each individual turbine.

Turbine No	Easting	Northing	Latitude	Longitude
1	439029	335101	52 54 43.00N	01 25 15.86W
2	439297	334782	52 54 32.60N	01 25 01.65W

Table 1. Derby Spondon Initial Layout Coordinates

2.4. Wind Farm Site Footprint

The proposed turbines occupy a site measuring approximately 0.33km (0.18nm) deep (north to south) by 0.27km (0.14nm) wide (east to west). Allowing for radar returns which may be up to three degrees wide and 120 metres in range, the worst case potential radar footprint of the site (in relation to East Midlands Airport) measures approximately by 0.47 km by 0.56 km (0.25nm by 0.30nm).

2.5. Wind Turbine Parameters

The manufacturer and model of the turbines have yet to be determined. For the analysis activities presented in this report, Osprey has used a maximum height to blade tip of 132metres in order to retain full flexibility for choice of turbine.

Ref: Wind/TNEI/7059/01 Issue 2
Date: 28th July 2010

Osprey Consulting Services Ltd

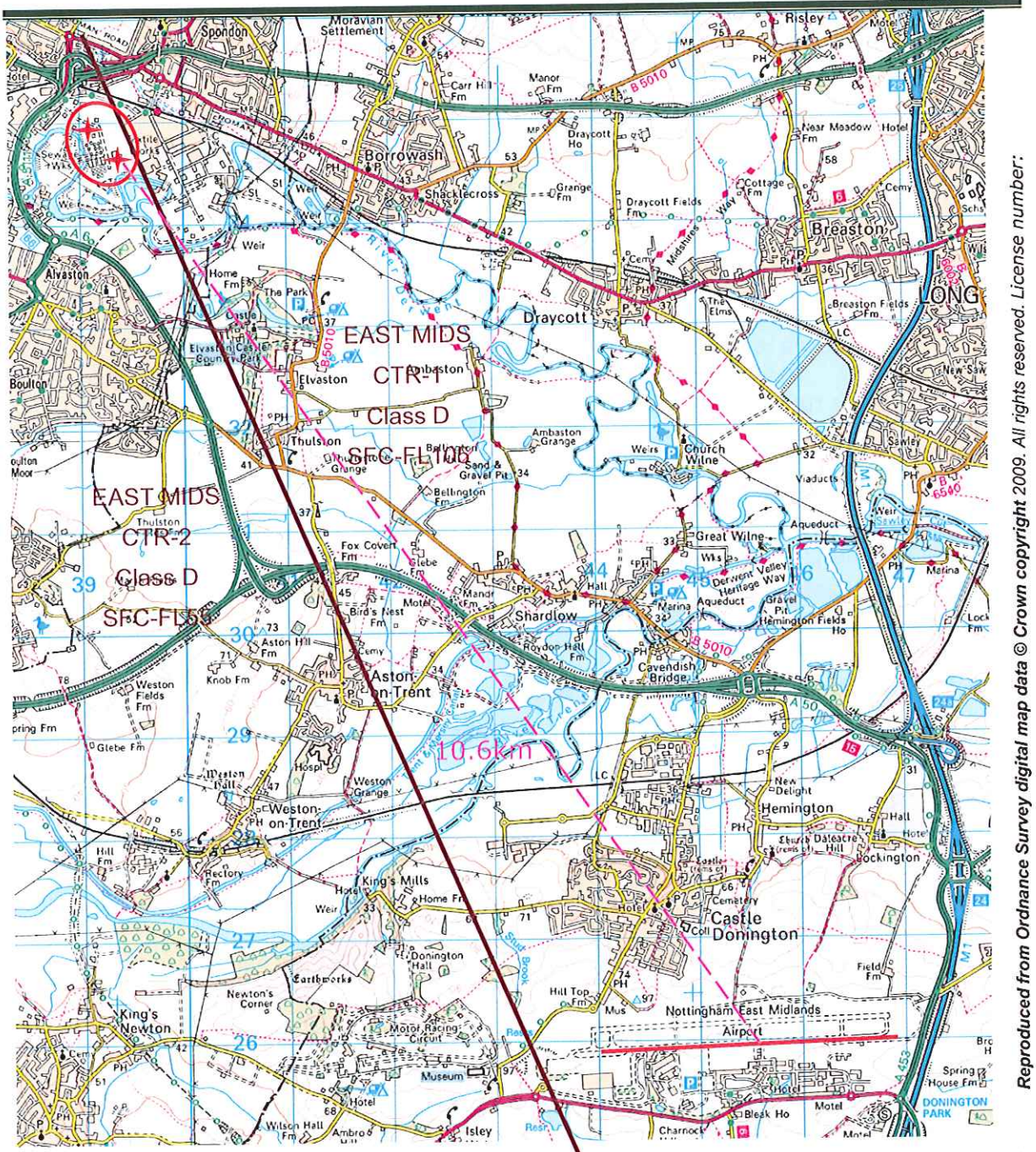


Figure 1. Map of Derby Spondon Site Relative to EMA (grid square =1km)

3. EAST MIDLANDS AIRPORT

3.1. Overview

East Midlands Airport (EMA) is owned by the Manchester Airports group (MAG), the largest British-owned airport operator. MAG also operates Manchester, Bournemouth and Humberside airports. Around 5 million passengers utilise EMA every year and it is the UK's primary pure freight airport.

3.2. Runways and Airspace

EMA has one runway which is 2893metres long and is oriented 09/27 (denotes the first two figures of the approximate bearing of the takeoff/landing direction i.e. 090°/270°). The airport is able to accept IFR (instrument flight rules) and VFR (visual flight rules) traffic and is open 24 hours a day.

The aerodrome reference point (ARP) is at 52°49'52"N 001°19'41"W, which corresponds to the mid-point of runway 09/27. The airport has an associated structure of Class D airspace. Directly overhead the runway there is Class D airspace from ground level up to FL 105. A flight level (FL) is an expression of altitude when the standard altimeter setting of 1013.2mbs is set on an aircraft's altimeter; therefore, FL105 is equivalent to 10,500ft when 1013.2mbs is set. The sector of Class D airspace over the Derby Spondon site extends from ground level to FL55 as shown in Figure 1.

3.3. Site Location Relative to EMA

The EMA ARP is approximately 10.6km from Turbine 2, the southernmost turbine of the Derby Spondon site.

3.4. Radar System

The PSR at EMA is a Marconi S511 radar system and hence Osprey has used the known nominal operating parameters for this radar type during the course of this assessment. The radar has the following parameters:

- Power 650kW;
- Frequency 2.7 – 2.9GHz;
- Position N52°49'59.18", W01°19'52.64" or OS Ref (445148, 3263883).

The NERL radar at Claxby in Lincolnshire provides an SSR feed to EMA.

3.5. Radar Line Of Sight Analysis

Osprey carried out an assessment of the line of sight between the EMA PSR and both of the Derby Spondon turbines. Figure 2 shows the line of sight terrain elevation profile between the EMA PSR and Turbine 1.

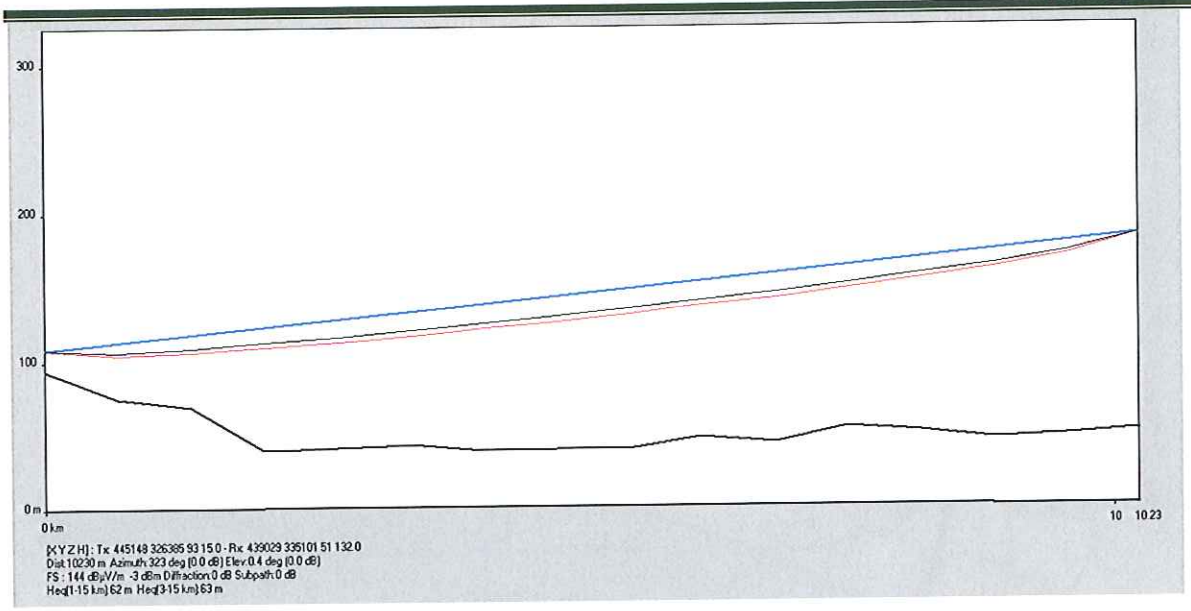


Figure 2. EMA PSR to Derby Spondon Turbine 1

The line of sight profile shows that the turbine will be theoretically visible to the radar antennae at EMA as there is no intervening terrain to shield the turbine from the radar. A full complement of line of sight profiles are at Annex A.

3.6. Protected Surfaces

The runway at EMA is 2893metres in length and 46metres wide. The lowest touchdown zone elevation is 282ft (85metres) and is located at the Runway 27 threshold at 52° 49′ 52.88″N 001° 18′ 30.94″W.

The inner horizontal surface is a horizontal plane located above an aerodrome. It represents the level above which consideration needs to be given to the control of new obstacles and the removal or marking of existing obstacles to ensure safe visual manoeuvring of aeroplanes in the vicinity of the aerodrome. At EMA the inner horizontal surface is 45metres above the lowest touchdown zone elevation (TDZE), which is 282ft amsl. It is made up of two circles of radius 4000m centred on the strip ends of the runway. These circles are joined by common tangents parallel to the runway centreline to form a racetrack pattern, as shown in Figure 3.

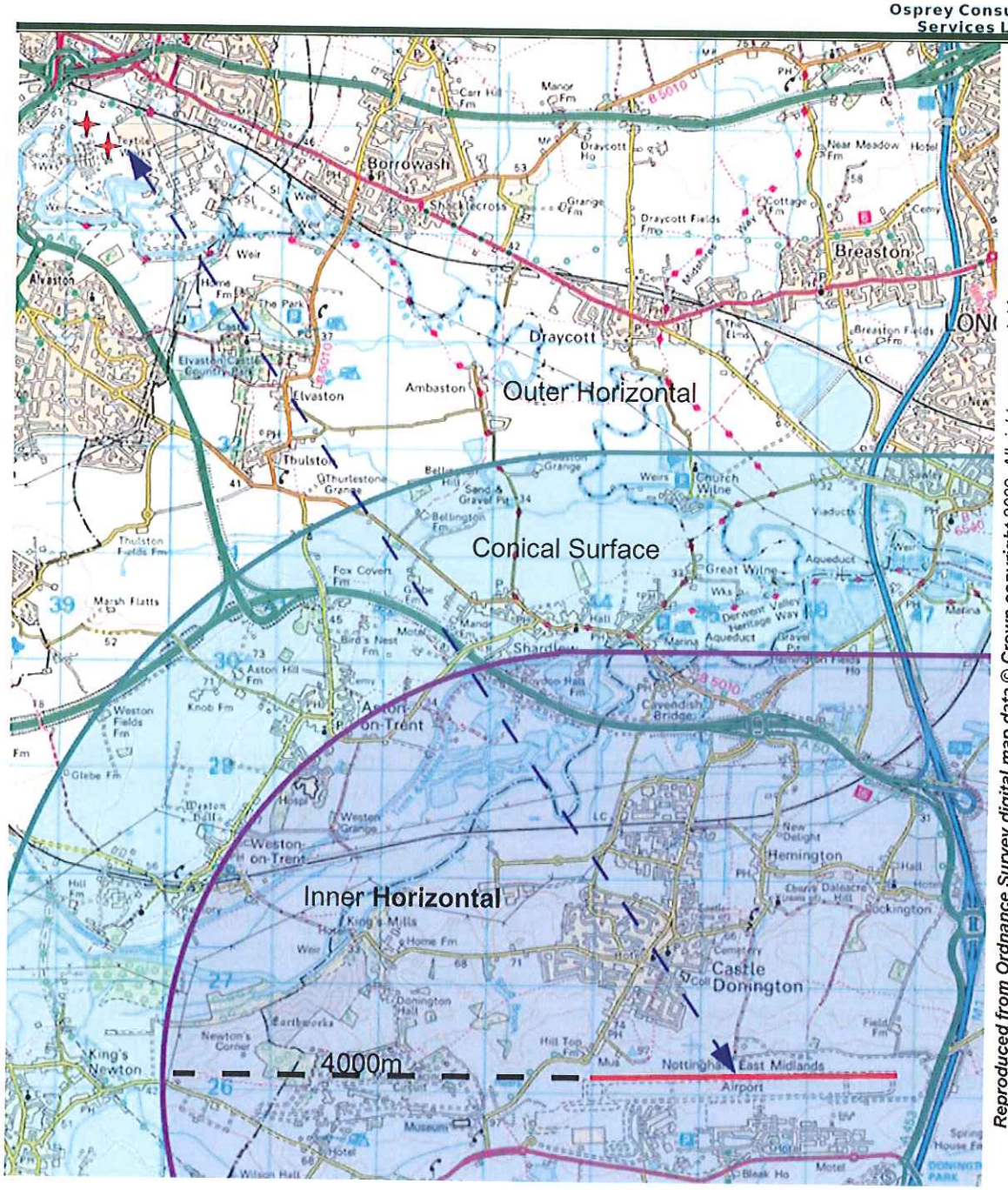


Figure 3. Map of EMA Protected Surfaces

The conical surface extends upwards from the inner horizontal surface by 105metres and increases in radius at a ratio of 1:20 (5%).

The EMA outer horizontal extends from the periphery of the conical surface and has a radius of 15km from the ARP.

As the lowest touchdown zone elevation is 85metres amsl, the upper level of the inner horizontal is 130metres amsl. The level of the outer horizontal is therefore equivalent to 235metres amsl, as shown in Figure 4.

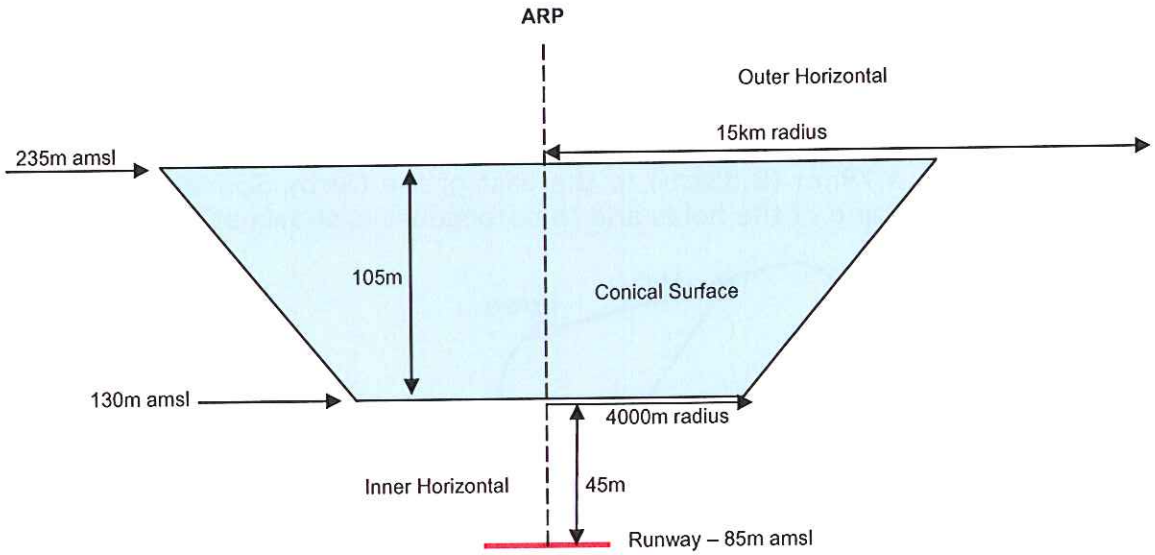


Figure 4. EMA Protected Surfaces and Dimensions

3.7. Impact on Operations at EMA

Aircraft departing EMA Runway 09 on a standard instrument departure (SID) to TRENT, or via TRENT to Wallasey or ASNIP, will route within 5nm of the Derby Spondon site. An aircraft following the precise track of the TRENT R127 heading 300° will route 1.4nm (2.6km) to the east of the site when it is between 12nm and 13nms from TRENT. The profile for the Runway 09 SID via TRENT is shown in Figure 5.

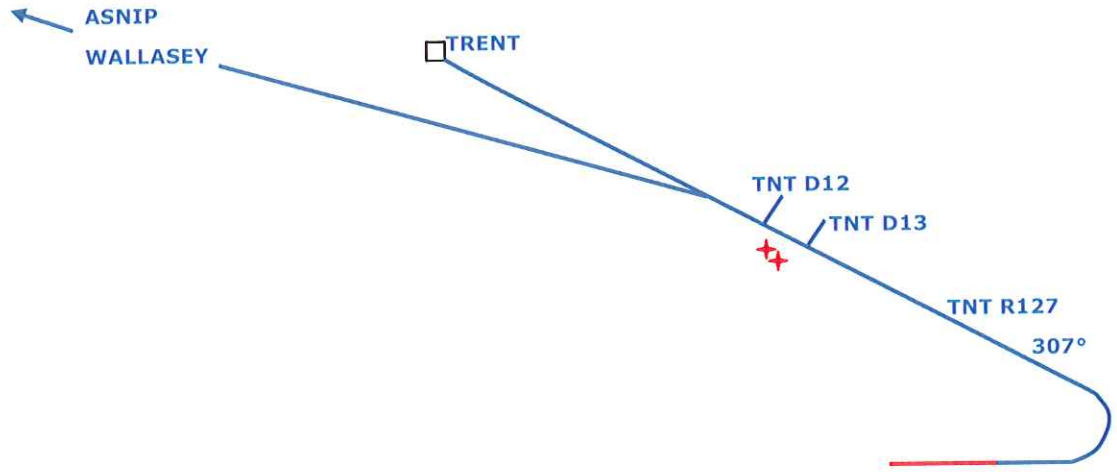


Figure 5. Routing of RWY 09 TNT, WAL and ASNIP SIDs

Aircraft following a Runway 09 SID to TRENT, Wallasey or ASNIP will be above 3000ft in the vicinity of the Derby Spondon site.

Aircraft conducting an ILS/DME approach to Runway 09/27 without radar control may initially be required to hold between ROCKUP and DIPSO at FL 80 or above. Aircraft holding between ROCKUP and DIPSO will potentially transit within 5nm of the Derby Spondon site when they turn onto the 294° leg towards ROCKUP. Aircraft following the precise 294° track will pass 4.4nm (8.17km) to the north of the Derby Spondon turbines. Aircraft leaving the ROCKUP-DIPSO hold to transit towards the EME will pass 4.78nm (8.85km) to the east of the Derby Spondon site. A diagram showing the routing of the holds and the procedure is shown at Figure 6.

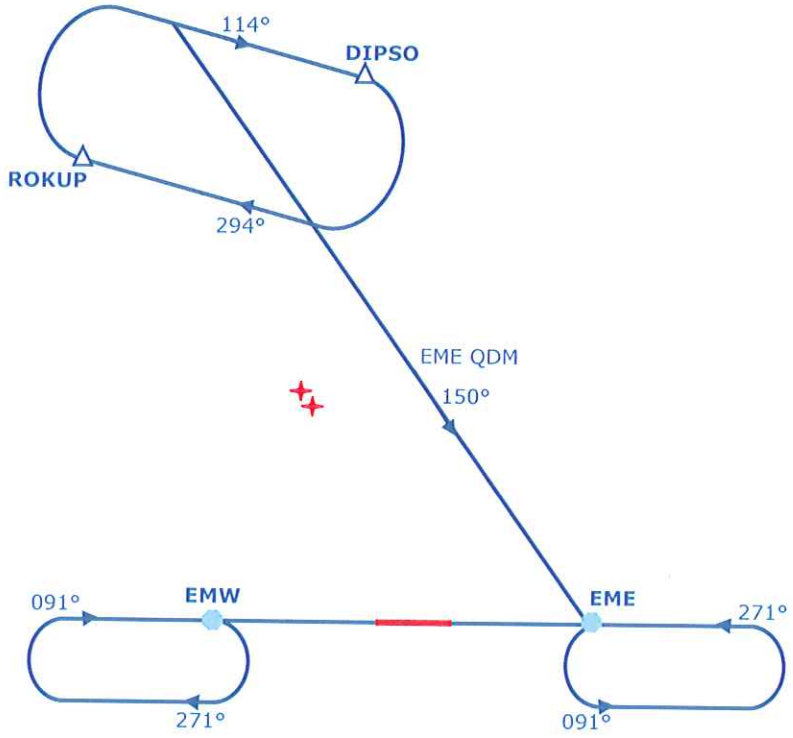


Figure 6. Initial non-Radar Approach procedures for ILS/DME RWY 09/27

Whilst the turbines at Derby Spondon may be shown on the radar display at EMA, the airspace in which the returns may be seen is a known traffic environment. The nature of this Class D airspace means that the likelihood of unknown aircraft being hidden by the clutter is much reduced as EMA should be aware of all aircraft in their control zone. The locations of the turbines, and the anticipated size of the radar clutter, are not expected to significantly affect EMA operations.

The Derby Spondon site is 45metres amsl in the vicinity of turbine 1 and 41metres amsl in the vicinity of trubine 2. At a maximum of 132metres to blade tip, the heighest turbine tip height will be 177metres amsl. As the base level of the outer horizontal is 235metres amsl, both turbines are clear of the EMA protected surfaces by at least 58metres.

Aircraft may transit the EMA airpspace under VFR. CAP 393 dictates that aircraft must maintain 500ft obstacle clearance at all times. None of the standard routings used by VFR aircraft are in close proximity to the Derby Spondon site; however a road junction to the north of the site is a good navigational feature for aircraft transiting the area.

This analysis suggest that EMA will not have a robust and sustainable reason to object to the site based on obstacle clearance in the vicinity of the aerodrome and its patterns. Additionally, EMA will have a relatively weak case in any attempt to justify of the use of obstruction lighting at the site based on the proximity of airfield protected surfaces.

4. NATS EN-ROUTE LTD RADAR IMPACT

4.1. Overview

National Air Traffic Services (NATS) provide air traffic services at some airports in the UK and NATS En-Route Ltd (NERL) provide air traffic services to traffic en-route within UK airspace. NERL operate a number of long range primary and secondary radars positioned to provide maximum coverage of UK airspace.

4.2. Radar Line of Sight Analysis

The closest NERL radar to the Derby Spondon site is the Claxby radar which is approximately 95.3km (51.46nm) from the proposed turbine locations. The Derby Spondon turbines are shielded by terrain from the NERL Claxby radar antennae, as shown in the line of sight analysis at Figure 8.

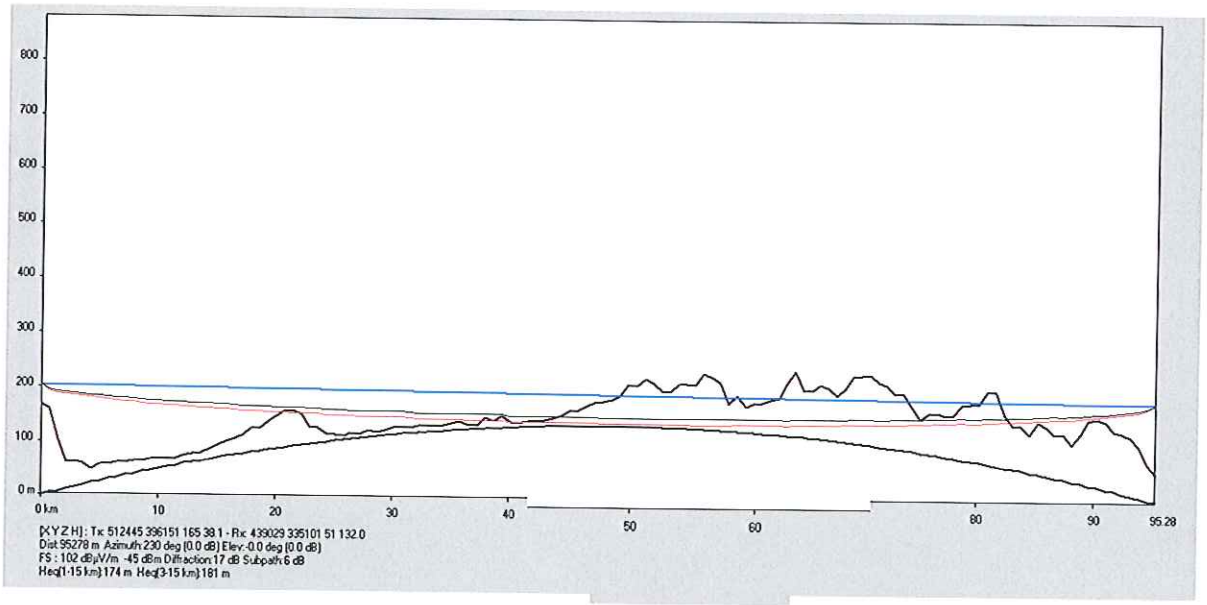


Figure 7. NERL Claxby PSR to Derby Spondon turbine 1

The Derby Spondon turbines, at the maximum height of 132metres, will theoretically be visible to the NERL Radar at Clee Hill as shown in Figure 9. The Clee Hill radar is approximately 97.8km (52.8nm) from the turbines at Derby Spondon. If the turbine tip height was limited to 115metres the intervening terrain would, theoretically, shield the turbines from the Clee Hill radar.

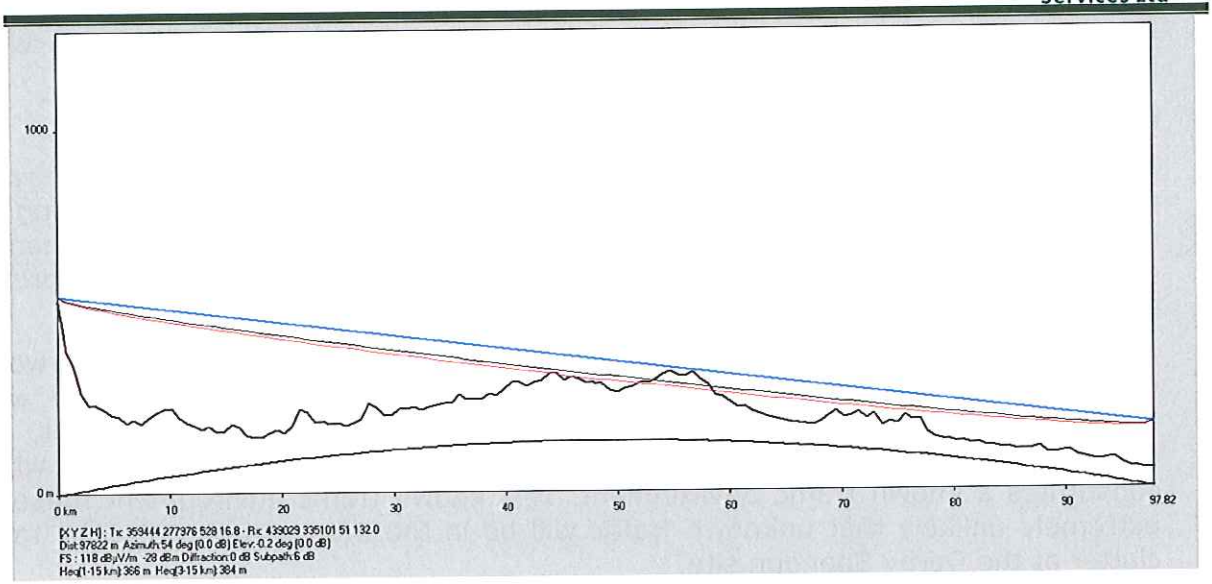


Figure 8. NERL Clee Hill PSR to Derby Spondon turbine 1

The NERL radar at Debden is approximately 153.3km (82.8nm) from the Derby Spondon site. As shown in Figure 10 below, the turbines are shielded by terrain from the radar antennae.

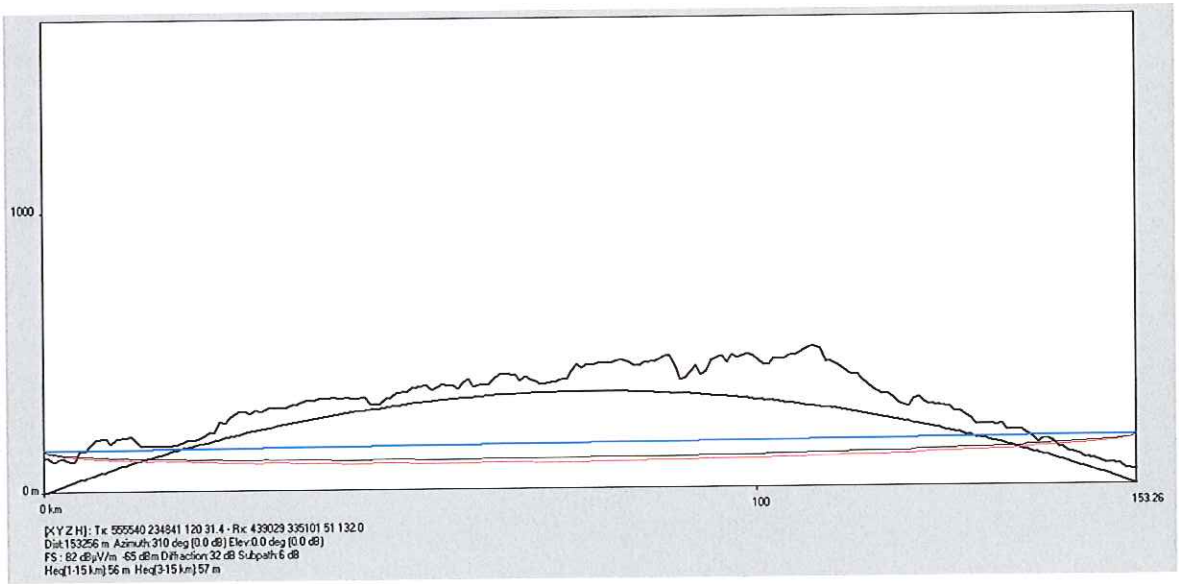


Figure 9. NERL Debden PSR to Derby Spondon turbine 1

4.3. Airspace

The airspace directly above the East Midlands CTR is Class A airspace forming part of the Daventry CTA which extends from FL55-FL195. There is then Class C airspace from FL195-FL245. Both Class A and Class C airspace are types of controlled airspace which constitutes a known traffic environment. This means that

the controller should know which aircraft are in these sectors of airspace, what height they are flying at and where they are.

4.4. Impact on NERL Operations

The airspace above the Derby Spondon site is relatively congested. Traffic may be routing into and out of airfields, joining holding patterns and transiting along air routes. Controller radar displays will contain a lot of information including, amongst other things, primary radar returns and secondary radar information comprising aircraft identification, altitude and speed data.

A controller is required to provide separation from unknown aircraft and this would normally necessitate the avoidance of areas of radar clutter produced by wind turbines as the clutter could potentially shield unknown aircraft. However, the Derby Spondon site is small and is situated beneath controlled airspace, which constitutes a known traffic environment. This known traffic environment makes it extremely unlikely that unknown traffic will be in the area and obscured by radar clutter at the Derby Spondon site.

5. OTHER AVIATION STAKEHOLDERS

5.1. MOD

The Derby Spondon site is not in the vicinity of any MOD aerodrome, area of intense air activity or low flying route; in fact, the site is contained within the Derby/Nottingham low level avoidance area.

This would strongly indicate that the MOD would have no sustainable grounds to object to the site and would have no reason to call for the installation of obstruction lighting.

5.2. General Aviation

The Derby Spondon site is located beneath an area of Class D airspace extending from surface-FL55. The site is 5km west of the boundary of the Long Eaton entry and exit lane used for transiting East Midlands airspace. There are no other recommended routes for VFR traffic in the vicinity. Any aircraft wishing to transit overhead the Derby Spondon site would first have needed to gain permission to transit from EMA.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Overview

This Section summarises the conclusions of the aviation impact assessment carried out by Osprey and makes some recommendations where applicable.

6.2. East Midlands Airport Conclusions

The proposed turbines at the Derby Spondon site do not infringe the EMA protected surfaces. The turbines are theoretically visible to the EMA PSR and may be shown on the radar display; however, the locations of the turbines and the anticipated small size of any associated radar clutter are not expected to significantly affect EMA operations.

A number of standard arrival and departure profiles, and a holding pattern, may cause aircraft to routinely route within 5nm of the potential turbine clutter at Derby Spondon. However, at only two turbines, the area of potential clutter will be relatively small. The site is also located in an area of controlled airspace which is a known traffic environment. This indicates that there is a much reduced risk of unknown traffic being obscured by any radar clutter in the area.

The site is not close to any standard published EMA VFR arrival and departure routes; however, there is a large road junction and a main road immediately to the north of the proposed turbine locations. Such features are easily used for navigation purposes so aircraft may fly over the area, with permission from EMA, following the "right hand rule". This aviation rule states that aircraft must fly to the right hand side of major navigational features (a potentially overhead the turbines).

6.3. NERL Conclusions

The turbines at the Derby Spondon site are theoretically visible to the NERL Clee Hill radar. There is intervening terrain which shields the turbines from the NERL Claxby radar.

NERL provide services in the Class A and Class C airspace above the proposed site. This is controlled airspace which constitutes a known traffic environment; therefore it is extremely unlikely that any associated radar clutter could shield unknown aircraft from the radar.

The airspace above the turbines is relatively busy and controller radar displays will be full of information such as primary radar and aircraft specific data. However owing to the small size of the site and any associated clutter, it is unlikely that NATS will insist on some form of mitigation.

6.4. MOD Conclusions

The Derby Spondon site is clear of MOD aerodromes, AIAAs and is situated in the Derby/Nottingham low level avoidance area. The MOD would have no sustainable reason to object to the development or insist on the installation of obstruction lighting.

6.5. General Aviation Conclusions

The Derby Spondon site is located beneath an area of Class D airspace extending from surface-FL55. The site is 5km west of the boundary of the Long Eaton entry and exit lane used for transiting East Midlands airspace. There are no other recommended routes for VFR traffic in the vicinity. Any aircraft wishing to transit overhead the Derby Spondon site would first have needed to gain permission to transit from EMA.

The GA community may request the installation of obstruction lighting on the turbines in the interest of aviation safety; however, this lighting may be low candela (18-25 Candelas).

6.6. Recommendations

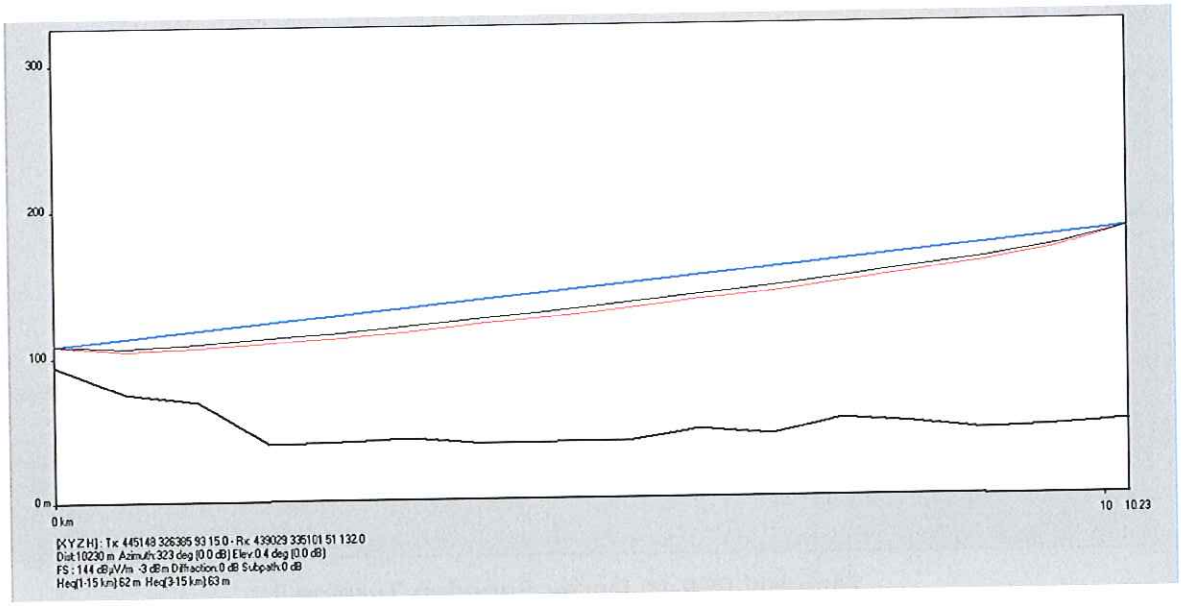
Osprey recommends that TNEI undertake the following:

- Submit the standard pro forma to the MOD with the expectation that there will be no objection;
- Ensure that information on the location of the turbines is promulgated throughout the UK Aeronautical Information Service (AIS) such that it can be depicted on appropriate aviation charts;
- Liaise with EMA to ascertain the likelihood of an objection based on the visibility of the turbines to the EMA PSR;
- Liaise with NATS to discuss the likelihood of an objection based on the visibility of the turbines to the Clee Hill radar;
- Anticipate that the general aviation community may request suitable aviation lighting to be installed on some of the turbines; however, recent discussions have centred upon the use of low visibility (18-25 Candela) lighting.

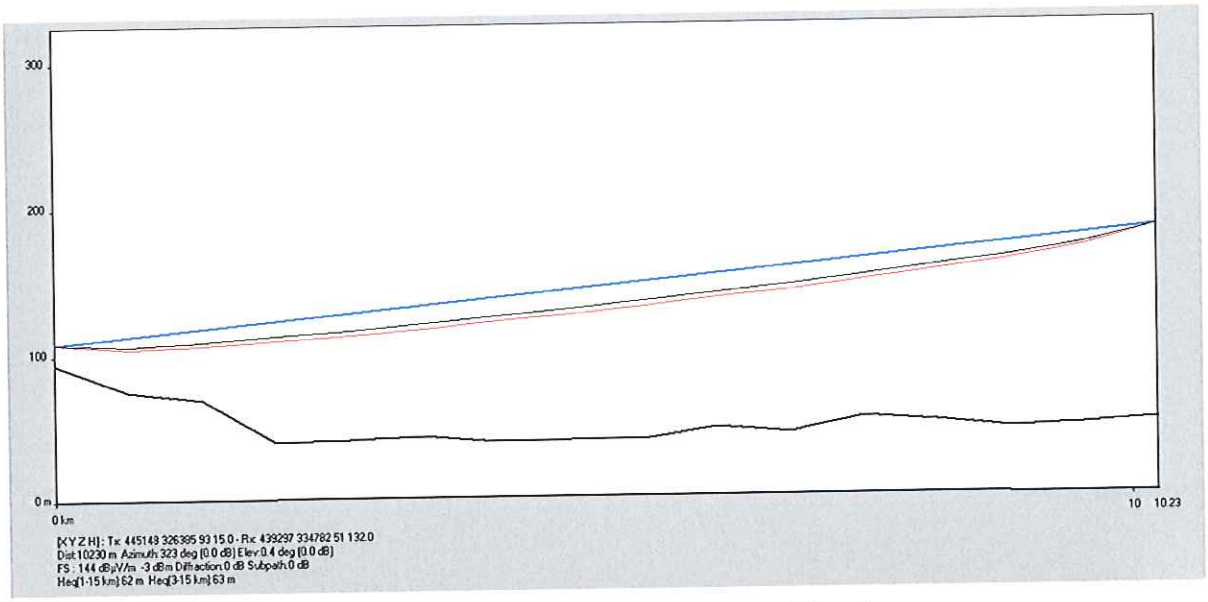
7. REFERENCES

Ref	Title	Origin
1	CAP 168 Licensing of Aerodromes, 8th Edition December 2008	CAA
2	CAP 670 Air Traffic Services Safety Requirements 22 May 2009	CAA
3	CAP 764 CAA Policy and Guidelines on Wind Turbines February 2009	CAA
4	CAP 393 Air Navigation: The Order and the Regulations September 2008	CAA

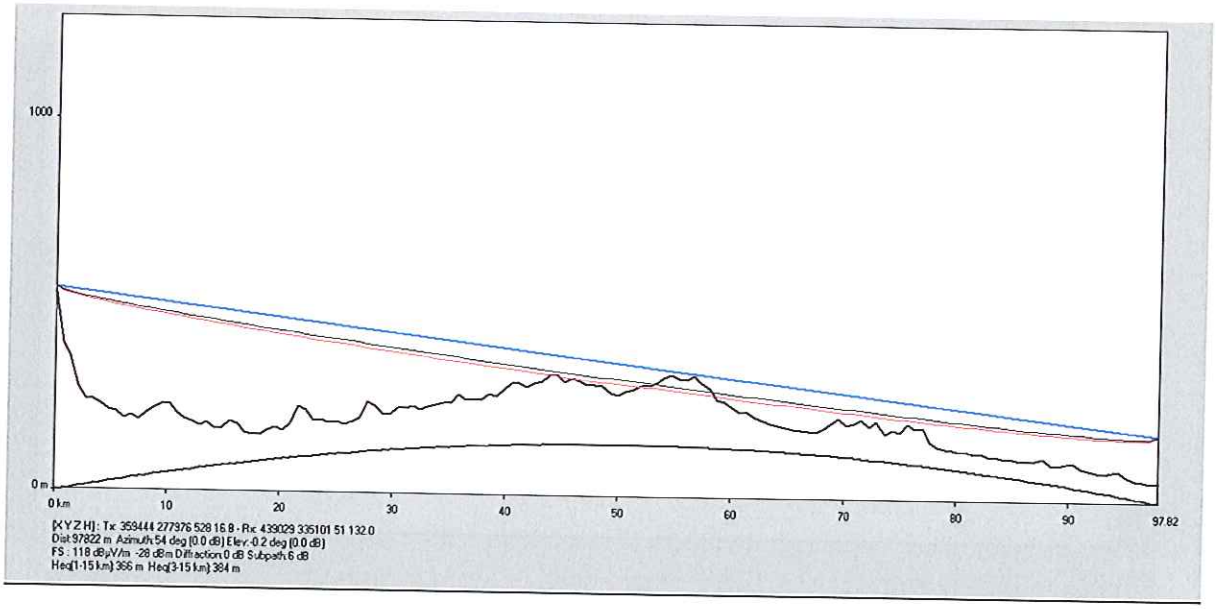
ANNEX A



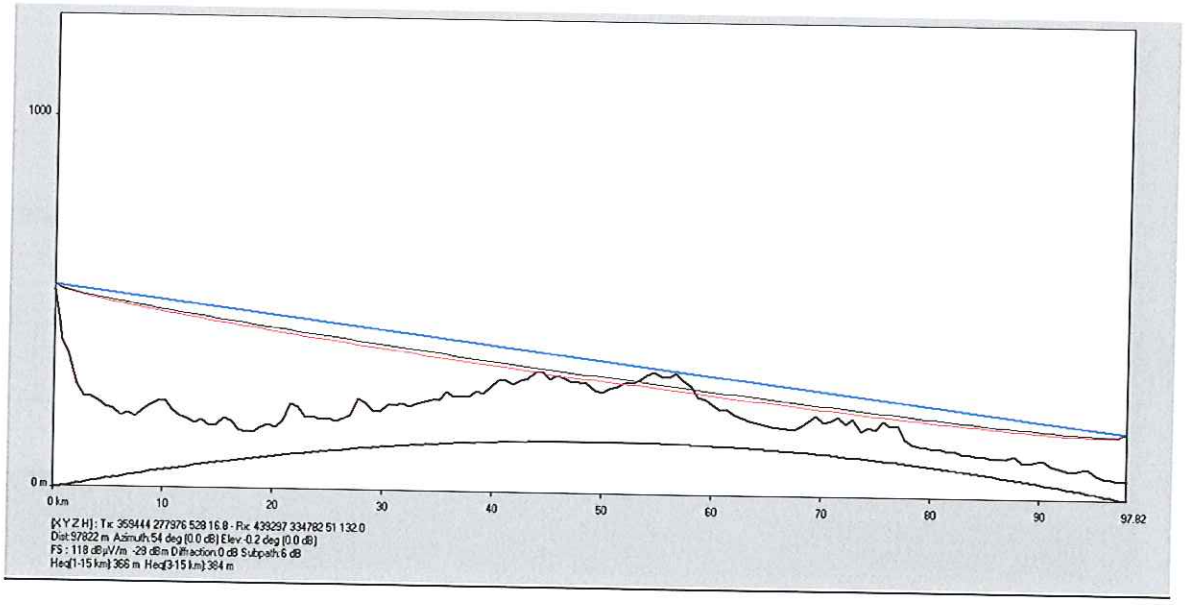
EMA PSR to Derby Spondon Turbine 1



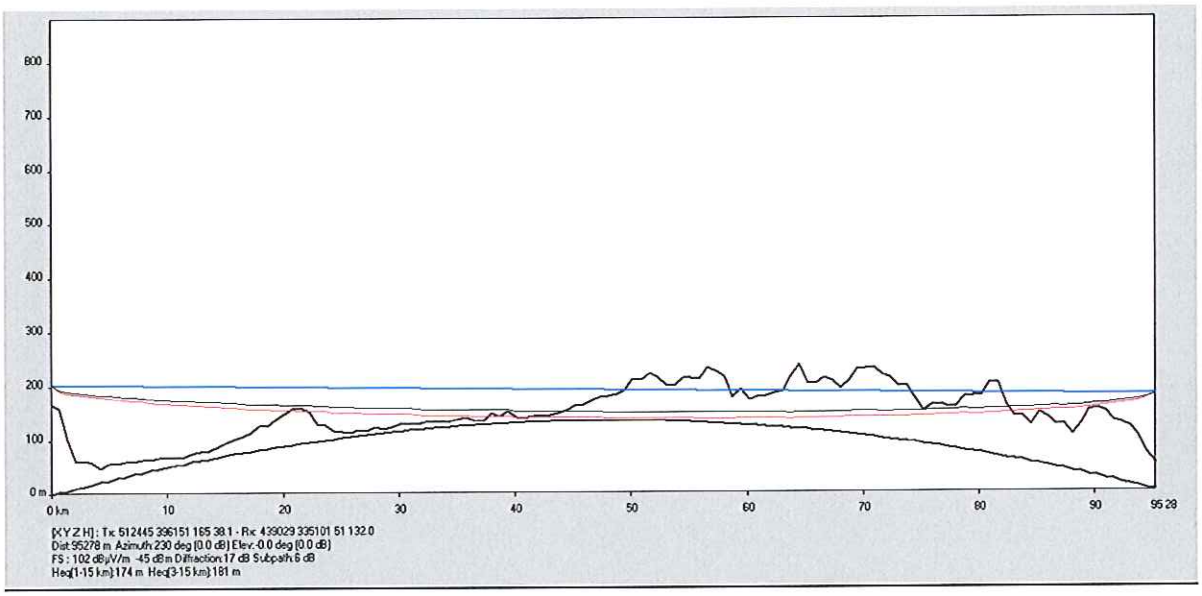
EMA PSR to Derby Spondon Turbine 2



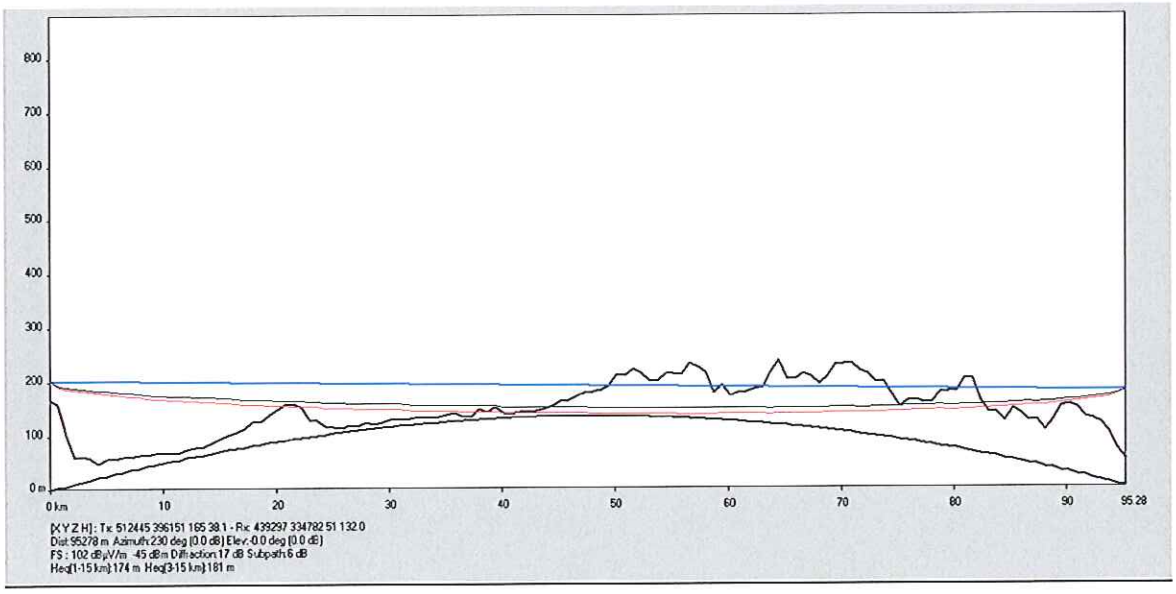
Clee Hill PSR to Derby Spondon Turbine 1



Clee Hill PSR to Derby Spondon Turbine 2



Claxby PSR to Derby Spondon Turbine 1



Claxby PSR to Derby Spondon Turbine 2

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SPAVEN CONSULTING

SPONDON WIND TURBINES, DERBY

ASSESSMENT OF IMPACT ON EAST MIDLANDS AIRPORT AIR TRAFFIC RADAR SERVICES

August 2010

Report No.10/294/TNEI/2

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DISCLAIMER

Acceptance of this document by the client is on the basis that Spaven Consulting is not responsible for the application or use made of the findings from the analysis. Such responsibility remains with the client.

1. Introduction

1.1 This report provides an assessment of the potential impact of a proposal for two wind turbines at the Derby Spondon Water Treatment Works on air traffic radar services provided by East Midlands Airport. This work has been undertaken at the request of TNEI Services Ltd on behalf of Severn Trent Water.

2. Consultation and assessment history

2.1 This report has been compiled as part of a process of consultation with East Midlands Airport (EMA). EMA was originally consulted on the proposed development on 9 March 2009. The Civil Aviation Authority (CAA) also advised that EMA should be consulted in their consultation response dated 20 October 2009.

2.2 Osprey Consulting Services Ltd was commissioned to undertake an assessment of the impact of the development on aviation and their report was completed in October 2009. It concluded that "the locations of the turbines and the anticipated small size of any associated radar clutter are not expected to significantly affect EMA operations "

2.3 A consultation response was received from EMA on 7 December 2009. This stated that EMA was minded to object to the proposal on the grounds that the development could not be accommodated without materially impacting upon the continued safe operation of aircraft at EMA.

2.4 In the light of the objection from EMA and its contrast with the conclusions of the Osprey report, TNEI Services asked Spaven Consulting to conduct a summary assessment of the impact of the project on EMA. This was conducted without sight of the Osprey report and was carried out in order to validate Osprey's conclusions and the points raised in the consultation response from EMA. The Spaven Consulting assessment confirmed the key Osprey finding that the Spondon development would not have a significant impact on the provision of air traffic radar services by EMA.

2.5 Meetings were held between the developers and EMA on 5 March and 11 May 2010 to discuss the Spondon project. These addressed the background to EMA's objection to the development and explored the mitigations that would be required to meet EMA's concerns.

2.6 Following the meeting on 11 May, a letter dated 28 May was received from EMA confirming their objection and referring to the history of unknown aircraft infringing the East Midlands controlled airspace. Further details of these infringements have been requested from EMA. This request was still under consideration by EMA at the time of writing of this report.

2.7 A further letter was written to EMA on behalf of the developers on 2 July, setting out preliminary conclusions from further assessment of the

potential aviation impacts of the Spondon proposal. In a response dated 21 July, EMA stated that they maintain that the development would be likely to result in a reduction in the safety of aircraft operations.

2.8 This report has been written in order to consider in detail the concerns raised by EMA in advance of the submission of a planning application and to explore potential mitigations.

3. Methodology

3.1 The assessment conducted for this report has been designed to follow the guidance set out in Civil Aviation Authority (CAA) guidance CAP 764, both in the consideration of the types of potential impact generated by the turbines, and the issues to be addressed in any assessment of the operational impact of the proposed turbines on the provision of air traffic services.

3.2 CAP 764 identifies the following potential impacts of wind turbines on air traffic control primary surveillance radar:[1]

- receiver saturation
- Constant False Alarm Rate (CFAR)
- defeating moving target processing (obscuration)
- false radar returns (clutter)
- plot extractor/filter memory overload
- presenting an obstruction (shadow).

3.3 Impacts on secondary surveillance radar (SSR) are not considered since EMA's SSR data is provided from the NATS Clee Hill radar, 98km south west of the Spondon site. According to CAA policy and NATS safeguarding criteria, the turbines will have no impact on SSR at that range.

3.4 The report includes the following issues recommended by CAP 764 as forming part of any assessment of the operational impact of wind turbines on the provision of air traffic radar services:[2]

- use of recorded traffic patterns in the vicinity of EMA
- consideration of Departure Routes including Standard Instrument Departures, Standard Terminal Arrival Routes, Airways, Area Navigation (RNAV) and Precision Area Navigation (P-RNAV) Routes, Sector Entry and Exit points, Holding points (including the holding areas), Missed Approach Routes, Radar Vectoring Areas, Final Approach Tracks, Visual Reporting Points, Published Instrument Flight Procedures for the aerodrome and Future Airspace and Operational requirements.
- the type of radar service being applied and the airspace classification
- cumulative effects
- traffic density in the area in question

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1 Civil Aviation Authority, *CAA Policy and Guidelines on Wind Turbines*, CAP 764, May 2010, Chapter 2.

2 CAP 764, Chapter 2, paragraphs 6.3 and 6.4 and Section 8; Chapter 4, paragraph 1.7.

- proximity of the wind turbine radar clutter to areas of regular aviation activity including General Aviation activity; the characteristics of the aircraft typically operating in the airspace concerned; the radar system performance e.g. the update rate; the Air Traffic Service Unit complexity and workload.

3.5 Taking the above parameters into account, this report is structured as follows:

- consideration of the radar line of sight from the EMA primary surveillance radar to the Spondon turbines
- assessment of the likely technical effects of the turbines on the radar
- operational assessment of the impact of the turbines on EMA air traffic radar services, including the issues referred to in paragraph 3.4 above and a review of regulatory requirements in relation to clutter inside and outside controlled airspace
- assessment of available data on infringements of EMA controlled airspace
- examples of existing and proposed wind turbines in the vicinity of EMA and at other UK airports with controlled airspace
- potential mitigation measures.

4. Technical impact on radar

4.1 The Osprey Consulting Services report considered the radar line of sight from the Marconi (Selex) S511 primary surveillance radar at EMA to the Spondon turbines. It concluded that the turbines would be visible to the radar since there is no intervening terrain. This analysis has been verified by use of the ATDI online tool to assess radar line of sight.

Receiver saturation

4.2 The first potential effect of wind turbines on primary surveillance radar referenced in CAP 764 is receiver saturation. CAP 764 notes that the likelihood of this being generated by wind turbines is low, and depends on target size and range. There are numerous examples of wind turbine developments at ranges similar to that of the Spondon turbines from the EMA radar. There are no known cases where receiver saturation has occurred. On that basis, it is concluded that receiver saturation is not likely to occur and is not considered further in this report.

Constant False Alarm Rate

4.3 Constant False Alarm Rate (CFAR), also known as clutter mapping or Temporal Threshold Processing, is a feature on the Marconi S511. As described in CAP 764, this adjusts the detection threshold of the radar in range-azimuth defined clutter cells according to the amount of energy generated from clutter in those cells. Wind turbines – and other clutter sources such as terrain, buildings and road traffic - can cause the detection

thresholds to rise, resulting in the radar having a lower probability of detection against smaller targets in those cells. This is normally referred to as the 'obscuration' effect.

4.4 The standard dimensions of clutter cells in the Marconi S511 are 228 metres in range by 2.8125° in azimuth (normally commencing at 0° True). Some variants of the radar have a greater pulse length, resulting in clutter cells which are 456 metres in range.

4.5 Applying those dimensions to the position of the two Spondon turbines relative to the EMA radar, the orientation and dimensions of the clutter cells containing the two Spondon turbines are estimated to be as illustrated in Figures 1 and 2. These diagrams show that:

- In neither case are the two turbines in the same clutter cell. This will reduce the maximum amplitude of the clutter return which the turbines might generate in each cell and will therefore limit both the frequency and the extent to which probability of detection of small targets is reduced in that cell.
- If the clutter cells are 228m in range, there will be an empty clutter cell between T1 and T2. This will improve the probability of detection of small targets overhead the turbines since they may be detected in the unaffected cell.
- If the clutter cells are 456m in range, there will be no empty clutter cell between the two turbines. There will therefore be two adjacent cells in range which are potentially affected by the turbines raising the clutter thresholds. However the turbines are located within each cell such that the effects will not extend to other adjacent cells in range.
- The turbines are located within the clutter cells such that the effects of raising the clutter thresholds may extend into the adjacent clutter cells in azimuth, particularly to the north. This will depend on the magnitude of the radar return from the turbine, which in turn is dependent on wind direction and speed and on the orientation of turbine blades when illuminated by the radar. In the event of this occurring, the effects on clutter thresholds in the adjacent cells will be less than the effects in the cell containing a turbine.

4.6 From the above it can be deduced that the maximum dimensions of the area which might be affected by raised clutter thresholds due to the Spondon turbines are 912m in range (including 201 m in front of T2 and 299m behind T1) and 1569m in azimuth (assuming the worst case of the adjacent azimuth cells also being affected).

4.7 The actual incidence of reduced probability of detection will depend on the radar cross-section of the wind turbines (which will vary with wind direction and speed and the orientation of the turbine blades when illuminated by the radar), the radar cross-section of the aircraft, and its height and speed. At an elevation angle of 0.4° or less from the radar, the wind turbines will be in the lower part of the radar beam where the radiated power is less than in the peak of the beam, which typically occurs at around 3-4° elevation (equivalent to altitudes of between 2100 and 2700 feet above the wind farm). Large aircraft

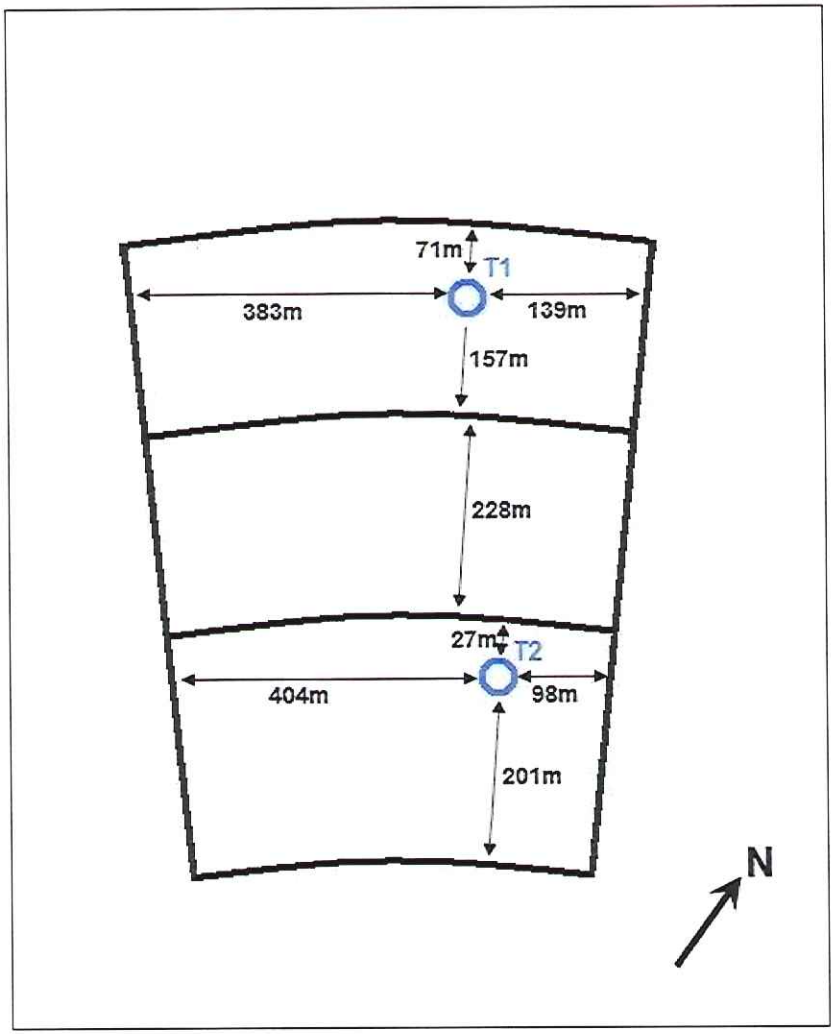

Figure 1: Estimated EMA radar clutter cell dimensions in the vicinity of the Spondon turbines (cells 228m in range)

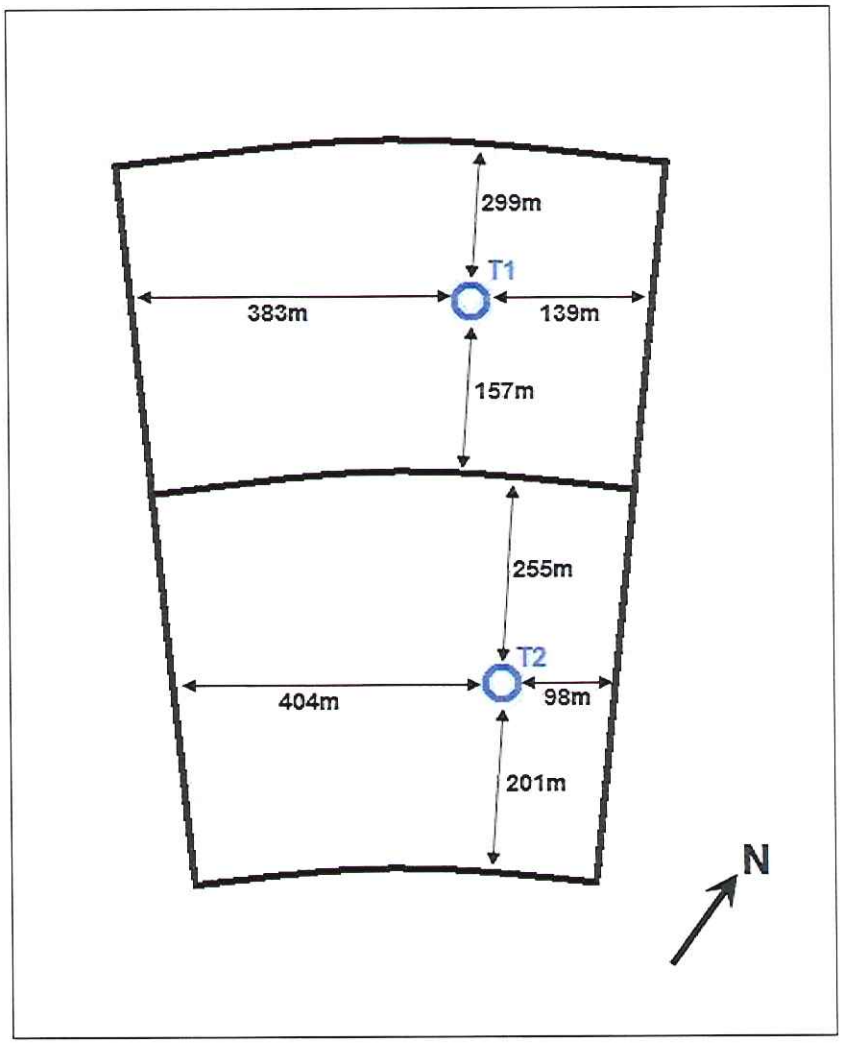

Figure 2: Estimated EMA radar clutter cell dimensions in the vicinity of the Spondon turbines (cells 456m in range)

flying at these higher altitudes are less likely to be affected by reduced probability of detection than small aircraft flying low over the area of the turbines.

4.8 From the above it can be concluded that airliner-sized aircraft, which will typically be flying at altitudes of 3000ft or more over the wind turbine site, and which will also be displaying a Secondary Surveillance Radar (SSR) transponder return, or 'squawk', are unlikely to be affected by any reduced probability of detection. For non-transponding light aircraft flying at low level the effects may be more significant. However they would not extend beyond the dimensions set out in paragraph 4.6 above. The maximum extent of the potentially affected area behind Turbine 1 is 299 metres. The boundary of the East Midlands Control Zone is 850 metres behind Turbine 1. Consequently any unknown aircraft entering the area potentially affected by raised clutter thresholds would already have had to enter controlled airspace without permission, and would have been in an area not affected by raised clutter thresholds from the turbines prior to that.

4.9 It should also be noted that CFAR processing, or clutter mapping, will not only happen over the wind turbines. It is happening constantly in every clutter cell of the radar. Areas which are subject to regularly high levels of clutter, such as busy roads, will already be driving up the clutter thresholds to levels where they reduce the probability of detection of aircraft overhead. In these cases the clutter thresholds are likely to remain fairly constant because the overall levels of clutter in each cell do not vary significantly. With wind turbines, the clutter threshold may vary due to changes in wind speed and direction and blade orientation. However there are no known cases of non-wind turbine developments, such as new roads, being subject to scrutiny of their potential effects on clutter thresholds. Nor are there any known cases of air traffic incidents caused by reduced probability of detection due to raised clutter thresholds, whether of wind turbine or non-wind turbine origin. It is not possible for controllers to know what clutter thresholds are being applied by the radar in which cells at which time. However CFAR processing is accepted as a legitimate technique for reducing the effects of clutter, albeit with the penalty of reducing probability of detection of some targets.

False radar returns (clutter)

4.10 CAP 764 refers to "false radar returns (clutter)" and "defeating moving target processing" as two separate phenomena, and uses the term "obscuration" in relation to the latter. However they are essentially the same thing. When a moving wind turbine blade is detected by the radar, the moving target processing concludes from the Doppler shift in the return that it is a moving target, so displays it on the radar screen. For the purposes of this report the term obscuration is used to refer to the phenomenon of raised clutter thresholds discussed in paragraphs 4.3 to 4.9 above, not to the generation of unwanted radar returns (clutter) on the radar display.

4.11 Since the EMA primary radar will have an unobstructed line of sight to the Spondon turbines it can be concluded that they will be displayed as clutter

on the radar display. At a range of 10km and with unobstructed line of sight it is likely that they will appear consistently on the radar display, other than in periods of low wind speed when the blades are not turning. It is unlikely that the turbine clutter will appear intermittently, other than in low or nil wind conditions.

4.12 The operational consequences of the turbines appearing on radar as clutter are addressed in section 5 below.

Plot extractor/filter memory overload

4.13 The EMA radar does not have a plot extractor. Since the development consists of only two turbines, filter memory overload is not a material issue in this case.

Presenting an obstruction (shadow)

4.14 As with any terrain or tall construction, wind turbines create a physical obstacle to the radar beam, which means that objects directly behind will not be detected. However CAP 764 states that "for wind turbines, it is generally accepted that the shadow area behind the turbines within which aircraft are unlikely to be detected is often only a few hundred metres because this is the generally the distance it takes for a radar beam to diffract around an obstacle and continue beyond it."[3] It should also be noted that any such shadow area is caused only by the turbine tower and nacelle and is therefore very narrow in azimuth and extends only up to hub height (in this case, a maximum of 80 metres above ground level).

4.15 The chances of an aircraft flying over the built up area of Derby, behind the Spondon turbines, at a height of less than 250 feet above ground level, and remaining in the narrow area immediately behind the turbines in which the probability of detection might be reduced for long enough to be significant, are effectively zero. It is concluded that the 'shadow' effect is not a material issue in this case.

5. Operational assessment

5.1 The Spondon turbines are located within the East Midlands Control Zone (CTR). This is Class D controlled airspace. All aircraft must obtain a clearance from East Midlands air traffic control (ATC) to enter or fly within this airspace. Turbine 1 is located in CTR-2, which extends from ground level to Flight Level 55 (approximately 5,500 feet). Above FL55 the airspace is Class A controlled airspace under the control of Scottish Area Control (Prestwick). Turbine 2 is located in CTR-1, which extends from ground level to Flight Level 105 (approximately 10,500 feet). Above FL105 the airspace is the Class A controlled airspace of airway N601, also under the control of Scottish Area Control (Prestwick).

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[3] CAP 764, Chapter 2, paragraph 2.3(f).

5.2 The actions required by controllers when clutter is present on the radar display are addressed in the Manual of Air Traffic Services (MATS) Part 1. The classification of the airspace in which the radar return is located has a major bearing on the actions a controller is expected to take when observing an unidentified radar return. For radar returns inside controlled airspace, as the Spondon turbines will be, MATS Part 1 states:

> If radar derived, or other information, indicates that an aircraft is making an unauthorised penetration of the airspace, is lost, or has experienced radio failure – avoiding action shall be given and traffic information shall be passed.[4]

In other words, the controller is only to assume that the unknown radar return is an aircraft if he has information indicating that this is an aircraft infringing controlled airspace.

5.3 Further guidance in MATS Part 1 on controller actions in relation to radar clutter is as follows:[5]

> **18.3 Inside Controlled Airspace**
> 18.3.1 In the event of clutter being present on the situational display the radar service shall not be limited, nor the air traffic service terminated. Controllers should consider the extent of the clutter and if necessary take the following actions:
> a) The controller may vector the aircraft around the clutter; however, this might not be practicable due to traffic density, airspace availability and/or the requirement to follow specific arrival or departure tracks.
> b) If the intensity of the clutter is such that the controller is not able to clearly see the aircraft's PSR or SSR position symbol, radar separation shall not be used to separate it and other controlled aircraft.

5.4 The latter section of MATS Part 1, which was added to the document in 2010, shows that, first, the question of whether controllers need to take any action in relation to clutter inside controlled airspace is a matter for professional judgement at the time, based on "the extent of the clutter"; second, re-routing around the clutter may be used but is contingent on the practicalities; and third, in the worst case, the consequence is limited to not being able to apply radar separation between the affected aircraft and any others from which horizontal separation is required i.e. other IFR traffic which is not vertically separated. Comparing the MATS Part 1 provisions quoted above with those applying *outside* controlled airspace, it is clear that wind turbines located inside controlled airspace, as the Spondon turbines would be, are likely to have less impact on air traffic radar services than those located outside controlled airspace.

5.5 In the case of the Spondon turbines, the extent of the clutter will be small, since the development consists of only two turbines. As with any

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4 MATS Part 1, Section 1, Chapter 5, para 15.2.
5 MATS Part 1, Section 1, Chapter 5, pp.15-16.

clutter return on air traffic control primary surveillance radar, the largest dimension is in azimuth. In the Spondon case, the azimuth extent of any clutter is minimised by the fact that the two turbines are almost in line with the direct path from the radar. This means that the azimuth extent of the clutter from the two turbines will be little more than the azimuth extent of the clutter from one turbine in this location. The range extent of the clutter will be small, consisting of two distinct radar returns, each approximately 60 to 120 metres deep, with a clear gap between them since the distance in range between the two turbines is in excess of the radar's range resolution.

5.6 In discussions with EMA, the principal concern expressed was that any wind turbine clutter inside the EMA CTR would have to be treated as if it was an unknown aircraft infringing controlled airspace, and aircraft receiving a radar service would have to be given avoiding action from the clutter. The excerpts from MATS Part 1 above indicate that controller actions are in fact contingent on judgements at the time on the way the clutter presents on radar. In making such judgements, controllers will use their knowledge and experience of the local airspace and air traffic patterns, and the typical patterns of clutter appearing on their radar, to assess the likelihood that clutter generated by the Spondon turbines represents an unknown aircraft infringing the CTR. Discussion of the historical evidence on infringements of the East Midlands controlled airspace is in Section 6 below.

Proximity to routes and flight paths

5.7 The operational impact of clutter from the Spondon turbines on the provision of air traffic radar services by EMA is dependent in part on the likelihood that aircraft receiving a radar service from EMA might fly over or close to the Spondon site.

5.8 The locations of EMA's Standard Instrument Departures (SIDs), Noise Preferential Routes (NPRs), Standard Terminal Arrival Routes (STARs) and Precision Area Navigation (P-RNAV) Routes have been identified from the UK Aeronautical Information Publication (AIP).

5.9 EMA has a series of Noise Preferential Routes (NPRs) which apply to departures by all jet aircraft and all aircraft over 17,000kg weight. These are co-terminous with the SID profile for departures from the two runway directions. NPRs extend to 1,500 metres either side of the route centreline. EMA's policy is to achieve 95% of departures remaining within the +/-1500m "swathe". Compliance by departing aircraft with the NPR routes was reported in November 2009 to be running at 98%.[6]

5.10 NPRs normally have an altitude limit. When aircraft reach that altitude they are no longer required to meet the track-keeping (and other) requirements. The normal NPR 'release altitude' is 3000ft but at EMA since 2006 the release altitude has been 5000ft. This means that the stringent track-keeping requirements apply to a greater radius around EMA than at

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6 East Midlands Airport Draft Noise Action Plan: Report on Consultation Process and Responses, November 2009, para 5.15.

most other airports. Noise Preferential Routes are aligned with Standard Instrument Departure (SID) routes, although SIDs extend much further than the limits of the NPR. In EMA's case, the SIDs (and their associated NPRs) which are relevant to an assessment of the potential impact of the Spondon turbines are the TNT/WAL/ASNIP 2P departures from runway 09, and the TNT/WAL/ASNIP 1N departures from runway 27.[7]

5.11 The nearest NPR/SID to the Spondon site is the TNT 2P departure off runway 09. At its closest point this departure route passes 1.9nm (3.5km) from the nearest of the Spondon turbines, thus any aircraft remaining within 1500 metres of the centreline of the route would remain at least 1.1nm (2.0km) from the nearest turbine. At this closest point to the turbines, aircraft following the TNT 2P departure route will have flown approximately 10.5nm from take-off and are therefore likely to have climbed above the 5000ft 'release altitude' of the NPR. However, even in the event that aircraft are released from the NPR at this closest point to the turbines, they would have to turn through 90° in order to overfly the turbines. A left turn off this NPR is in any case unlikely because this would take the aircraft over the built-up area of Derby, a flight path which the NPR is specifically designed to avoid.

5.12 The next nearest NPR/SID to the Spondon site is the TNT 1N departure off runway 27. At its closest point this departure route is 3.6nm (6.7km) from the nearest of the Spondon turbines, thus any aircraft remaining within 1500 metres of the centreline of the route would remain at least 2.8nm (5.2km) from the nearest turbine. At this closest point to the turbines, aircraft following the TNT 1N departure route will have flown approximately 5nm from take-off and are therefore likely to be below the 5000ft 'release altitude' of the NPR – in other words they will still be subject to the requirement to remain within 1500 metres of the centreline of the route. Even in the event that aircraft are released from the NPR at this closest point to the turbines, they would have to turn through 90° in order to overfly the turbines. A right turn off this NPR is in any case unlikely because this would take the aircraft over the built-up area of Derby, a flight path which the NPR is specifically designed to avoid.

5.13 In circumstances where an aircraft flying on the TNT 1N or TNT 2P SIDs has passed the NPR release altitude and is not therefore subject to the NPR's track-keeping requirements, there are nevertheless track-keeping requirements applying to the SID itself. According to a 2005 Airprox Report, "the East Midlands MATS Part 2, Section 4-2-11, states that aircraft above 3000ft may be vectored off the SID for separation purposes but 'this should only be used when absolutely necessary and consideration must be given to the possible environmental effect of such action'."[8]

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7 The TNT, WAL and ASNIP departures follow the same alignment until approximately 1.5nm after passing the Spondon site. They are therefore dealt with in the remainder of this report as a single flight path, and referred to as TNT 1N and TNT 2P.

8 Airprox Report No.132/05 (the Manual of Air Traffic Services Part 2 sets out the specific rules and procedures for each particular airport).

5.14 The Webtrak flight routing maps from the EMA website confirm that aircraft departing on the TNT 1N departure generally do not deviate from the NPR/SID route until they are at or beyond a point south west of Derby, and aircraft departing on the TNT 1P departure generally do not deviate from the NPR/SID route until they are clear of Derby to the north, although deviations to the north of the route (away from the direction of the Spondon turbines) do occur earlier than that (see Figures 3 and 4).

5.15 The Webtrak flight path maps are believed to have been compiled in 2006. Since that date, track-keeping compliance with the NPR flight tracks has increased, so it can be expected that a higher proportion of tracks are now contained within the 'swathe' than depicted on those maps. In summary, the noise abatement and air traffic management procedures put in place and enforced by EMA make it unlikely that any departing IFR traffic will overfly the Spondon turbines.

5.16 The Webtrak flight path maps have also been consulted to assess the likelihood of inbound IFR traffic crossing over or close to the Spondon site. The maps showing easterly and westerly arrivals, annotated with the location of the Spondon wind turbine site, are reproduced at Figures 5 and 6. They show that only a small proportion of flights – approximately 3% in both cases – flew over the Spondon area. The bulk of flights remained clear of the city of Derby. All of these aircraft would have been under radar control and flying headings under the instruction of the EMA controller. In the worst case of a controller judging that the clutter generated by the turbines required him to vector his traffic around the clutter, a small adjustment to the radar heading would ensure that the aircraft did not directly overfly the site.

5.17 EMA's noise abatement policies and procedures have been further refined since 2006, when the Webtrak flight path maps were generated. It is therefore likely that a general aim of avoiding overflight of Derby has led to a reduction in such overflights since then.

5.18 Trial P-RNAV Arrival Procedures were introduced for East Midlands Airport during April 2006. The trial lasted until April 2010.[9] A key design aim of these procedures was to avoid overflight of the city of Derby, for noise abatement reasons[10] The closest point on the NEMAX 2B procedure was 2.5nm (4.7 km) north east of the Spondon site. P-RNAV procedures are designed to keep aircraft within one nautical mile of track. Consequently there was no possibility of aircraft on the P-RNAV procedure overflying the Spondon site unless they were radar-vectored off the route by controllers.

5.19 Although P-RNAV procedures have not subsequently been introduced on a permanent basis at EMA, they will become the norm for instrument arrivals in European airspace in the next few years and can be expected to replace conventional arrival procedures at EMA. The noise abatement design

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9 UK AIP Supplement S1/2008.

10 T.G. Reynolds, L. Ren & J-P.B. Clarke, Advanced Noise Abatement Approach Activities at Nottingham East Midlands Airport, UK, Paper for 7th USA/Europe Air Traffic Management R&D Seminar (ATM 2007), Barcelona, Spain, 2-5 July 2007, p.3.

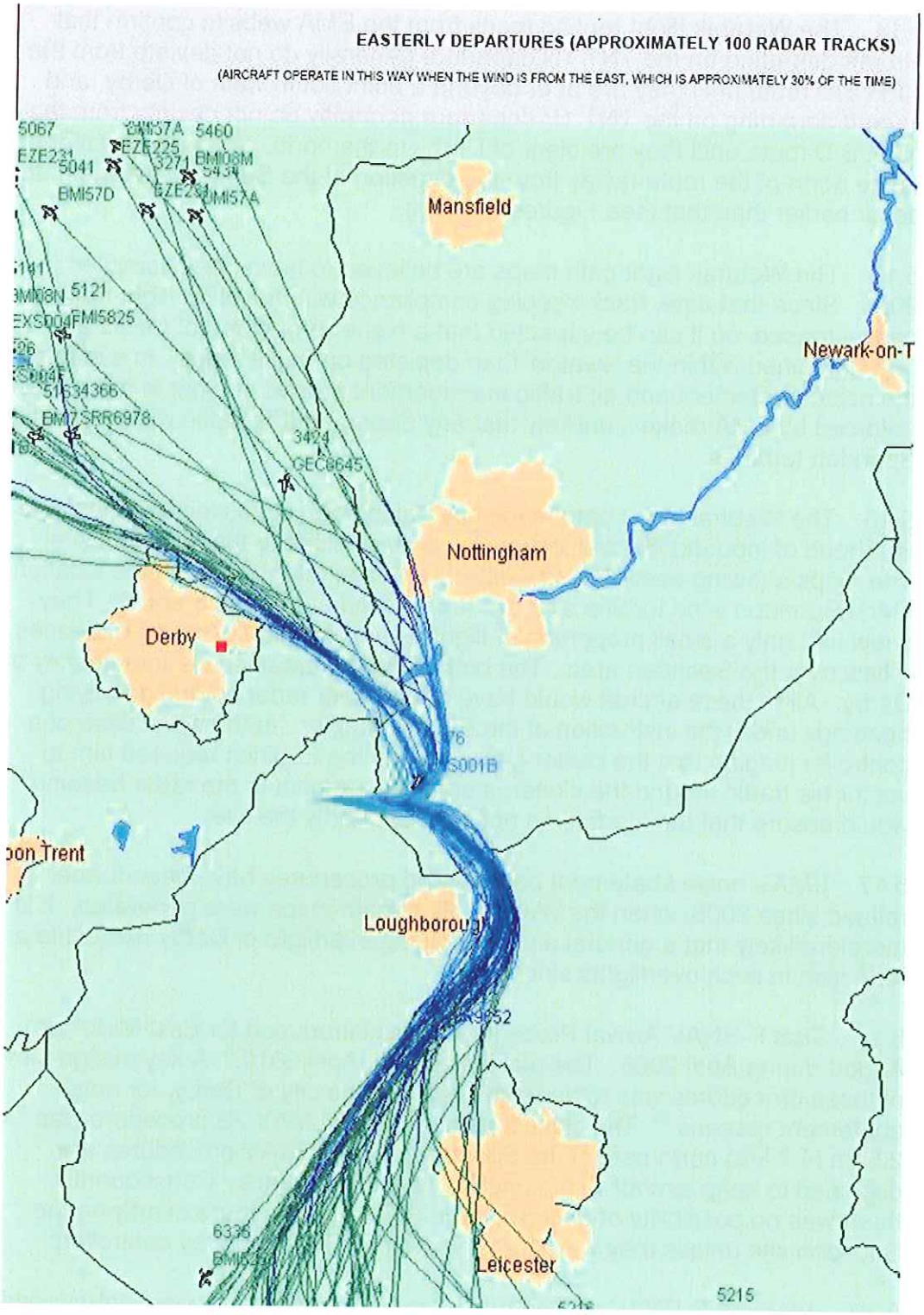

Figure 3: Easterly departure tracks from EMA

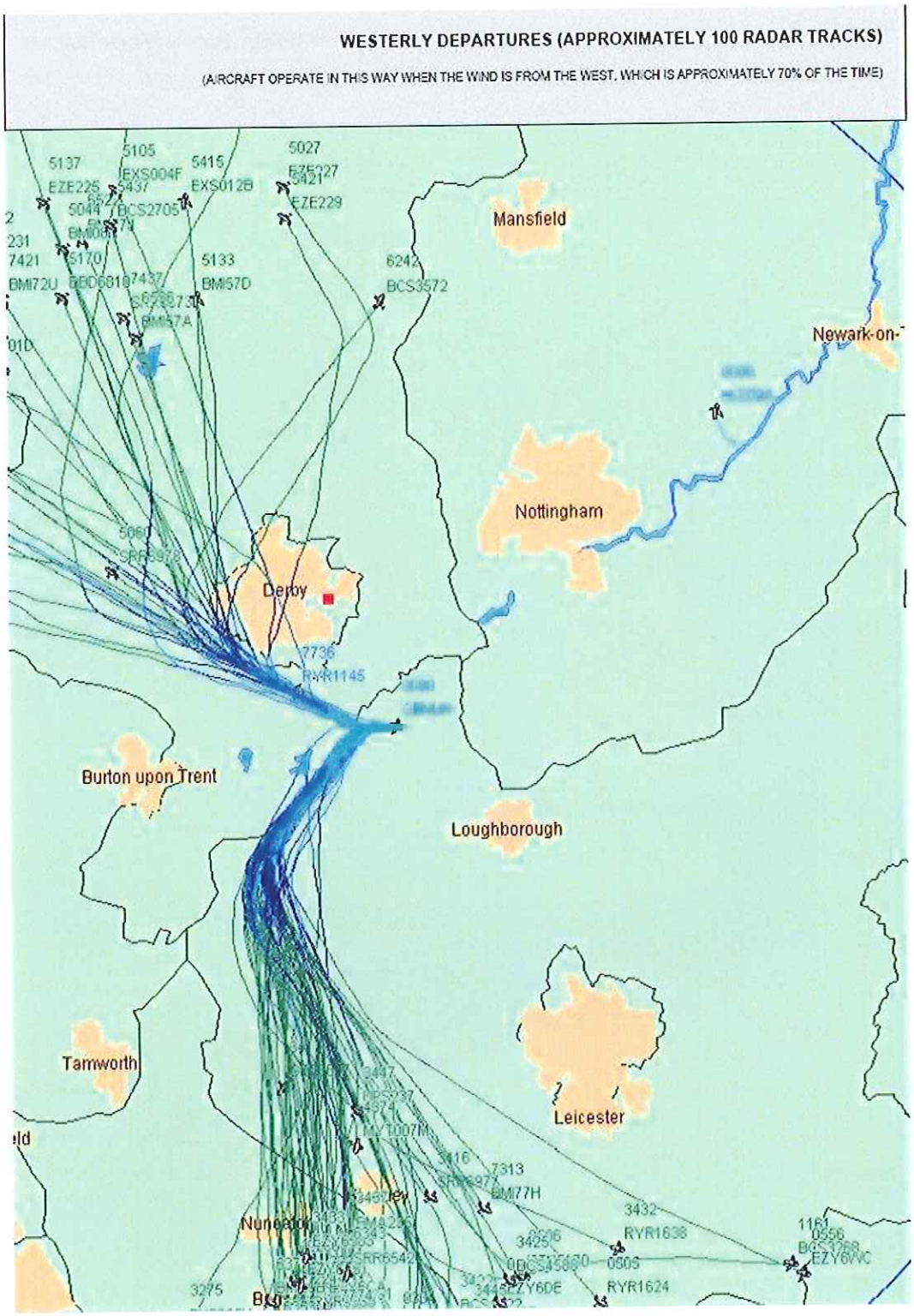

Figure 4: Westerly departure tracks from EMA

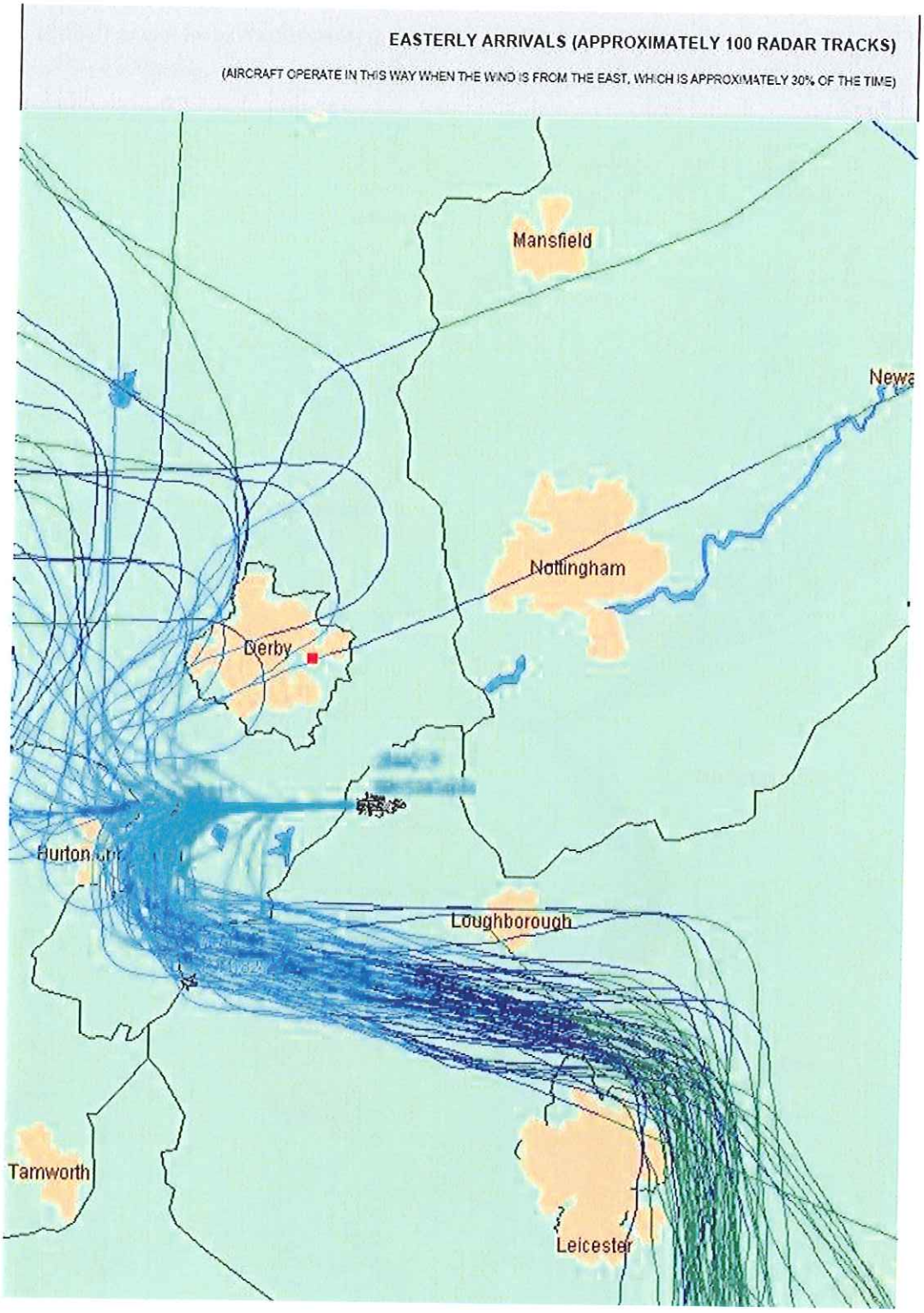

Figure 5: Easterly arrival tracks to EMA

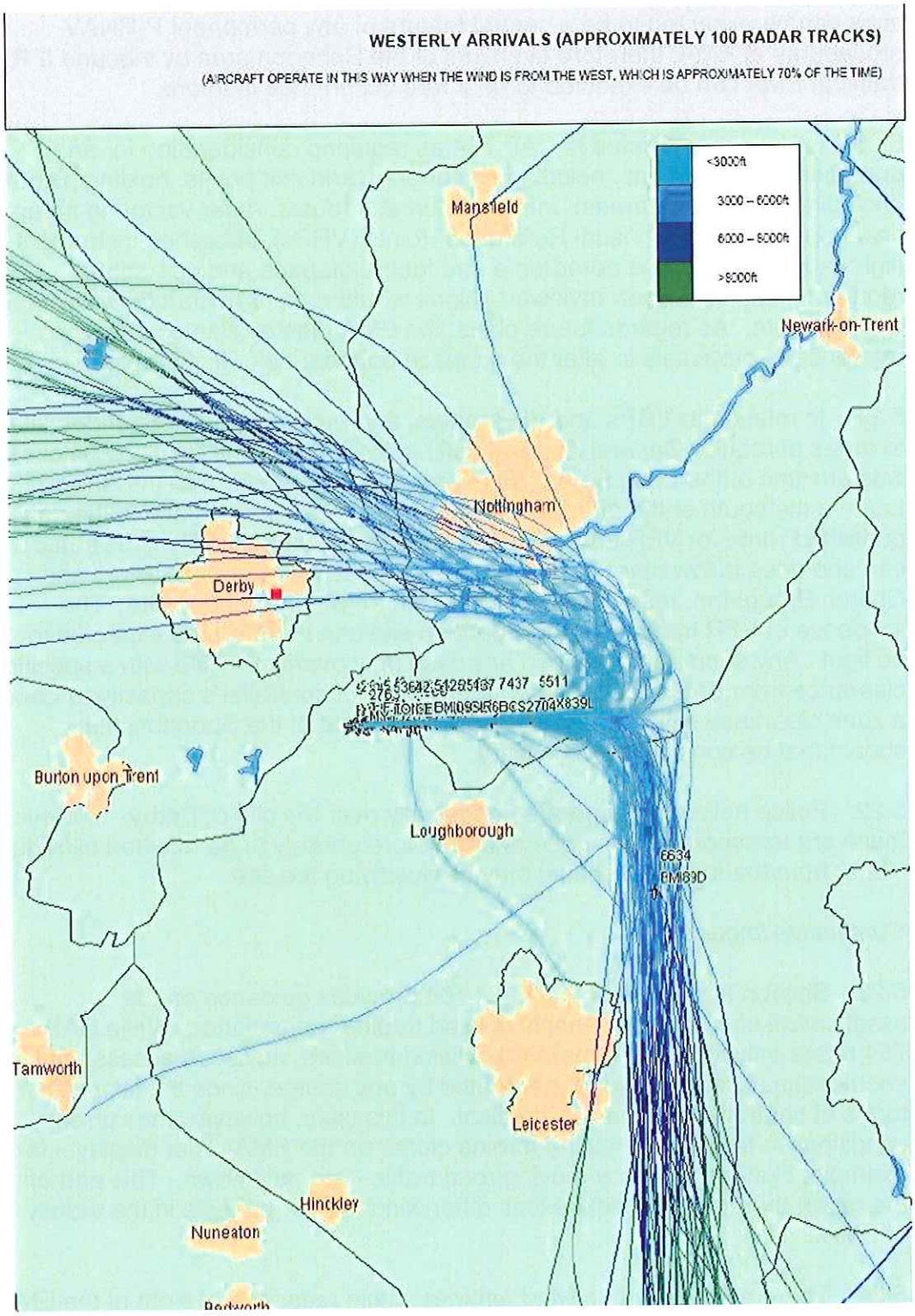

Figure 6: Westerly arrival tracks to EMA

aims can be expected to be a central feature of any permanent P-RNAV procedures at EMA, therefore overflight of the Spondon area by inbound IFR traffic at EMA can be expected to be a rare occurrence in future.

5.20 Other aspects listed in CAP 764 as requiring consideration for an operational assessment, including sector entry and exit points, holding points (including the holding areas), missed approach routes, radar vectoring areas, final approach tracks, Visual Reference Points (VRPs), published instrument flight procedures for the aerodrome and future airspace and operational requirements, have been reviewed. None would require aircraft to fly over the Spondon site. As regards future plans, the EMA Master Plan contains no reference to proposals to alter the airspace boundaries or flight routes.

5.21 In relation to VRPs and VFR routes, and proximity of the Spondon site to areas of regular General Aviation (GA) activity, the site is 2.5nm west of the western limit of the Long Eaton VFR Lane, which, together with the Shepshed Lane to the south of the airport, follows the M1 north to south and is the only published route for VFR traffic through the East Midlands CTR. VFR traffic can and does follow other routes, but the nearest VRPs are at Trowell and Church Broughton, respectively 6 and 10nm from the Spondon site. The incidence of VFR traffic over the Spondon site can therefore be expected to be light. Any such traffic could in any case only overfly the site with a specific clearance from EMA ATC. It is therefore within a controller's capacity to issue a zone clearance which does not involve overflight of the Spondon site, should that be considered necessary.

5.22 Police helicopters operate periodically over the city of Derby. However these are transponder-equipped and therefore unlikely to be affected by radar clutter from the turbines, should they be overflying the site.

Cumulative impacts

5.23 Section 8 of Chapter 2 of CAP 764 provides guidance on the assessment of cumulative effects of wind turbine radar clutter. While CAP 764 refers only to clutter generated by wind turbines, any such assessment should take account of clutter generated by any source, since the issues in terms of controller actions are identical. In this case, however, the current conditions in terms of non-wind turbine clutter on the EMA radar display – for example, clutter caused by moving road traffic - are not known. This part of the report therefore only addresses other wind turbine projects in the vicinity of EMA.

5.24 There are no existing wind turbines within radar line of sight of the EMA primary surveillance radar. Wind turbine proposals in the vicinity are as follows:

- DE Wind Brush Works, Loughborough (single turbine inside EMA CTR, approved September 2004, consent expired August 2009)
- East Midlands Airport (4 x 45m turbines inside EMA CTR, approved March 2008)

- Glebe Farm, Wymeswold (1 x 78.5m turbine under EMA CTA-2, approved July 2008)
- Queniborough (4 x 126.5m turbines under EMA CTA-15, application submitted February 2010)
- Dalby (9 x 79m turbines under EMA CTA-2, application submitted April 2010)
- Wanlip (1 x 132m turbine under EMA CTA-15, application refused April 2010, appeal lodged August 2010).

5.25 All of the above projects are within radar line of sight of the EMA primary surveillance radar and all have or had approval from East Midlands Airport. The refusal of the Wanlip proposal was on non-aviation grounds and is being appealed. The East Midlands Airport proposal is understood to be applying technical measures to mitigate its effects on the radar, which is only 1100 metres away from the turbines.

5.26 The four remaining projects consented or in the planning system – Glebe Farm, Dalby, Queniborough and Wanlip – are all underneath sections of East Midlands CTA, with a base of 1500ft in the case of Glebe Farm and Dalby and 4500ft in the case of Queniborough and Wanlip. Their proximity to arrival and departure tracks can be summarised as follows:

- Glebe Farm and Dalby are under the flight paths of westerly arrivals from the south
- Queniborough is under the flight paths of both easterly and westerly arrivals from the south
- Wanlip would be close to easterly departures to the south and possibly some easterly arrivals from the south.

5.27 In terms of cumulative impacts of these projects with Spondon, since all of the potentially affected flight paths in the above cases are to/from the south, while the potentially affected flight paths in the Spondon case are all to/from the north, there will be no cumulative impact.

5.28 CAP 764 advises the consideration of two other issues in any operational impact assessment - the radar system performance e.g. the update rate, and the Air Traffic Service Unit complexity and workload.

5.29 In terms of radar system performance, the EMA primary radar update rate is 4 seconds, which is the fastest update rate normally applied in terminal airspace. As noted above, the location and elevation of the radar and the topography around the wind farm site mean that the radar has good coverage of the area of the wind turbines and the airspace behind and around it. This gives the radar a good probability of detecting aircraft, including potential infringing aircraft, in the vicinity of the site.

5.30 East Midlands Airport handles approximately 90,000 aircraft movements a year – a comparable level of overall activity to Birmingham, Liverpool and Luton Airports. About 70% of the movements are by commercial air transport aircraft. A significant number of these movements are by cargo aircraft operating mainly at night. The airport hosts light aircraft

training and airliner crew training. Established SIDs, STARs, NPRs and VFR lanes create a significant degree of structure to traffic flows in and around the EMA airspace. There is no military low-level activity around the airport, which is located inside a large low level avoidance area. The airport is not an official Lower Airspace Radar Service provider but does provide services to transiting light aircraft in the vicinity.

6. Analysis of infringement data

6.1 One of the factors influencing controller judgements about what a particular instance of clutter might represent is their knowledge of the history of infringements of controlled airspace in the area – where such infringements have taken place, the type of aircraft involved, and the way such aircraft have appeared on radar. In their letter to TNEI dated 28 May 2010, EMA refers to 61 instance of infringements of the East Midlands controlled airspace reported to the CAA in the period since January 2006. The letter notes that "our analysis has shown that they are essentially random in nature and that the rate of occurrence is increasing."

6.2 Since the nature of past infringements of East Midlands controlled airspace is an important element in understanding the operational context for the impact of the Spondon turbines on air traffic services provided by EMA, a request was made to EMA for access to the 61 Mandatory Occurrence Reports (MORs) referred to in the letter. That request was still under consideration by EMA at the time of writing of this report.

6.3 In the absence of access to the MORs themselves, summary data on controlled airspace infringements at East Midlands were obtained from the CAA's *Safety Data Occurrence Listings* for General Aviation aircraft. Data was obtained for the whole of the period from 1 January 2006 to 28 May 2010, with the exception of two four-week periods (22/10-20/11/09 and 23/1-18/2/10). In addition, Aircraft Proximity Hazard (Airprox) reports for the period were analysed in order to locate any such incidents which had not been recorded through the MOR system.

6.4 The summary data are reproduced at Appendix 1. A total of 49 incidents was found (80% of the 61 reported by EMA). The categories of aircraft involved in these 49 incidents are shown in Table 1.

6.5 Detailed data on the location of incidents is not generally provided in the CAA summary data used for this analysis. However in the eleven cases where the location was evident from the data:

- six involved vertical infringements of the CTA to the east of EMA
- two involved infringements of the Control Zone boundary to the south west of EMA
- two involved infringements of the Control Zone boundary to the north of EMA
- one involved an infringement of the Control Zone boundary to the north west of EMA.

Table 1: Infringement data: aircraft categories		
Aircraft category	*No. of incidents*	*% of total*
Light single	29	59%
Light twin	9	18%
Helicopter	9	18%
Motor glider	1	2%
Glider	1	2%

6.6 While none were noted in the vicinity of Spondon, the small proportion where the location is known precludes drawing any conclusions.

6.7 In addition to the eleven vertical infringements of the CTA to the east of EMA noted above, a further 17 involved vertical infringements of the EMA CTA in unspecified locations. By definition these must have occurred somewhere outside the boundaries of the CTR. Notably, for these infringements to have been reported, the aircraft's altitude must have been known. This could be a result of the pilot concerned reporting the incident to EMA, but is more likely to result from the aircraft having a transponder with Mode C switched on so that the controller could see that the aircraft was making a vertical infringement of controlled airspace. In total, of the 49 listed incidents, the height of the aircraft was known in 39 cases. The fact that the aircraft was squawking is mentioned in 19 cases.

6.8 Of particular interest, in terms of informing controllers' views of the likelihood that the regular radar returns from the two turbines at Spondon represent an infringing aircraft, is the occurrence of infringements by unidentified aircraft – those which are not displaying a transponder return and are therefore a primary radar return only, and which were not traced. The most likely categories of aircraft for which this may occur are gliders and flex-wing microlights, which are less likely to be transponder-equipped and whose detectability on radar is generally lower than a typical light single-engined aircraft. Of the 49 incidents, only one involved an unidentified and untraced non-transponding aircraft. This was a glider which is believed to have made a vertical infringement of the EMA CTA-2 (base, 1500ft) to the east of EMA in July 2008, leading to an airprox with a Boeing 737 inbound to runway 27 at EMA. In terms of the applicability of this scenario to the area around Spondon, gliders are highly unlikely to fly in that airspace. The nearest gliding site is 48km away, there is no Letter of Agreement in place with the British Gliding Association permitting glider access to East Midlands controlled airspace, and gliders would normally avoid flying over extensive built-up areas such as the city of Derby at a level low enough to stay below the 2500ft base of controlled airspace.

6.9 It is also notable that the glider/Boeing 737 incident occurred in an area where controlled airspace does not extend down to ground level. The base of

controlled airspace in this area is 1500 feet. This is also the area where the majority of EMA's inbound IFR traffic routes – arriving from the south to land on runway 27. In this area, controllers have no way of telling whether a primary-only radar contact, which is not from an aircraft in radio contact with EMA, is staying below the base of controlled airspace. As the remainder of the infringement data show, vertical infringements of this section of EMA's controlled airspace are frequent. But controllers can only know if such an infringement is taking place if the pilot is in contact with EMA and/or the aircraft has a transponder with Mode C selected. For non-transponding aircraft not in radio contact with EMA, the controller must act on faith that the pilot concerned is aware of his position and of the base of controlled airspace and is flying on the correct altimeter setting. This is discussed further in section 7 below.

6.10 By contrast, at Spondon, for an aircraft to have reached the wind turbine site it would have to have already infringed the Control Zone undetected on radar. This is unlikely since:

- low radar cross-section aircraft, notably gliders, are not likely to be operating in this airspace
- the EMA radar coverage of this area is good since there is no intervening terrain
- small targets have a good probability of detection at a range of 10km
- the terrain slopes upwards behind the wind turbines, reducing the possibility of aircraft flying low enough to be undetected
- the area of the CTR boundary is a heavily built-up area where aircraft are legally obliged to fly at least 1000 feet above the highest obstacle, again increasing the probability that they will be detected on radar
- the visual cues to pilots as to their position relative to the boundary of the CTR are good in this area – the north west corner of the CTR over the city of Derby is located immediately north of the prominent A52/A6 road junction, the A52 to the east parallels the zone boundary, and the Derby County football stadium and the River Derwent valley are prominent cues to the west.

7. Examples from elsewhere

7.1 Proposed wind farms in the vicinity of EMA are discussed in paragraphs 5.24 to 5.27 above. The three projects which have either been consented or are not yet determined are all under portions of controlled airspace containing significant amounts of EMA inbound and outbound IFR traffic, and where other aircraft may transit beneath the base of controlled airspace without radio contact with EMA or any other ATC agency and without carrying or operating an SSR transponder.

7.2 It is a long-established convention in UK air traffic management – although it is not published in the Manual of Air Traffic Services Part 1 - that an aircraft operating above the base of a Control Area (controlled airspace not extending down to ground level) is 'deemed separated' from any unidentified radar returns visible on the radar within the lateral boundaries of that

controlled airspace. This is despite that fact that the controller may have no information on the altitude or intentions of the unidentified aircraft operating below controlled airspace. All UK airports with controlled airspace, including Heathrow, operate on the basis of this convention, with the initial stages of the final approach always conducted in a Control Area with uncontrolled airspace beneath. In essence, this convention is based on trust that the pilots of aircraft operating below controlled airspace are aware of their position and of the base of controlled airspace, have set their altimeter correctly, and are not flying so close to the base of controlled airspace that they are at risk of infringing it inadvertently due to turbulence or inaccurate flying.

7.3 In the event that other sources of radar returns, such as wind turbines, are present in the airspace below a CTA, the same principle would apply – even if the returns from these developments are considered to represent an unknown aircraft, they are deemed to be below controlled airspace and therefore not in conflict with any traffic above the base of controlled airspace.

7.4 EMA has applied this principle to the Glebe Farm, Dalby and Queniborough projects, confirming to their developers that the risk is assessed as tolerable and they have no objection to those wind turbines.

7.5 In relation to clutter inside a Control Zone (CTR), as the Spondon turbines will be, the CAA guidance to controllers is as set out in paragraphs 5.2 to 5.4 above. Controllers are only advised to take action if they consider it necessary, taking into account the extent of the clutter. Clutter arises inside most CTRs as a matter of course, not least because the airspace within a CTR is closer to the radar where ground clutter, road traffic, buildings and other phenomena may generate unwanted radar returns which the processors are unable to filter out. Controllers are familiar with the typical clutter patterns in different parts of their airspace and apply their judgement on the basis of that experience. Clutter inside a CTR which appears consistently is likely to be easier to manage than clutter which is intermittent, since the latter could represent a low radar cross section aircraft such as a glider which the radar has failed to detect before it infringed controlled airspace. In the Spondon case, because the turbines will be fully visible to the radar and are at relatively short range, the radar returns from the turbines can be expected to appear regularly on the screen, making them relatively predictable.

7.6 There are many examples of persistent clutter returns within CTRs in the UK, with a variety of causes, road traffic being the most prevalent. One notable case of clutter inside a CTR not caused by wind turbines or road traffic is at Stansted, where the primary surveillance radar shows persistent plots from the rotating antenna of the NATS En Route long-range radar at Debden, 11km north of Stansted, and approximately 2.7km inside the Stansted CTR. This is an area where large numbers of aircraft are vectored on to base leg for runway 23. Controllers do not routinely vector traffic away from these radar returns.

7.7 At Glasgow Airport, the existing six turbine wind farm at Wardlaw Wood is located 800 metres inside the south western part of the Glasgow CTR and

approximately 3.5km north of the final approach track to runway 05. The Wardlaw Wood turbines are fully visible to the primary radar at Glasgow Airport. The Talla and New Galloway SIDs from Glasgow's runway 05 pass approximately 2km east of the wind farm. Most aircraft flying these SIDs will have been transferred to Scottish Area Control by this point; however Scottish uses the Lowther Hill radar to control this traffic and Lowther Hill also has full visibility of the Wardlaw Wood turbines. There are significant volumes of light aircraft VFR traffic immediately outside the zone adjacent to Wardlaw Wood, including microlights. A six-turbine extension to this wind farm has been approved by Glasgow Airport.

7.8 A 14-turbine wind farm at Kelburn in North Ayrshire is currently under construction, adjacent to the north of the Wardlaw Wood wind farm. This wind farm is also visible to the primary radars at Glasgow Airport and Lowther Hill and is also inside the Glasgow CTR. It was also approved with no objection from Glasgow Airport (BAA) or NATS.

7.9 Glasgow handles a similar number of aircraft movements to East Midlands. However the number of air transport movements is approximately 30% higher than at East Midlands.

7.10 The above examples indicate that there is scope for accepting radar-visible wind turbines (and other objects) inside a CTR without posing an unacceptable risk to air traffic operations.

8. Potential measures to minimise impact

Turbine layout

8.1 At present the proposed locations of the two turbines relative to the EMA primary radar place them almost in line with the radar. As a result, the azimuth extent of the wind turbine clutter will be little more than the width of the clutter from a single turbine. There are however additional measures which could be taken in order to minimise the impact on the EMA radar.

8.2 Micro-siting of the two turbines could be used to place them exactly one behind the other as viewed from the radar. This would have a number of advantages:

- By placing T1 directly behind T2, T1 would then be in the 'shadow' region behind T2, within which there would be a reduced probability of the radar detecting the tower and nacelle of T1. As a result, T1 would be less likely to drive up clutter thresholds and the 'obscuration' effect would be less extensive than if both towers were visible to the radar.
- Although the radar would still be expected to detect the moving blades of T1, its probability of detecting them would be reduced in wind directions when the rotor disc is oriented 90° away from the radar beam, e.g. the prevailing south-westerly wind. There may also be some reduction in probability of detection of the moving blades of

T1 when they are in line with the tower and therefore in the shadow of T2.

- By placing T1 behind T2, any shadow area behind the turbines will be only the width of one turbine tower, thus reducing even further the possibility of an aircraft being affected by this phenomenon.
- Aligning the turbines in this way will reduce the overall azimuth extent (maximum width) of any clutter from the two turbines to the minimum possible. This will minimise the time spent in clutter-affected airspace by any aircraft crossing the wind turbine site.

Amendment of MATS Part 2

8.3 In the event that it is regarded as unacceptable for departing IFR traffic to overfly the turbines, the existing stipulation in the EMA MATS Part 2 regarding the conditions in which aircraft may be vectored off the SID route could be amended in order to further reduce the likelihood of aircraft overflying the site.

Guidance to VFR pilots

8.4 The construction of two large wind turbines close to the north west corner of the EMA CTR, where navigation errors could result in aircraft inadvertently 'clipping the corner' of the CTR, will provide a clear visual cue to VFR pilots of their position relative to the boundary of controlled airspace. It is therefore likely to decrease the rate of CTR infringements in this area. This effect could be enhanced by positively encouraging pilots to use the turbines as a visual cue to this corner of the CTR boundary.

8.5 The CAA Directorate of Airspace Policy (DAP) publishes guidance for VFR pilots flying in and around the East Midlands Control Zone in the VFR Guide Supplements section of their website. This information has not been revised for some years. Information – including photographs – of the Spondon turbines could be added to this site to assist VFR pilots in adhering to the boundaries of the Control Zone in the Spondon area.

8.6 There is also an unofficial guide for pilots flying VFR in and around the EMA CTR, written by an EMA controller who is also a private pilot, available through both the EMA official website and the CAA DAP website. Amendment of this website to include information on the Spondon turbines would help to disseminate the message to VFR pilots that the Spondon turbines are in place and to encourage use of the turbines as an aid to identifying the aircraft's location relative to the boundary of controlled airspace.

9. Summary and conclusions

9.1 Radar receiver saturation is not likely to occur.

9.2 Reduced probability of detection of smaller aircraft overhead the wind farm could occur over a maximum area of 1569 by 912 metres. The actual incidence of this effect will depend on wind direction and speed, turbine blade orientation and aircraft size, height and speed. This phenomenon occurs over any source of clutter but is not assessed in relation to non-wind turbine clutter.

9.3 The Spondon turbines will appear regularly on the EMA radar display.

9.4 The 'shadow' effect is not a material consideration in this case.

9.5 The question of whether controllers need to take any action in relation to clutter inside controlled airspace is a matter for professional judgement at the time, based on the extent of the clutter and the operational circumstances.

9.6 The Spondon proposal is a small development. The extent of any clutter will be small.

9.7 Controllers do not have to issue avoiding action against radar clutter inside a Control Zone. Controller actions are contingent on judgements at the time on the way the clutter presents on radar.

9.8 EMA IFR departure flight paths would not cross the Spondon site.

9.9 Only a small proportion of inbound IFR flights are likely to fly close to or over the Spondon site. If necessary a small adjustment to the radar heading would ensure that these aircraft did not directly overfly the site.

9.10 The Spondon site is well clear of published routes for VFR traffic through the Control Zone.

9.11 The Spondon proposal will have no cumulative impact with other consented or proposed wind farm proposals in the vicinity of EMA.

9.12 Historical data on infringements of EMA's controlled airspace show that a high proportion are vertical infringements of the East Midlands CTA. Infringements by unidentified non-transponding untraced aircraft are rare and are particularly unlikely to occur in the vicinity of Spondon due to good radar coverage, unattractiveness of the airspace and terrain to gliders, built-up areas and good visual cues to the boundary of controlled airspace.

9.13 Examples from elsewhere in the UK indicate that there is scope for accepting radar-visible wind turbines (and other objects) inside a CTR without posing an unacceptable risk to air traffic operations.

9.14 Aligning the two turbines directly behind each other as viewed from the radar will reduce the impact of the development on the EMA radar.

9.15 Amendment to the EMA MATS Part 2 could reduce the probability of IFR departures overflying the Spondon site.

9.16 Promulgation of information about the turbines in guides for VFR pilots will reduce the probability of airspace infringements in this area.

APPENDIX 1

SUMMARY DATA ON EMA CONTROLLED AIRSPACE INFRINGEMENTS, 1 JANUARY 2006 TO 28 MAY 2010

Date	*Type*	*Circumstances*
12-1-06	Be200	Called for joining clearance, told to standby, nevertheless entered CTR
10-2-06	Be58	Infringed CTR at FL40, Coventry squawk, was receiving a service from Coventry, not specifically instructed to remain outside CAS
11-6-06	PA28	Infringed CTR at 1900ft. Inbounds vectored to remain clear. Subsequently identified and assigned a squawk.
18-6-06	Robin 200	Infringed CTR/CTA, then called EMA saying unsure of position
19-7-06	Mooney 20	Lost, infringed CTR/CTA, subsequently contacted ATC & given headings to destination
5-9-06	Robinson R44	Infringed CTR, no RT contact. Plt contacted after, apologised.
30-12-06	PA31	Infringement of CTR/CTA while receiving a FIS.
10-3-07	PA28	Alleged infringement of CTA at 4000ft
25-6-07	A109	Alleged infringement of CTR
31-7-07	PA38	Infringed CTA at 3000ft, 12nm E of EMA; pilot failed to comply with ATC instructions to remain clear of CAS.
17-2-08	PA28	Infringement of CTA at 3000ft. Tfc info and avoiding action given
4-4-08	Cessna 152	Infringement of CTA by C152 squawking 7000 at 2700ft
8-5-08	Cessna 421	Infringement of CTR at 2700ft.
8-5-08	Cessna 441	Infringement of CTA at 4000ft. On entering CAS a/c was displaying a Coventry squawk
8-5-08	PA28	Infringement of CTA at 2300ft. Plt unsure of position
18-5-08	Cessna 172	Alleged infringement of CTR/CTA at 3000ft. R/w and app lights switched on
26-5-08	Robinson R44	Infringement of CTR, partly due wind gusting 38kts and pilot insufficient hrs to fly in those conditions

31-5-08	PA28	Infringement of CTR/CTA at 2500ft
4-6-08	Cessna 152	Infringement of CTR and CTA at 2500ft.
13-6-08	Glasair	Infringement of CTA at 2600ft.
23-6-08	Robinson R44	Infringement of CTA by R44 squawking 7000 at 2100ft
24-6-08	B757/Hughes 500	Airprox 5nm final r/w 09. EMA APR saw primary contact about to cross 09 FAT in front of 757 and gave avoiding action. H500 was spotted by Twr controller on ATM as it entered S bdy of CTR, and APR informed.
28-6-08	Cessna 172	Infringement of CTA by C172 squawking 7000 at 3500ft
28-6-08	Rockwell 114	Infringement of CTA at 2200ft.
4-7-08	B737/untraced glider	Airprox 10nm E EMA, S of r/w 27 FAT. Glider was above the 1500ft base of the CTA. Controller had seen an intermittent primary contact in the vicinity.
4-8-08	CP301 Emeraude	Infringement of CTA at 2100ft
16-8-08	Slingsby T67	Infringement of CTR/CTA by T67 unsure of its position. Navigational assistance given to bring a/c through zone and back to departure airfield.
23-8-08	PA23	Infringement of CTA by PA23 squawking 7000 at 3400ft
26-8-08	SA355	Infringement of CTA by SA355 squawking 7000 at 2000ft.
13-9-08	Robinson R22	Infringement of CTA by R22 at 2300ft
20-9-08	Cessna 152	Infringement of CTR by C152 squawking 7000 at 2000ft. On contact with ATC plt reported lost; DI setting error.
2-10-08	Jodel DR1050	Infringement of CTR by Jodel squawking 7000 at 2500ft. Tfc info given. Plt listening out but did not respond since thought he was near TNT VOR
6-10-08	Cessna 172	Infringement of CTA by C172 at 2400ft, 11nm ENE EMA. Plt requested CTA transit, given squawk, but penetrated CAS before clearance given.
9-12-08	Bell 206	Infringement of CTR by B206 at 1000ft. Tfc info given. A/c subsequently called ATC requesting FIS and route southbound. ATC

		advised of infringement and to route eastbound. A/c continued southbound.
10-12-08	Bell 206	Infringement of CTR 3-4nm SW EMA by B206 at 2000ft. Plt stated airspace wasn't on GPS and chart said CAS base 2500ft.
10-12-08	PA28	Infringement of CTA by PA28 squawking 7000 at 2600ft
17-1-09	Cessna 150	Infringement of CTA by C150 at 3500ft
12-2-09	PA31	Infringement of CTR by PA31 squawking 7000 at 1500ft.
21-3-09	Cirrus SR20	Infringement of CTR by SR20 squawking 7000 at 1700ft.
23-5-09	Socata TB10	Infringement of CTR by TB10 squawking 7000 at 1700ft.
12-7-09	PA28	Infringement of CTR by PA28 squawking 7000
13-8-09	Cessna 172	Infringement of CTA by C172 squawking 7000 at FL60. Blind calls made. C172 responded and given zone clearance.
21-8-09	Stemme S10	Alleged infringement of CTR 6nm NW EMA squawking 7000 at 2400ft.
11-9-09	PA28	Infringement of CTR by PA28 at 1700ft.
29-10-09	Jabiru	Infringement of CTA 14nm SE EMA squawking 7000 at 3400ft
30-1-10	PA34/ATR72	Airprox 5nm final r/w 27 EMA. Approach controller vectored PA34 into conflict with ATR72 having misunderstood the PA34's position. PA34 pilot continued into CAS without a positive clearance.
11-3-10	Grob G115	Infringement of CTA at FL56. Plt spoke with ATC and local action taken.
15-4-10	PA28/C172	Infringement of CTA 6nm E EMA by PA28 & C172 in formation at 2200ft
5-5-10	Be33	Infringement of CTA 10nm E EMA (and subsequently CTR) at 2000ft

east midlands airport
Nottingham • Leicester • Derby

Our reference: EMA/302/W/2010/Pre
Your reference: 5581-17 (Derby)

East Midlands Airport
Castle Donington, Derby, East Midlands DE74 2SA United Kingdom
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www.eastmidlandsairport.com

28th May 2010

David Wood,
Renewable Energy Development Engineer
Severn Trent Water Ltd
Endevour House
PO Box 51
Raynesway
Derby
DE21 7JA

Dear David

EMA-302-2009-Pre; Proposed Installation of 2 Wind Turbines at Severn Trent Sewage Works, Spondon, Derby

Thank you for taking the time to meet with us on 11th May 2010 to discuss your proposed development. This meeting followed our earlier meeting of 5th March 2010. I felt it might be helpful to recap on the main points of our discussion to date.

The turbines that you propose are large structures with large moving blades. As there is no shielding provided by local terrain we have agreed that they will be visible to the Airport's primary surveillance radar. The Osprey Consulting report (ref: Wind/TNEI/7059/01 Issue 1) commissioned by you confirms this at Page 5, noting that "The line of sight profile shows that the turbine will be theoretically visible to the radar antennae at EMA as there is no intervening terrain to shield the turbine from the radar". This is also graphically represented in figure 2 on the same page'.

Whilst it is clearly not desirable that the wind turbines you propose would be visible on the radar display of our air traffic controllers, we have made clear at our meetings that this alone would not necessarily prejudice the safe operation of aircraft. In forming a view of the likely impact on aircraft operations we have carefully considered the likely scale of the impact on radar and the operational context. As a result of this assessment we have concluded that the proposed development is likely to result in a reduction in the safety of aircraft operations and therefore that we would be minded to object to your development should you seek planning consent at this stage. Factors key to our decision include:

- The likelihood that the turbines will be visible to the Airport's primary radar and the scale of the resulting 'clutter'
- The location of the proposed development, which is within the East Midlands Control Zone

- The proximity of the development site to key aircraft routings flown by both arriving and departing aircraft

- The history of unknown aircraft ('zone incursions') entering the controlled airspace of East Midlands Airport without consent

Given the above concerns we had understood from our first meeting that you would explore more fully the options for mitigating the risk to aircraft safety. We note that no mitigation was proposed by you at our meeting of 11th May 2010 and we were disappointed to learn that you now consider our concerns to be unfounded. We consider the proposed development in its current form would result in a reduction in aircraft safety and requires mitigation.

We would therefore respectfully request that you please set out for our consideration any mitigation that you believe might be effective in this instance. As you are advised by experts I am sure that you will be aware that mitigation has been possible in some other cases and there are a number of very encouraging projects that are now well advanced, including radar infill.

East Midlands Airport is supportive in principle of the development of wind turbines and we always seek to engage constructively with developers, to ensure that our operations do not unnecessarily hinder any development. We are proud of our track record and would note that in most previous cases we have been able to reach an agreed resolution.

Finally, at our latest meeting you specifically requested details of the 'zone incursions' at East Midlands Airport. I would note that the Airport's mandatory occurrence reporting records show that 61 such incidents were reported to the Civil Aviation Authority since January 2006. Our analysis has shown that they are essentially random in nature and that the rate of occurrence is increasing.

We are happy to continue to discuss your proposed development and to clarify any aspect of our position should you so wish.

Yours sincerely

N. A. Robinson

Neil Robinson
Director of Sustainability

tnei
enterprise with energy

Mr Neil Robinson
Director of Sustainability,
East Midlands Airport,
Castle Donington,
Derby,
East Midlands,
DE74 2SA.

Mrs Rachel Allum
Email: rachel.allum@tnei.co.uk
DD: 0191 211 1402

Date: 13th August 2010

Dear Mr Robinson,

Proposal: **The Installation of 2No Wind Turbines**

Location: **Severn Trent Water Ltd's Spondon Water Reclamation Works, Raynesway, Derby.**

I refer to the above named proposal in relation to which East Midlands Airport (EMA) issued a letter of objection dated 7th December 2009 and further correspondence the most recent being your letter dated 21st July 2010.

Following the previous meeting on the 11th May 2010 it was somewhat of a surprise to receive your letter as we had been given the impression at the meeting that the mitigation options, such as aligning the turbines along the 'line of sight' of the radar, would not result in any material benefit to EMA. As such our letter dated the 2nd of July was sent in which set out our understanding of the issues prior to the submission of a planning application.

As advised in my colleagues' letter dated 2nd July 2010 we are still looking to submit to planning at the end of this month. However, in order to ensure an openness of dialogue and thorough consideration of all issues raised in previous correspondence and at the two previous meetings, Spaven Consulting have produced a report (see attached) which provides a detailed assessment of the potential impact of the proposed wind turbine development on EMA air traffic radar services.

The Spaven Consulting report demonstrates that the two wind turbines can be accommodated at the Derby site without impacting upon the safe operation of aircraft and also suggests options to minimise the impact of the development to EMA radar, including aligning the turbines. Having looked further at the possibility of aligning the turbines I can confirm that from a development view point that this is possible and can be achieved on site.

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Company Reg. 03891836

As stated above and given the considerable length of time that has passed to reach this point, it is still intended to submit to planning at the end of this month. I hope that you can see that every effort has been made to explain our position and whilst I am hopeful that a letter withdrawing your previous objection of the 7th December 2009 will come following the receipt of this report it maybe that we submit to planning with an ' agreement to disagree'.

Should you feel that you are able to suggest other options that would help mitigate the impact of the proposal to a level deemed acceptable to EMA these would be always welcomed. If however, you are still in disagreement with our findings I would request that you also provide an evidence base to back up your reason for your objection.

Finally, in your letter dated 21st July 2010 you considered that the analysis of the impact of the development is oversimplified and misunderstands the implications for air traffic control and that our conclusion is flawed. I now hope that having read the attached report your view changes. In addition, you queried why Mr Spaven was requesting further information and analysis when we had already reached an opinion that the risks posed are 'negligible'. On this point I would clarify that Mr Spaven was seeking clarification of the data he had already obtained and it is disappointing that this request is still outstanding and yet to be resolved.

I would also add that in the attached report regard is given to examples of other wind turbine developments elsewhere. Whilst you advised that any discussion regarding other examples were not relevant, it is considered that you demonstrate either why you differ from the examples or why other airports are wrong in allowing turbines in their airspace. Precedent is a material consideration and it is considered unreasonable to discount other examples without evidence to support your case.

I look forward to hearing from you in the near future.

Yours sincerely,

Rachel Allum
Senior Consultant
TNEI Services Limited

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Dean Street,
Newcastle upon Tyne
NE1 1LE

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east midlands airport
Nottingham • Leicester • Derby
Our reference: EMA/302/W/2010/Pre
Your reference: 5581-17 (Derby)

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24th August 2010

Rachel Allum,
TNEI Services Ltd
Milburn House
Dean Street
Newcastle Upon Tyne
NE1 1LE

Dear Ms Allum,

EMA-302-W-2009-Pre; Proposed Installation of 2 Wind Turbines at Severn Trent Sewage Works, Spondon, Derby

Thank you for your letter and attached report of 13 August 2010 (received 16 August 2010) on the above proposed development. We appreciate the ongoing dialogue on this proposed development.

We note the contents of your letter and have carefully considered the accompanying report. There are many aspects of the report which we consider are correct, however, we do not agree with the fundamental conclusions the report draws. We also note that you intend to apply for planning permission at the end of this month (August 2010). At the present time therefore should you choose to apply for planning permission we would be minded to object to the proposed development, for reasons previously outlined in our letters of 7 December 2009, 21 July 2010 and at various meetings in between these dates.

The second paragraph of your letter notes your surprise at our comments regarding mitigation measures from our letter of 21 July 2010. I feel you may have misread our letter and intentions. To date we do not feel that we have been presented formally with mitigation which will in this case remove or significantly reduce the risk posed to aircraft safety by this development. We do not consider that the only mitigation measure proposed formally so far of aligning the proposed turbines to the EMA radar will make a significant difference to the risk posed by this proposed development. That is not to say that there are no mitigation proposals possible which may assist in this and we are always happy to consider or discuss alternative possible mitigation proposals you may wish to put forward now or in the future. In this respect we note the advice in PPS22 which expects developers to address any adverse impacts.

Your letter also notes your disappointment that a request from Mr Spaven for information is still outstanding. Thank you for clarifying the reasons why Mr Spaven was interested in the data when you already considered that the risks from your development were "negligible".

Mr Spaven's report, submitted under cover of your letter of 13 August 2010, makes reference to published mandatory occurrence reports (MORs) and therefore it is unclear if this information would still be helpful to you. If Mr Spaven or yourselves still require further data I would ask that you please restate your request and we will endeavour to deal with this promptly.

On your final point of precedence, I would note that the correct approach to the determination of applications on planning grounds is that each case should be judged on its own merits in accordance with the development plan, unless material considerations dictate otherwise. We do not consider that any of examples listed by yourselves amount to material considerations in this case but this of course would be for the Local Planning Authority to determine.

We are happy to continue to discuss your proposed development and to clarify any aspect of our position should you so wish.

Yours sincerely

N.A. Robinson

Neil Robinson
Director of Sustainability

tnei
enterprise with energy

Mr Neil Robinson
Director of Sustainability,
East Midlands Airport,
Castle Donington,
Derby,
East Midlands,
DE74 2SA.

Mrs Rachel Allum
Email: rachel.allum@tnei.co.uk
DD: 0191 211 1402

Date: 26th August 2010

Dear Mr Robinson,

Proposal: **The Installation of 2No Wind Turbines**

Location: **Severn Trent Water Ltd's Spondon Water Reclamation Works, Raynesway, Derby.**

With reference to the above I would like to thank you for your letter dated 24th August 2010 and would like to take this opportunity to respond to several of your points.

1) I am pleased to note that you consider many aspects of the report to be correct but would appreciate it if you can provide a more detailed response on the aspects of the report you are not in agreement with. Specifically please can you provide evidence to demonstrate your reasoning for your objection particularly as the Spaven Consulting report demonstrated that the two wind turbines can be accommodated at the Derby site without impacting upon the safe operation of aircraft.

2) With regard to mitigation measures that will remove or significantly reduce the risk that you consider would exist if the proposed development were constructed, the Spaven Consulting report suggests mitigation measures in Section 8 of the report that would minimise the impact of the development to EMA. However, your letter states that you feel that you have not been formally presented with mitigation which will remove or significantly reduce the risk posed to aircraft safety by this development. Does this mean that you do not consider that any or all of the mitigation measures set out in Section 8 meet that requirement?

3) With regard to other possible mitigation measures, your letter dated 28th May 2010 refers to "a number of very encouraging projects which are now well advanced, including radar infill". On a two-turbine project it is highly unlikely that any form of radar infill would be economically viable, even if a suitable radar could be found to act as the gap-filler. More importantly, it is highly likely that a gap-filler approach to a small project such as this would introduce at least as many additional degradations of performance as it would solutions to the impacts. Two are of particular note:

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(a) the base of radar cover some way beyond the turbines themselves would be raised from ground level to whatever the gap-filler was capable of providing, thus denying controllers any information on low level traffic close to or even outside the edge of the Control Zone;

(b) there remains significant uncertainties about the presentation of radar data in the boundary areas between the 'patch' and the main radar. These could well cause distractions or uncertainties for controllers.

4) When Osprey Consulting Ltd met with EMA on 5 March 2010 the airport expressed an interest in a Transponder Mandatory Zone (TMZ). Osprey's stated view of that is "I was surprised that EMA agreed to consider this mitigation as the fact that an area is within a TMZ will not prevent inadvertent penetration of the airspace by lost or unknown traffic. Their agreement to look at this mitigation somewhat contradicts their reasons for objecting to the turbines in the first place". Spaven Consulting concur with that comment. Moreover, a TMZ would make most sense as a mitigation for the other projects approved by EMA (Queniborough, Dalby etc) which are under a CTA, but EMA has judged all but one of those to require no mitigation.

In addition, at the 5th March 2010 meeting, EMA also stated that you would consider technical or operational mitigation. The Spaven Consulting report sets out a range of operational measures to which you have not responded.

6) The agreed mitigation for Glebe Farm - drawing a circle round the development on the radar video map - might be advanced as a mitigation for Spondon but (a) Spaven Consulting do not consider it to provide any significant mitigation for Glebe Farm and (b) EMA stated clearly at the time that they would not regard its use there as a precedent for other cases.

7) EMA has also expressed interest in the use of radar absorbent materials (RAM) on the turbine blades. It is understood that this technology has reached the stage of being able to reduce the radar cross-section of blades, but not make them invisible. In the particular case of the turbines pointing into the prevailing south west wind, RAM at its best is likely to eliminate many of the radar returns but not the highest peak returns. This would be likely to change the Spondon turbines from appearing quite regularly and consistently, to appearing intermittently and unpredictably. That will add to the risk of controller distraction and uncertainty, not reduce it.

Clearly, we would like to find a mutual resolution to this issue but it is imperative that we understand, through a technical response, why you consider the proposed scheme to be unworkable and why you disagree with the conclusions in the Spaven Consulting report. Without this it is very difficult to suggest mitigation options to a development when the technical reasons for the original objection have not been fully demonstrated and backed up by supporting evidence.

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Finally, with regard to the Mandatory Occurrence reports I would be grateful if you can still provide this data to Mr Spaven as a matter of priority.

I would be grateful for your speedy response to this letter particularly given the time that has already passed.

I look forward to hearing from you in the near future.

Yours sincerely,

Rachel Allum
Senior Consultant
TNEI Services Limited

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Blank sheet

Appendix K

Radio-communications and Television

Subject: DERBY CONSULTATION T1, AT GRID REFERENCE SK 39029 35101, RADIUS 500 METRES
From: Gerard Blaevoet <Gerard.Blaevoet@ofcom.org.uk>
Date: Wed, 23 Sep 2009 11:08:29 +0100
To: "rachel.allum@tnei.co.uk" <rachel.allum@tnei.co.uk>

SCOPING REPORT REPLY – LINKS FOUND

-

FIXED LINK REPORT FOR WINDFARM CO-ORDINATION AREA:
DERBY CONSULTATION T1, AT GRID REFERENCE SK 39029 35101, RADIUS 500 METRES

Dear Rachel,

Ofcom have found that within the assessed fixed link frequency bands (see table below), the following fixed link end(s) within or fixed link path(s) that cross your requested coordination area, as given above. This assessment is based on the Ofcom fixed links database status as of the 13th September 2009 which may vary before the windfarm project implementation.

Links	*Company*	*Contact*	*Telephone*	
0434974/2	T-Mobile	Windfarm Enquiries	0	Tech.S
0596074/1	Central Networks East PLC	John Taylor	07710 155114	john.tay
0392900/1	Bt	BT Mail-box	0	radior
0504573/1	Vodafone Limited	Simon Bartrip	7771775750	win
0474964/1	Hutchison 3G UK Limited	Windfarm Enquiries	0	Tech.S
0499060/1	Vodafone Limited	Simon Bartrip	7771775750	win
0504780/1	Vodafone Limited	Simon Bartrip	7771775750	win

The fixed link operator(s) identified in the table above should be contacted directly for further information.

This response to your co-ordination request is only in respect of microwave fixed links managed and assigned by Ofcom within the bands and frequency ranges specified in the table below. For scanning telemetry systems operating in the 457-458 MHz paired with 463-464 MHz band, a copy of your co-ordination request has been sent to:

CSS Spectrum Management Services Ltd. Mark Carney 01458273789 mark.carney@css.gb.com

Joint Radio Company (JRC). Peter Swan 020 7953 7142 windfarms@jrc.co.uk

For self coordinated links operating in the 64-66GHz, 71-76GHz and 81-86GHz bands a list of current links can be found at: http://www.ofcom.org.uk/radiocomms/ifi/licensing/classes/fixed/

Regarding assessment with respect to TV reception, the BBC has an online tool available on their website: www.bbc.co.uk/windfarms. Ofcom do not forward enquiries to the BBC.

Please note other organisations may require coordination with regard to your request; more information regarding windfarm planning is available on the British Wind Energy Association website www.bwea.com .

-

Table of assessed fixed links bands and frequency ranges

Band (GHz)	Frequency Range (MHz)
1.4/1.5	1350 – 1375 1450 – 1452 1492 – 1530
1.6	1672 – 1690
1.7	1764 - 1900
2	1900 - 2690

4	3600 - 4200
6	5925 - 7110
7.5	7425 - 7900
11	10700 - 11700
13	12750 - 13250
14	14250 - 14620
15	14650 - 15350
18	17300 - 19700
22	22000 - 23600
25	24500 - 26500
28	27500 - 29500
38	37000 - 39500
50	49200 - 50200
55	55780 - 57000

Regards

:: Gerry Blaevoet
Windfarm Administration & International Co-ordination
Corporate Customer Team
Desk 02:70
Tel: 020 7981 3160 Fax: 020 7981 3060
gerard.blaevoet@ofcom.org.uk

:: Ofcom - Office of Communications
Riverside House
2a Southwark Bridge Road
London
SE1 9HA
www.ofcom.org.uk

Subject: DERBY RE-CONSULTATION FOR TURBINE TWO AT GRID REFERENCE SK 39297 34782, RADIUS 500 METRES
From: Gerard Blaevoet <Gerard.Blaevoet@ofcom.org.uk>
Date: Wed, 23 Sep 2009 11:15:33 +0100
To: "rachel.allum@tnei.co.uk" <rachel.allum@tnei.co.uk>

SCOPING REPORT REPLY – LINKS FOUND

-

FIXED LINK REPORT FOR WINDFARM CO-ORDINATION AREA:
DERBY RE-CONSULTATION FOR TURBINE TWO AT GRID REFERENCE SK 39297 34782, RADIUS 500 METRES

Dear Rachel,

Ofcom have found that within the assessed fixed link frequency bands (see table below), the following fixed link end(s) within or fixed link path(s) that cross your requested coordination area, as given above. This assessment is based on the Ofcom fixed links database status as of the 13th September 2009 which may vary before the windfarm project implementation.

Links	*Company*	*Contact*	*Telephone*	
0596074/1	Central Networks East PLC	John Taylor	07710 155114	john.tay
0434974/2	T-Mobile	Windfarm Enquiries	0	Tech.S
0504780/1	Vodafone Limited	Simon Bartrip	7771775750	win
0474964/1	Hutchison 3G UK Limited	Windfarm Enquiries	0	Tech.S
0504573/1	Vodafone Limited	Simon Bartrip	7771775750	win
0392900/1	Bt	BT Mail-box	0	radior
0499060/1	Vodafone Limited	Simon Bartrip	7771775750	win
0497080/1	Vodafone Limited	Simon Bartrip	7771775750	win
0504785/1	Vodafone Limited	Simon Bartrip	7771775750	win

The fixed link operator(s) identified in the table above should be contacted directly for further information.

This response to your co-ordination request is only in respect of microwave fixed links managed and assigned by Ofcom within the bands and frequency ranges specified in the table below. For scanning telemetry systems operating in the 457-458 MHz paired with 463-464 MHz band, a copy of your co-ordination request has been sent to:

CSS Spectrum Management Services Ltd. Mark Carney 01458273789 mark.carney@css.gb.com

Joint Radio Company (JRC). Peter Swan 020 7953 7142 windfarms@jrc.co.uk

For self coordinated links operating in the 64-66GHz, 71-76GHz and 81-86GHz bands a list of current links can be found at: http://www.ofcom.org.uk/radiocomms/ifi/licensing/classes/fixed/

Regarding assessment with respect to TV reception, the BBC has an online tool available on their website: www.bbc.co.uk/windfarms. Ofcom do not forward enquiries to the BBC.

Please note other organisations may require coordination with regard to your request; more information regarding windfarm planning is available on the British Wind Energy Association website www.bwea.com .

-

Table of assessed fixed links bands and frequency ranges

Band (GHz)	Frequency Range (MHz)
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2	1900 - 2690
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6	5925 - 7110
7.5	7425 - 7900
11	10700 - 11700
13	12750 - 13250
14	14250 - 14620
15	14650 - 15350
18	17300 - 19700
22	22000 - 23600
25	24500 - 26500
28	27500 - 29500
38	37000 - 39500
50	49200 - 50200
55	55780 - 57000

Regards

:: Gerry Blaevoet
Windfarm Administration & International Co-ordination
Corporate Customer Team
Desk 02:70
Tel: 020 7981 3160 Fax: 020 7981 3060
gerard.blaevoet@ofcom.org.uk

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SE1 9HA
www.ofcom.org.uk

Rachel Allum
TNEI Services Ltd

24 September 2009
Your reference:

Our ref. WID3700

Dear Sir/Madam,

RE: PROPOSED WIND TURBINES AT SPONDON DERBY. Turbine 1 NGR: SK 39029 35101. Turbine 2 NGR: SK 39297 34782.

Thank you for your letter dated 23 September,2009.

We have studied this wind farm proposal with respect to EMC and related problems to BT point-to-point microwave radio links.

The conclusion is that, the Wind farm Project indicated should not cause interference to BT' s current and presently planned radio networks.

This is on the proviso that the wind turbine locations remain unchanged.

Yours sincerely

Peter McSorley
BT Network Radio Protection

PP 306B, Monument TE, 11-13 Gt Tower St, London, EC3R 5AQ

Subject: Approved Wind farm: Spondon Derby- TMUK12992 / Midlands 2
From: "Alexandre Freitas" <alexandre.freitas@ericsson.com>
Date: Thu, 24 Sep 2009 11:09:42 +0200
To: <rachel.allum@tnei.co.uk>
CC: "Tech Services-Tx" <tech.services-tx@ericsson.com>

TMUK12992 - Spondon Derby

Hi Rachel,

The attached map indicates current location of each Turbine in relation to any existing T-Mobile and 3GUK microwave links/sites.

T-Mobile/3GUK have no objections to the exact proposed Turbine locations.

Any mitigation works required to our links as a result of this development will be at the developer cost.

Any changes made to the proposed site location of either turbine, will require a further desktop study to re-confirm the minimum clearance criteria set within the T-Mobile/3GUK guidelines.

Kind Regards,

Alexandre Freitas:

National Windfarm Coordinator
www.ericsson.com
07975 595 195
alexandre.freitas@ericsson.com

12992.xls

Subject: RE: Derby T1 - vodafone consultation
From: "Hobson, Daniel, VF UK, Partner" <Daniel.Hobson@vodafone.co.uk>
Date: Mon, 5 Oct 2009 12:12:59 +0200
To: "Rachel Allum" <rachel.allum@tnei.co.uk>

2653 799 24.09.09 Rachel.allum@tnei.co.uk Turbine 1 at Derby Sewage Treatment facility 439029 335101 No impact 345m
2654 799 24.09.09 Rachel.allum@tnei.co.uk Turbine 2 at Derby Sewage Treatment facility 439297 334782 No impact 270m

Hi Rachel,

Please find our response to your recent consultation.

Provided that the coordinates you have provided are accurate, Vodafone has no objection to these proposals.

Regards

Dan Hobson
Transmission Planning Engineer
Regional Operations, Technology.
Vodafone UK
++44(0)7500 032571
daniel.hobson@vodafone.co.uk

Vodafone Ltd
Registered Office - The Connection,
Newbury, Berkshire, RG14 2FN.
Registered in England:- No 1471587

-----Original Message-----
From: Rachel Allum [mailto:rachel.allum@tnei.co.uk]
Sent: 24 September 2009 09:33
To: Windfarms
Subject: Derby T1 - vodafone consultation

Dear Simon

Severn Trent Water are proposing a two turbine development at a site in Spondon Derby. The grid co-ordinates for turbine 1 are provided in the attached spreadsheet.

The turbine dimensions are 132m to tip, 80m hub and 52m blade length (total 104m rotor diameter).

Ofcom have identified the following links that have the potential to be affected by our proposed wind farm development:

0504573/1
0499060/1
0504780/1

I would be grateful if you can confirm if you have any objections to the proposed turbines. If I do not receive a response within 21 days of the date of this email I will assume you have no objections to the proposal.

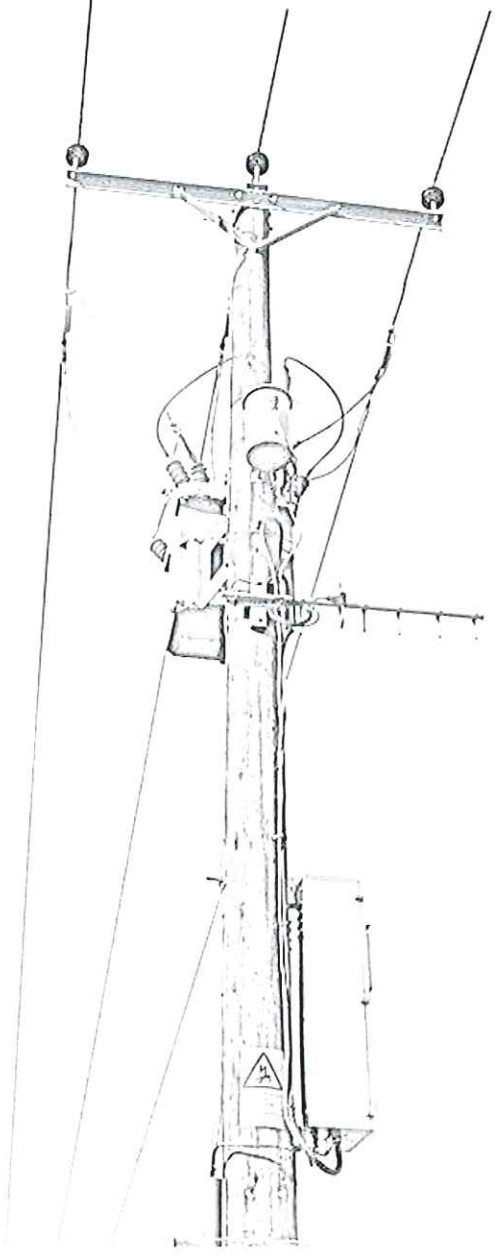
Should you have any queries regarding the above please do not hesitate to contact me.

Kind Regards
Rachel Allum

joint radio company

jrc

Joint Radio Company Ltd



REPORT

for TNEI Ltd
on a proposal for a
wind farm at
Derby, Spondon
Works
regarding radio
systems operated
by Central Networks

December 2009

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1 Executive Summary

(1) This report presents the results of an investigation into the effect of constructing a wind farm at Derby, Spondon Works, on a point to point link operated by Central Networks.

(2) The report concludes:

- That it is considered that the influence of wind turbines on microwave links is sufficiently well understood to have confidence in the predicted effects.
- That Turbine 2 must not be allowed to move any closer to the Central Networks radio link. The exclusion area is defined as the sector 226 to 47 degrees east of grid north.
- Providing the turbine does not move any closer to the link then the Derby development as stated returns figures above the JRC's minimum requirements.

(3) The report recommends:

- That TNEI should continue to liaise with Central Networks and JRC whilst the Derby, Spondon Works wind farm is being planned. This will enable them to understand any plans regarding their radio networks and if they have any future radio systems planned that would be affected by the wind farm.
- That this report is shared with Central Networks so that their opinion can be sought.
- Providing the micrositing conditions set out in this report are met, it is JRC opinion that the proposed Derby wind farm will not degrade the availability of the Central Networks point to point radio link below operational requirements.

(4) It must be stressed that all predictions have been made on the basis of best available data but since there has been little practical work to investigate the precise nature of the effect of wind turbines on radio systems of interest to this report the results are subjective.

(5) Due to the number of unknown variables involved it is not practical to consider the interference scenarios that will be created during the construction phase of the wind farm project, in particular the influence of any scaffolding or tower cranes used for construction.

2 Background

(6) The potential adverse effect of large inanimate structures on radio propagation is relatively well understood, and a number of sophisticated modelling tools exist to predict the effects. Wind farms will create a similar effect due to their physical bulk but raise new issues because of the large rotating elements, the effect of which is currently poorly understood.

(7) The majority of work reported in the public domain relates to interference to UHF television reception. There has also been a substantial amount of concern regarding potential interference to radar navigation systems, but much of this work is not in the public domain. Studies of the effect of wind farms on domestic TV reception have been conducted in mainland Europe. It is likely that these effects are observed in TV Band III (200 MHz) as well as the UHF bands (470-862 MHz) used in the UK.

(8) JRC, as the radio spectrum manager for the UK gas and electricity industry, is uniquely placed to investigate the potential impact of proposed wind farm developments, being experienced in radio engineering associated with operational radio systems used by the utilities, and also a part of the energy sector and therefore committed to finding solutions to the problems posed by this new energy source.

(9) JRC has undertaken similar studies for other wind farm developers, which have resulted in detailed mitigation proposals that have been agreed by all interested parties.

(10) The utility radio services that are potentially affected by the construction of wind farms are:

- Private Mobile Radio Systems operating in VHF and UHF frequency bands;
- Telemetry and telecontrol systems operating in the VHF and UHF bands; and
- Fixed microwave radio links

(11) In the context of the proposed wind farm development at Derby, JRC has assessed the impact on the licensed radio systems used by Central Networks.

3 The Derby Wind Farm

(12) The proposed Derby wind turbines have a 104 metre rotor diameter and 80 metre hub height, giving a maximum blade tip height of 132 metres.

(13) The currently proposed Derby wind turbine positions may cause interference to the radio systems operated by Central Networks.

(14) The wind farm development had been highlighted by OFCOM for coordination. Central Networks had requested JRC coordinate the proposed wind energy development with their radio network. The coordination process indicated that there may be a problem and consequently an objection was raised.

(15) The location of the turbine are given below in Table 3.1:

Table 3 1: Turbine Locations (UK National Grid)

Turbine	Easting	Northing
1	439029	335101
2	439297	334782

4 Radio systems affected

(16) For utility operations, there are three main classes of operational services that might be affected.

Microwave fixed links –
used for point-to-point communications over low-density traffic routes, for hard to reach locations, and for resilience as alternative routing to a wired connection. These typically operate in frequency bands of 1.4/1.5 GHz, 5 GHz, 7.5 GHz, 13/14 GHz, 24 GHz, 38 GHz and 58 GHz. They employ a variety of digital modulation techniques.

Scanning Telemetry and Telecontrol links –
used for point to multi-point communications, almost exclusively using equipment complying with MPT1411 and MPT1329 in the UHF 450-470 MHz band (although increasingly using the 140 MHz band as well).

Private Mobile Radio (PMR) -
for communications with mobile (vehicle mounted) units and to a lesser extent hand-held radios. For the electricity industry, these systems usually operate around 140 MHz and employ MPT1327 trunking protocols.

(17) This reports looks at the interference caused by the wind farm to the licensed radio systems within the coordination zone. The radio systems that are affected are operated by Central Networks.

4.1 Exclusions

(18) This report does not address the implications of this wind energy development on other types of communications systems used by utilities, most commonly GSM mobile phone technology; GPRS – the General Packet Radio Service, PAKNET and TRANSCOMM, a radio data service; and Very Small Aperture Terminals (VSATs) operating to fixed satellites, nor does it address the effect of wind turbines on radar systems or aeronautical band radio communications.

(19) Extensive research has been conducted into the effect of wind turbines on aeronautical radar that would affect utility airborne operations, but that is a matter for the utilities themselves and the Civil Aviation Authority (CAA).

5 The study

It was agreed that JRC would produce a study comprising of the following elements:

Undertake:

a detailed study and survey into the existing radio communication infrastructure and locations within the area of the wind farm to confirm the data for the services operated by Central Networks.

Review :

the theoretical analysis of the proposed wind turbine layout on the licensed radio systems and in doing so identify the exclusion zone for the affected radio infrastructure.

Liaise:

with TNEI to present the above.

6 Mechanisms by which wind farms may affect radio transmissions

(20) It may be helpful to consider the effects of wind turbines on radio transmissions under three main headings:

Obstruction –
physically obstructing the direct radio path, attenuating the received signal.

Diffraction –
although not directly obstructing the radio signal, because of the wave-like nature of a radio signal, large structures close to the radio path can cause interference patterns to be generated, generally referred to as Fresnel Zone interference.

Reflection/Scattering –
where the radio waves are reflected or scattered off a large structure and interfere with the wanted signal.

(21) The sensitivity of a particular radio service to interference will depend on a number of radio parameters, including the frequency, modulation (some modulation types and coding schemes are designed to be more resilient than others) and the polarisation of the radio signal.

(22) The intensity of the effect on radio signals will depend on a number of the details of the construction of the turbine. This will include the materials used in the construction of the tower, nacelle and blades, particularly whether metallic, or incorporating metallic components. At certain radio frequencies, the propensity of the material to absorb surface water may also be significant. Although the overall size of the wind turbine will have an impact on its ability to cause interference, previous studies highlight the possibility of some elements of the wind turbine resonating at frequencies used in practical communications systems, giving rise to non-linear scaling factors.

(23) Wind turbines create a number of unique factors, not associated with other large structures. The turbine will offer a multiplicity of profiles, depending on:

- The speed of rotation of the blades
- The angle the blade subtends to the shaft (pitch)
- The angle the nacelle subtends (yaw)
- Moisture retention or icing of the turbine blades.

(24) Wind turbines pose particular problems for radio transmissions as the turbines tend to occupy the high ground also used by the radio infrastructure, and their size implies that they offer radio interference paths that may be superior to the designed radio path profile.

(25) A full explanation of the method JRC use while undertaking any assessment of the impact a proposed wind turbine/farm may have on the radio infrastructure can be seen on the JRC web site.