NORTH AYRSHIRE
COUNCIL

Cunninghame House,
Irvine.

14 February 2013

Local Review Body

You are requested to attend a Meeting of the above mentioned Committee of North Ayrshire Council to be held in the Council Chambers, Cunninghame House, Irvine on **WEDNESDAY 20 FEBRUARY 2013** at **2.30 p.m., or at the conclusion of the meeting of the Planning Committee, whichever is the later** to consider the undernoted business.

Yours faithfully

Elma Murray

Chief Executive

1. Declarations of Interest
Members are requested to give notice of any declarations of interest in respect of items of business on the Agenda.

2. Minutes
The Minute of the meeting held on 23 January 2013 will be signed in accordance with paragraph 7(1) of Schedule 7 of the Local Government (Scotland) Act 1973 (copy enclosed).

3. **Notice of Review: 12/00469/PP: Erection of a wind turbine with a hub height of 24m and a maximum blade tip height of 35m: Titwood Farm, Kilmaurs, Kilmarnock**

Submit report by the Chief Executive on a Notice of Review by the applicant in respect of the refusal of a planning application by officers under delegated powers (copy enclosed).

Local Review Body

Sederunt:		
Matthew Brown	(Chair)	
John Ferguson	(Vice-Chair)	Chair:
Robert Barr		
John Bell		
John Bruce		
Joe Cullinane		
Ronnie McNicol		
Tom Marshall		Attending:
Jim Montgomerie		
Robert Steel		
		Apologies:
		Meeting Ended:

Local Review Body
23 January 2013

IRVINE, 23 January 2013 - At a Meeting of the Local Review Body of North Ayrshire Council at 2.45 p.m.

Present
Matthew Brown, John Ferguson, Robert Barr, Joe Cullinane, Ronnie McNicol, Tom Marshall, Jim Montgomerie and Robert Steel.

In Attendance
D. Hammond and K. Smith, Planning Advisers to the Local Review Body (Development and Environment); J. Law, Legal Adviser to the Local Review Body and D. McCaw Committee Services Officer (Chief Executive's Service).

Chair
Councillor Brown in the Chair.

Apologies for Absence
John Bell and John Bruce.

1. Declarations of Interest

There were no declarations of interest by Members in terms of Standing Order 16 and Section 5 of the Code of Conduct for Councillors.

2. Minutes

The Minutes of the (i) meeting held on 5 December 2012; and (ii) Special Meeting held on 19 December 2012 were signed in accordance with paragraph 7(1) of Schedule 7 of the Local Government (Scotland) Act 1973.

3. Notice of Review: 12/00496/PP: Erection of 55kW wind turbine measuring 24.8m to hub and 34.5m to blade tip: Auchenhew Farm, Kildonan, Isle of Arran

Submitted report by the Chief Executive on a Notice of Review by the applicant in respect of the refusal of a planning application by officers under delegated powers for the erection of a 55kW wind turbine measuring 24.8m to hub and 34.5m to blade tip at Auchenhew Farm, Kildonan, Isle of Arran. The Notice of Review documentation, the Planning Officer's Report of Handling, a location plan and a copy of the Decision Notice, were provided as Appendices 1-4 to the report.

The Planning Adviser to the Local Review Body introduced the matter under review, confirming that the Notice of Review had been submitted timeously by the applicant. Photographs and plans of the proposed development were displayed and the Planning Adviser provided the LRB with a verbal summary of the review documents.

Members agreed that the Local Review Body had sufficient information before it to determine the matter without further procedure.

Accordingly, having considered all the information, the Local Review Body agreed (a) to uphold the decision to refuse planning permission on the following ground:-

1. That, the proposed development would not accord with: (a) Policy INF 8 and the Development Control Statement of the Isle of Arran Local Plan; (b) the Ayrshire Supplementary Planning Guidance on Wind Farm Development; and (c) the Council's adopted Landscape Capacity Study for Wind Farm Development in North Ayrshire (Phase 2 Report) 2009, in that by reason of its scale, design, appearance and isolated siting, it would: (i) intrude upon an area of relatively open countryside, detracting from its natural appearance and scenic quality, which would be detrimental to visual amenity; and (ii) establish an undesirable precedent for further unsuitable wind farm development, thereby detracting from the amenity and appearance of the countryside.

and (b) that the Decision Notice be drafted by Officers, agreed by the Chair and, thereafter, signed by the Proper Officer for issue to the applicant.

4. Notice of Review: 12/00432/PP: Erection of detached dwellinghouse: Site to West of 35 Margnaheglish Road, Lamlash, Isle of Arran

Submitted report by the Chief Executive on a Notice of Review by the applicant in respect of the refusal of a planning application by officers under delegated powers for erection of detached dwellinghouse at a site to west of 35 Margnaheglish Road, Lamlash, Isle of Arran. The Notice of Review documentation, representations received from interested parties, the Planning Officer's Report of Handling, a location plan and a copy of the Decision Notice, were provided as Appendices 1-5 to the report.

The Planning Adviser to the Local Review Body introduced the matter under review, confirming that the Notice of Review had been submitted timeously by the applicant. Photographs and plans of the proposed development were displayed and the Planning Adviser provided the LRB with a verbal summary of the review documents.

Members agreed that the Local Review Body had sufficient information before it to determine the matter without further procedure.

Accordingly, having considered all the information, the Local Review Body agreed (a) to uphold the decision to refuse planning permission on the following grounds:-

1. That, the proposed development would be contrary to Policy ENV 1 of the adopted Isle of Arran Local Plan, in that the dwellinghouse is not required for persons employed in agriculture, forestry or an established rural business and consequently there is no justification for the dwellinghouse which, if approved, would establish an undesirable precedent for unnecessary development within the countryside, to the detriment of its appearance and amenity.

2. That, the proposed development would be contrary to Policy RES 1 of the adopted Isle of Arran Local Plan, in that it would comprise residential development outwith the settlement boundary and within the countryside, for which there is no specific locational need which would be detrimental to the amenity and appearance of the countryside and set an undesirable precedent for further similar developments.

3. That, the proposed development would be contrary to: (i) Policy H 1 of Alteration No. 1 and Criteria (a) and (b) of the Development Control Statement of the Isle of Arran Local Plan, in that the proposed dwellinghouse would not constitute an acceptable addition to an existing well-defined nucleated group and that its design would not be sympathetic to the character and form of the surrounding area ; and (ii) Policy H 2 of Alteration No. 1 given its proximity to the settlement of Lamlash.

and (b) that the Decision Notice be drafted by Officers, agreed by the Chair and, th ereafter, signed by the Proper Officer for issue to the applicant.

The meeting ended at 3.20 p.m.

NORTH AYRSHIRE COUNCIL

Agenda Item 3

20 February 2013

Local Review Body

Subject:	**Notice of Review: 12/00469/PP: Erection of a wind turbine with a hub height of 24m and a maximum blade tip height of 35m: Titwood Farm, Kilmaurs, Kilmarnock**
Purpose:	To submit, for the consideration of the Local Review Body, a Notice of Review by the applicant in respect of a planning application refused by officers under delegated powers.
Recommendation:	That the Local Review Body considers the Notice.

1. Introduction

1.1 The Town and Country Planning (Scotland) Act 1997, as amended by the Planning (Scotland) Act 2006, provides for certain categories of planning application for "local" developments to be determined by appointed officers under delegated powers. Where such an application is refused, granted subject to conditions or not determined within the prescribed period of 2 months, the applicant may submit a Notice of Review to require the Planning Authority to review the case. Notices of Review in relation to refusals must be submitted within 3 months of the date of the Decision Notice.

2. Current Position

2.1 A Notice of Review has been submitted in respect of Planning Application 12/00469/PP for the erection of a wind turbine with a hub height of 24m and a maximum blade tip height of 35m at Titwood farm, Kilmaurs, Kilmarnock.

2.2 The application was refused by officers for the reasons detailed in the Decision Notice at Appendix 4.

2.3 The following related documents are set out in the appendices to this report:-

Appendix 1 - Notice of Review documentation;
Appendix 2 - Report of Handling;
Appendix 3 - Location Plan; and
Appendix 4 - Decision Notice.

3. Proposals

3.1 The Local Review Body is invited to consider the Notice of Review.

4. Implications

Financial Implications

4.1 None arising from this report.

Human Resource Implications

4.2 None arising from this report.

Legal Implications

4.3 The Notice of Review requires to be considered in terms of the Town and Country Planning (Scotland) Act 1997, as amended by the Planning (Scotland) Act 2006, and the Town and Country Planning (Schemes of Delegation and Local Review Procedure) (Scotland) Regulations 2008.

Equality Implications

4.4 None arising from this report.

Environmental Implications

4.5 None arising from this report.

Implications for Key Priorities

4.6 None arising from this report.

5. Consultations

5.1 Interested parties (both objectors to the planning application and statutory consultees) were invited to submit additional representations in terms of the Notice of Review. No such additional representations have been received.

6. Conclusion

6.1 The Local Review Body is invited to consider the Notice of Review, including any further procedures which may be required prior to determination.

ELMA MURRAY
Chief Executive

Reference :
For further information please contact Diane McCaw, Committee Services Officer on 01294 324133.

Background Papers
Planning Application 12/00469/PP and related documentation is available to view on-line at www.north-ayrshire.gov.uk or by contacting the above officer.

NOTICE OF REVIEW

UNDER SECTION 43A(8) OF THE TOWN AND COUNTRY PLANNING (SCOTLAND) ACT 1997 (AS AMENDED)IN RESPECT OF DECISIONS ON LOCAL DEVELOPMENTS

THE TOWN AND COUNTRY PLANNING (SCHEMES OF DELEGATION AND LOCAL REVIEW PROCEDURE) (SCOTLAND) REGULATIONS 2008

THE TOWN AND COUNTRY PLANNING (APPEALS) (SCOTLAND) REGULATIONS 2008

IMPORTANT: Please read and follow the guidance notes provided when completing this form. Failure to supply all the relevant information could invalidate your notice of review.

Use BLOCK CAPITALS if completing in manuscript

Applicant(s)		**Agent** *(if any)*	
Name	Mr M Montgomerie	Name	Houghton Planning
Address	c/o Agent	Address	102 High Street Dunblane
Postcode		Postcode	FK15 0ER
Contact Telephone 1		Contact Telephone 1	
Contact Telephone 2		Contact Telephone 2	
Fax No		Fax No	
E-mail*		E-mail*	

Mark this box to confirm all contact should be through this representative: x

	Yes	No
* Do you agree to correspondence regarding your review being sent by e-mail?	x	☐

Planning authority	North Ayrshire Council
Planning authority's application reference number	N/12/00469/PP
Site address	Titwood Farm, Kilmaurs, Kilmarnock, Ayrshire, KA3 2PN
Description of proposed development	Erection of a wind turbine with a hub height of 24m and a maximum blade tip height of 35m

Date of application: 29 August 2012 Date of decision (if any): 17 October 2012

Note. This notice must be served on the planning authority within three months of the date of the decision notice or from the date of expiry of the period allowed for determining the application.

Nature of application

1.	Application for planning permission (including householder application)	x
2.	Application for planning permission in principle	☐
3.	Further application (including development that has not yet commenced and where a time limit has been imposed; renewal of planning permission; and/or modification, variation or removal of a planning condition)	☐
4.	Application for approval of matters specified in conditions	☐

Reasons for seeking review

1.	Refusal of application by appointed officer	x
2.	Failure by appointed officer to determine the application within the period allowed for determination of the application	☐
3.	Conditions imposed on consent by appointed officer	☐

Review procedure

The Local Review Body will decide on the procedure to be used to determine your review and may at any time during the review process require that further information or representations be made to enable them to determine the review. Further information may be required by one or a combination of procedures, such as: written submissions; the holding of one or more hearing sessions and/or inspecting the land which is the subject of the review case.

Please indicate what procedure (or combination of procedures) you think is most appropriate for the handling of your review. You may tick more than one box if you wish the review to be conducted by a combination of procedures.

1.	Further written submissions	☐
2.	One or more hearing sessions	x
3.	Site inspection	x
4	Assessment of review documents only, with no further procedure	☐

If you have marked box 1 or 2, please explain here which of the matters (as set out in your statement below) you believe ought to be subject of that procedure, and why you consider further submissions or a hearing are necessary:

A hearing would allow the various issues as set out in the Report of Handling to be tested.

Site inspection

In the event that the Local Review Body decides to inspect the review site, in your opinion:

		Yes	No
1.	Can the site be viewed entirely from public land?	x	☐
2	Is it possible for the site to be accessed safely, and without barriers to entry?	x	☐

If there are reasons why you think the Local Review Body would be unable to undertake an unaccompanied site inspection, please explain here:

Statement

You must state, in full, why you are seeking a review on your application. Your statement must set out all matters you consider require to be taken into account in determining your review. Note: you may not have a further opportunity to add to your statement of review at a later date. It is therefore essential that you submit with your notice of review, all necessary information and evidence that you rely on and wish the Local Review Body to consider as part of your review.

If the Local Review Body issues a notice requesting further information from any other person or body, you will have a period of 14 days in which to comment on any additional matter which has been raised by that person or body.

State here the reasons for your notice of review and all matters you wish to raise. If necessary, this can be continued or provided in full in a separate document. You may also submit additional documentation with this form.

See attached statement.

Have you raised any matters which were not before the appointed officer at the time the determination on your application was made?	Yes	No
	☐	x

If yes, you should explain in the box below, why you are raising new material, why it was not raised with the appointed officer before your application was determined and why you consider it should now be considered in your review.

Further photomontages have been produced that show how the turbine appears in the landscape in combination with the consented turbines nearby and when viewed from the B469. These were not submitted with the planning application, having only been prepared in response to the planning application having been refused, but they relate to a matter, cumulative visual impact, that is before the Local Review Board to decide upon and so it is respectfully requested that they be allowed in to the review as further supplementary information.

List of documents and evidence

Please provide a list of all supporting documents, materials and evidence which you wish to submit with your notice of review and intend to rely on in support of your review.

See attached statement.

Note. The planning authority will make a copy of the notice of review, the review documents and any notice of the procedure of the review available for inspection at an office of the planning authority until such time as the review is determined. It may also be available on the planning authority website.

Checklist

Please mark the appropriate boxes to confirm you have provided all supporting documents and evidence relevant to your review:

x Full completion of all parts of this form

x Statement of your reasons for requiring a review

x All documents, materials and evidence which you intend to rely on (e.g. plans and drawings or other documents) which are now the subject of this review.

Note. Where the review relates to a further application e.g. renewal of planning permission or modification, variation or removal of a planning condition or where it relates to an application for approval of matters specified in conditions, it is advisable to provide the application reference number, approved plans and decision notice from that earlier consent.

Declaration

I the agent hereby serve notice on the planning authority to review the application as set out on this form and in the supporting documents.

Signed

Date 10th JANUARY 2012

houghton
• planning ltd •

STATEMENT IN SUPPORT OF LOCAL REVIEW

FOR:

ERECTION OF A WIND TURBINE WITH A HUB HEIGHT OF 24M AND A MAXIMUM BLADE TIP HEIGHT OF 35M

AT

TITWOOD FARM, KILMAURS, AYRSHIRE, KA3 2PN

ON BEHALF OF:	MR M MONTGOMERIE (FINE ENERGY)
PREPARED BY:	HOUGHTON PLANNING
DATE:	10TH JANUARY 2013

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1.0 INTRODUCTION

1.1 This review statement has been prepared in relation to a detailed planning for the erection of a 55kW three bladed wind turbine measuring 24m to the hub, 35m to the blade tip and with a rotor diameter of 20m maximum. There would also be a temporary access route from close to Titwood Farm created to allow access during construction.

1.2 This statement has been prepared by Houghton Planning on behalf of the applicant, Mr M Montgomerie, and agent, Fine Energy. Houghton Planning is a full service planning consultancy led by Paul Houghton BSc (Hons), LLB (Hons), MA, MRTPI who has over 20 years' experience in planning and is the author of this statement.

1.3 The application was the subject of a full range of consultations and the Civil Aviation Authority (CAA), Glasgow Airport, Glasgow Prestwick Airport, the MOD and National Air Traffic Services (NATs) were all consulted and have raised no concerns.

1.4 The Council's Environmental Health section has also been consulted and has no objections in relation to noise subject to the imposition of planning conditions in relation to noise. They also require separate planning conditions in relation to submitting a suitable contamination mitigation strategy, should any be encountered during construction, and in relation to times of working. All of these proposed planning conditions are acceptable to the applicant.

1.5 **It is notable that despite the Council undertaking both neighbour notification and advertising the planning application that no comments from local residents were received.**

1.6 The case officer's Report of Handling concludes that there will no issues in relation to the visual and landscape impact of the turbine in isolation, although he is concerned at its possible cumulative visual and landscape impact alongside two consented turbines on adjoining land. He agrees with the applicant that shadow flicker will not be an issue due to the distance of the nearest possible affected dwelling nor will noise be a concern.

1.7 The application was refused under delegated powers on 17th October 2012 for a single reason as follows:

> *The proposed development would be contrary to criterion (f) of Policy INF 7 of the adopted North Ayrshire Local Plan (excluding Isle of Arran) by reason of the unacceptable cumulative impact the proposed development would have*

on the countryside, in combination with the consented Wheatrig Farm wind turbine development, to the detriment of the setting and character of the area.

2.0 THE SITE

2.1 The site is located at Titwood Farm, Kilmaurs, which is situated north east of Irvine and west of the B769 that connects Irvine with Stewarton.

2.2 The site is situated circa 500m west of Titwood Farm, although the nearest dwelling would be at Mid Lambroughton, which is located approximately 375m to the north. Other local farms and dwellings that will have sight of the turbine will be West Lambroughton, Hillhead, Wheatrig, Floors, Townhead of Lambroughton and Chapeltoun House.

2.3 Titwood Farm is owned by the applicant who has also gone out of his way to speak to as many of his neighbours as possible to ascertain if they have any concerns. No concerns have been raised with him and no comments have otherwise been submitted to the Council during its consultation on the planning application. This is extremely unusual situation and suggests that in this case there is an acceptance that a turbine on this site is unlikely to be seen as having a visual (or cumulative visual) impact on those people living nearby.

2.4 The local landscape character is described in the Cumulative Landscape and Visual Impact Assessment, but is best summarised in the Ayrshire Landscape Character Assessment No.111, published in 1998 by Land Use Consultants for Scottish Natural Heritage (SNH) as part of the nationwide programme of landscape assessments. This document classifies the land and its immediate setting as falling within the 'Ayrshire Lowlands' character area. The key characteristics of the Ayrshire Lowlands area are:

- "Predominantly pastoral, with arable farmland on the lower and better soils;
- Historically peat bogs which have been drained and reclaimed for agriculture, although some peat areas still remain;
- Regular shaped field patterns enclosed by beech/hawthorn hedgerows, which are in good condition; and
- Many field boundaries are marked by mature hedgerow trees, with beech trees predominating."

2.5 It is also noticeable that local roads in this area are often set down with both embankments and hedgerows restricting the views that drivers have over adjoining fields.

2.6 There are no biodiversity, environmental or cultural heritage designations immediately in the vicinity of the site and no issues in regard to these have been raised by the case officer or consultees.

3.0 PLANNING HISTORY

3.1 The site itself has no relevant planning history, although planning was granted on an adjoining site, which is part of the neighbouring farm, Wheatrig, on 1st November 2011 for the erection of two wind turbines measuring 31.5m to the hub and 45m to the blade tip. There are no documents available online to view in relation to this application, but presumably the case officer concluded that this development was considered acceptable in relation to visual and landscape impact and equally caused no other relevant technical concerns.

3.2 There is no indication on the online file that the planning permission has been commenced, or indeed if this is ever likely to happen. This is odd as there was a rush during 2012 to commence and construct consented wind turbines to ensure that they beat the reduction in feed-in-tariff payments that came into effect on 1st of December 2012. Although it is still financially viable for schemes, including the application proposal, to progress going forward, despite the tariff reduction, it perhaps suggest that there is something else that has caused the proposals at Wheatrig to stall.

4.0 PLANNING POLICY AND DISCUSSION

4.1 Section 25 of the Town and Country Planning (Scotland) Act as modified states that "Where, in making any determination under the planning Acts, regard is to be had to the development plan, the determination shall be made in accordance with the plan unless material considerations indicate otherwise".

4.2 Material considerations can include a wide range of issues and also, more specifically, relevant Scottish Government guidance and advice, along with locally approved supplementary planning guidance, reports and studies.

4.3 The Scottish Government's support for green energy is an important material consideration and something that needs to be weighed in the balance and we hope

that the Local Review Body will do this. Even if some level of harm is anticipated, this may well be outweighed by the necessity of supporting Scotland's aim to be self-sufficient from renewable sources of energy, which has recently been reiterated by the First Minister.

4.4 In planning policy terms, we agree that the appropriate policy to test the turbine against is Policy INF8 in the adopted North Ayrshire Local Plan. As the proposal is not within the *"Sensitive Landscape Character Area"* the policy states that this turbine accords with the policy, i.e. the presumption is in favour of planning permission being granted provided the criteria included within the policy are met.

4.5 The six criteria of Policy INF8 are set out in full in the Report of Handling and it would appear that the only area of contention for this review is in relation to criterion (f) and thus cumulative impact.

4.6 In relation to criteria (a), (b) and (c) the case officer considers that the local landscape can absorb a turbine of the scale proposed and relies in that regard on what is said in the Landscape Capacity Study for Wind Farm Development in North Ayrshire - Phase Two Report. This states that within the 'Ayrshire Lowlands' landscape character area turbines up to 70m can be acceptable and thus this proposal is, in principle, acceptable. It would also appear that the case officer does not see this proposed turbine, in isolation, as having any adverse visual impact and it is only in how it would relate to the consented turbines at Wheatrig that he raises a concern.

4.7 There is comment in the Report of Handling as to how the turbine would appear in the landscape, and where it can be viewed from, and whilst the case officer generally agrees with the Cumulative Landscape and Visual Impact Assessment in that regard, he does comment that the turbines will perhaps be more visible than is concluded in that report.

4.8 In terms of the above, it should be stressed that a ZTV is a tool and not an absolute representation of where a turbine will be visible from. It is there is assist the technician in identifying locations from where the turbine may potentially be visible and thus where photographs should be taken to generate photomontages. It is accepted, therefore, that there are many other locations from which the turbine would be visible, including all of those mentioned by the case officer. In particular, the turbine would be seen by those walking along the B769, who could see over and through gaps in the hedgerow, although only in glimpsed views by those driving. It would also be visible from all of the dwellings mentioned above in paragraph 2.2.

This is nonetheless best judged by members of the Local Review Body visiting the site and local area.

4.9 The only information that can be provided as to how many people will be walking in this area is anecdotal, but the applicant suspects that it is mainly local people and neighbours walking dogs. This is not an area to which people travel to enjoy the landscape, or for active or passive recreation purposes, and so the numbers of people who will see the turbine, and thus have an emotional reaction to it, are likely to be limited to those living close-by. It is thus particularly notable that none of those have seen a need to comment on the proposal, perhaps suggesting that for those living in this locale the impact is considered neutral (at worst) and possibly even positive for some. Public views about turbines are polarised and so for every person who has a dislike for them, there are those who find them an acceptable, or even interesting, addition to a view.

4.10 The remainder of criterion (c) relates to the natural, cultural and built heritage and these aspects of the policy are addressed in the Planning Statement, Cumulative Landscape and Visual Impact Assessment, the Historical Assets Plan and the Natural and Landscape Assets Plan. No consultees have raised concerns in regard to these and nor has the case officer.

4.11 Criterion (d) is also complied with as all related consultees have no objection. The proposal can be connected with the grid and thus also complies with criterion (e).

4.12 That leaves the issue of cumulative impact and criterion (f) to be assessed. Cumulative impact is a difficult issue to judge and comment upon meaningfully as it is very much in the eye of the beholder. One person's invisible 'line in the sand' will be different to another's and whereas the case officer, in this case, considers that two turbines are fine, and a third is a step too far, that is not to say that someone else could not come to the totally opposite view.

4.13 The cumulative visual impact of the three turbines together can be seen in photomontages 5, 6 and 7, which were submitted with the planning application, and in further photomontages that show how the turbine appears in the landscape in combination with the consented turbines and when viewed from the B469. These were not submitted with the planning application, having only been prepared in response to the planning application having been refused, but they relate to a matter, cumulative visual impact, that is before the Local Review Board to decide upon and so it is respectfully requested that they be allowed in to the review as further supplementary information.

4.14 The above aside, the issue of cumulative visual impact is always best left to the members of the Local Review Board to consider at a site visit and in doing so the same comments as presented above in relation to criterion (a) equally apply here. Who lives in this area, who uses it and what are their likely thoughts on having three turbines rather than two? It has been commented several times already that nobody has seen a need to comment during consultation on the planning application, or directly to the applicant, which perhaps suggest that cumulative impact is not as much an issue as the case officer suggests.

4.15 The case officer is also concerned that the three turbines would appear awkward when viewed together. The Report of Handling does not explain in what sense this would be other than it is a question of distance and height relationship. Again, something feeling visually 'awkward' is a personal thing. It is accepted that the proposed turbine is different to the ones that are consented at Wheatrig, but there is no guarantee that these will be constructed nor indeed that the applicant here will not eventually seek to install a different make or height of turbine. It is accepted that what is on the application site in combination with the possible Wheatrig turbines is not perfect, but equally there has to be an acceptance that sometimes different heights and makes of turbine will be seen in combination. To require conformity would be for the planning system to be unduly influencing what, at the end of the day, is a commercial decision for the applicant as to which manufacturer to work with.

4.16 It is accepted that the three turbines taken together will have a cumulative impact, but that is only marginally greater than the impact that the two consented ones will probably have on this area on their own. As those were deemed acceptable, will a third turbine really take this area from visual/landscape acceptability, through neutral, past adverse to a significantly adverse impact, which is where Policy INF 8 sees the tipping point between conformity/non-conformity with the Local Plan? In our view it does not.

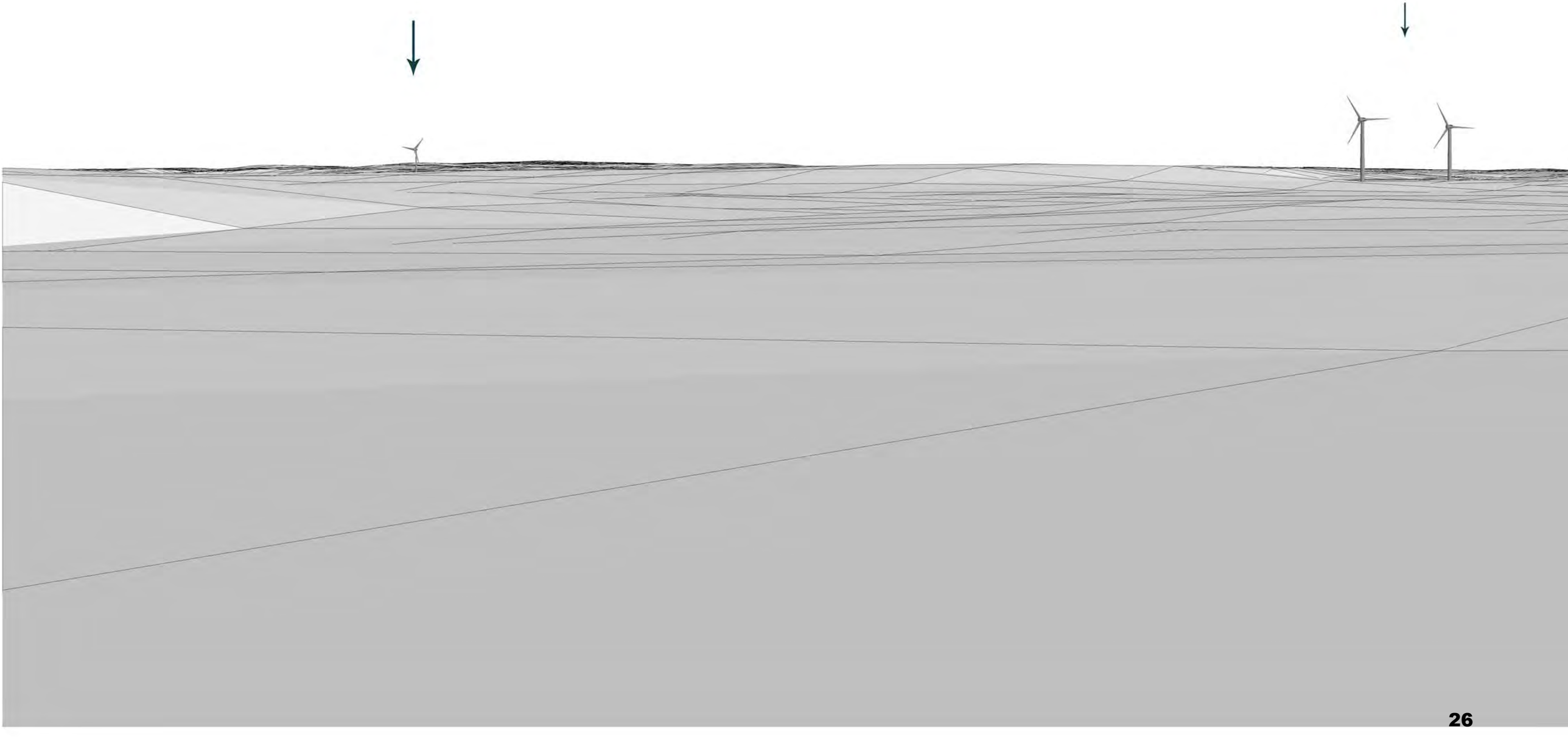
4.17 It is nonetheless always accepted that in considering the acceptability of a turbine in a particular area that the issues are always finely balanced. The turbine proposed here is considered to be acceptable and cumulative impact not the concern that has been suggested. It is hoped that the Local Review Body will support the applicant in this and, therefore, grant planning permission. However, if it nonetheless has a lingering concern at the possible cumulative impact then it is also requested that it make a firm commitment, or as firm as possible, that a third turbine in this locale is acceptable and it is a question of position, perhaps type and not the principle.

VIEW 1 - wireframe

Looking north-east from B769 leaving Cunninghamhead

CO-ORDINATES OF VIEW POINT - 237952E, 642189N
DISTANCE TO APPLICATION TURBINES - 2.1Km
ORIENTATION OF VIEW - 66degrees
PHOTOGRAPH DATE - 3rd January 2013 (13:58pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

2no. 45m high turbines (to tip) @
Wheatrig Farm (app: 11/00572)
status: GRANTED



VIEW 1

Looking north-east from B769 leaving Cunninghamhead

CO-ORDINATES OF VIEW POINT - 237952E, 642189N
DISTANCE TO APPLICATION TURBINES - 2.1Km
ORIENTATION OF VIEW - 66degrees
PHOTOGRAPH DATE - 3rd January 2013 (13:58pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

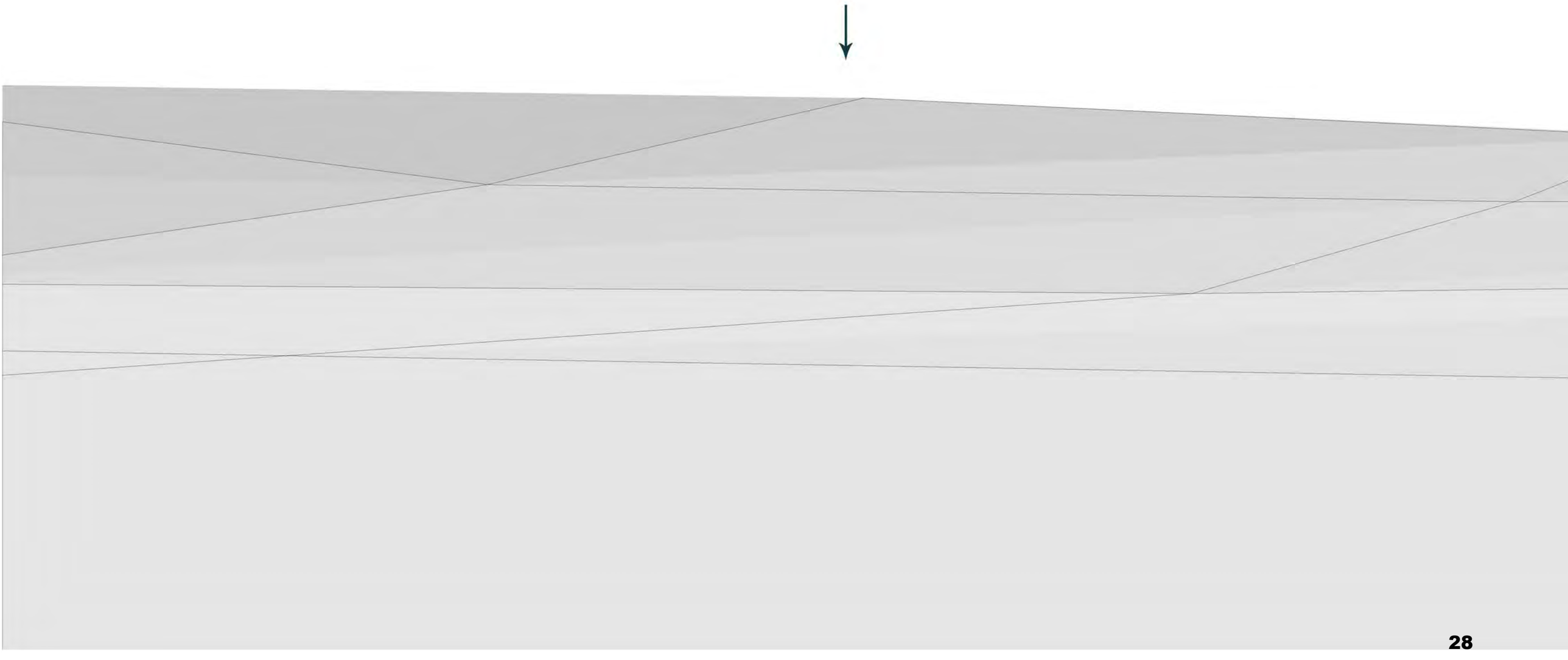
VIEW 2 - wireframe

Looking north-east from B769 at Langlands Farm (at crossroads)

turbine obscured by hill ridge - possibility of view to rotor tip only

CO-ORDINATES OF VIEW POINT - 238656E, 642823N
DISTANCE TO APPLICATION TURBINES - 1.1Km
ORIENTATION OF VIEW - 70degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:03pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

2no. 45m high turbines (to tip) @
Wheatrig Farm (app: 11/00572)
status: GRANTED

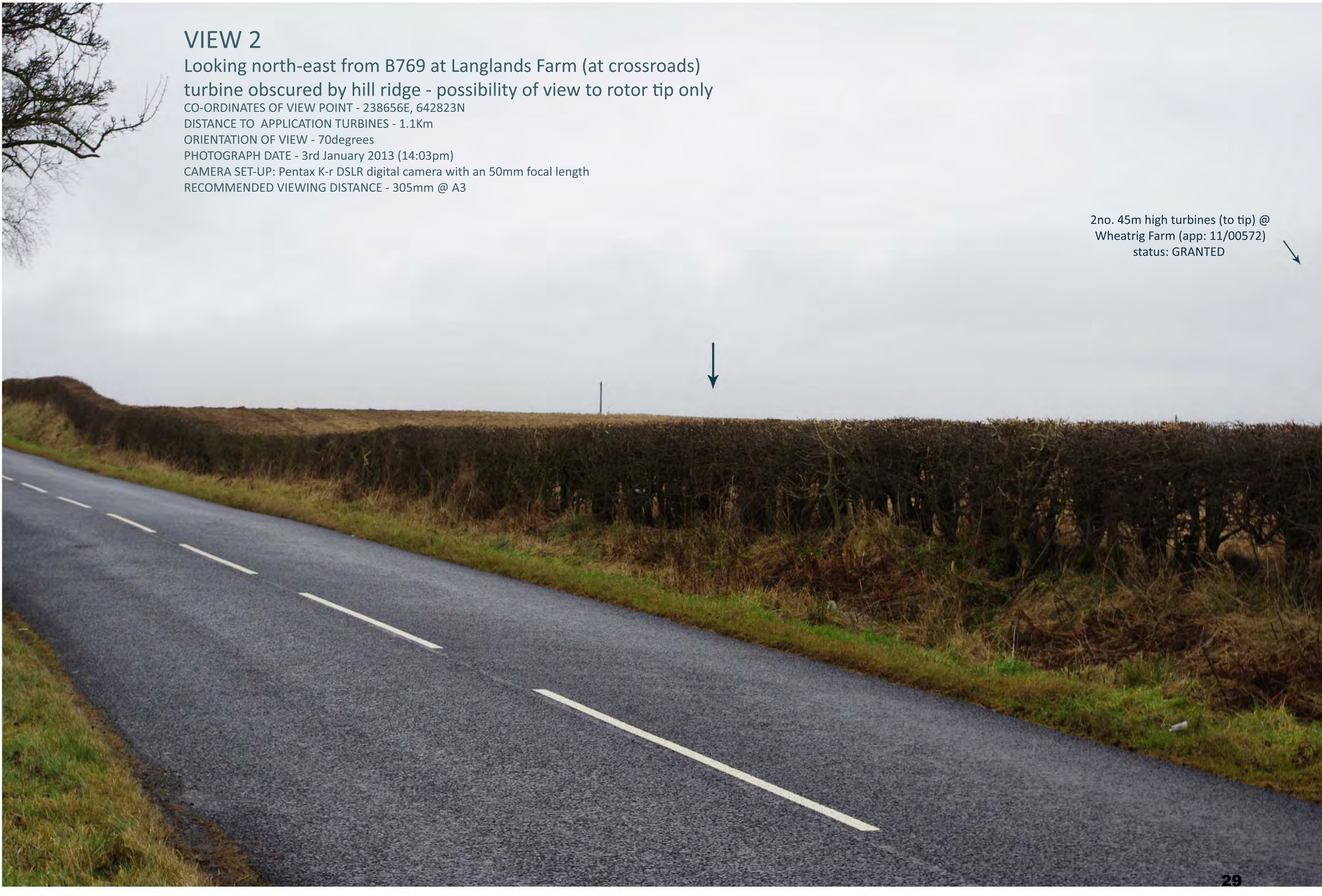


VIEW 2

Looking north-east from B769 at Langlands Farm (at crossroads)
turbine obscured by hill ridge - possibility of view to rotor tip only

CO-ORDINATES OF VIEW POINT - 238656E, 642823N
DISTANCE TO APPLICATION TURBINES - 1.1Km
ORIENTATION OF VIEW - 70degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:03pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

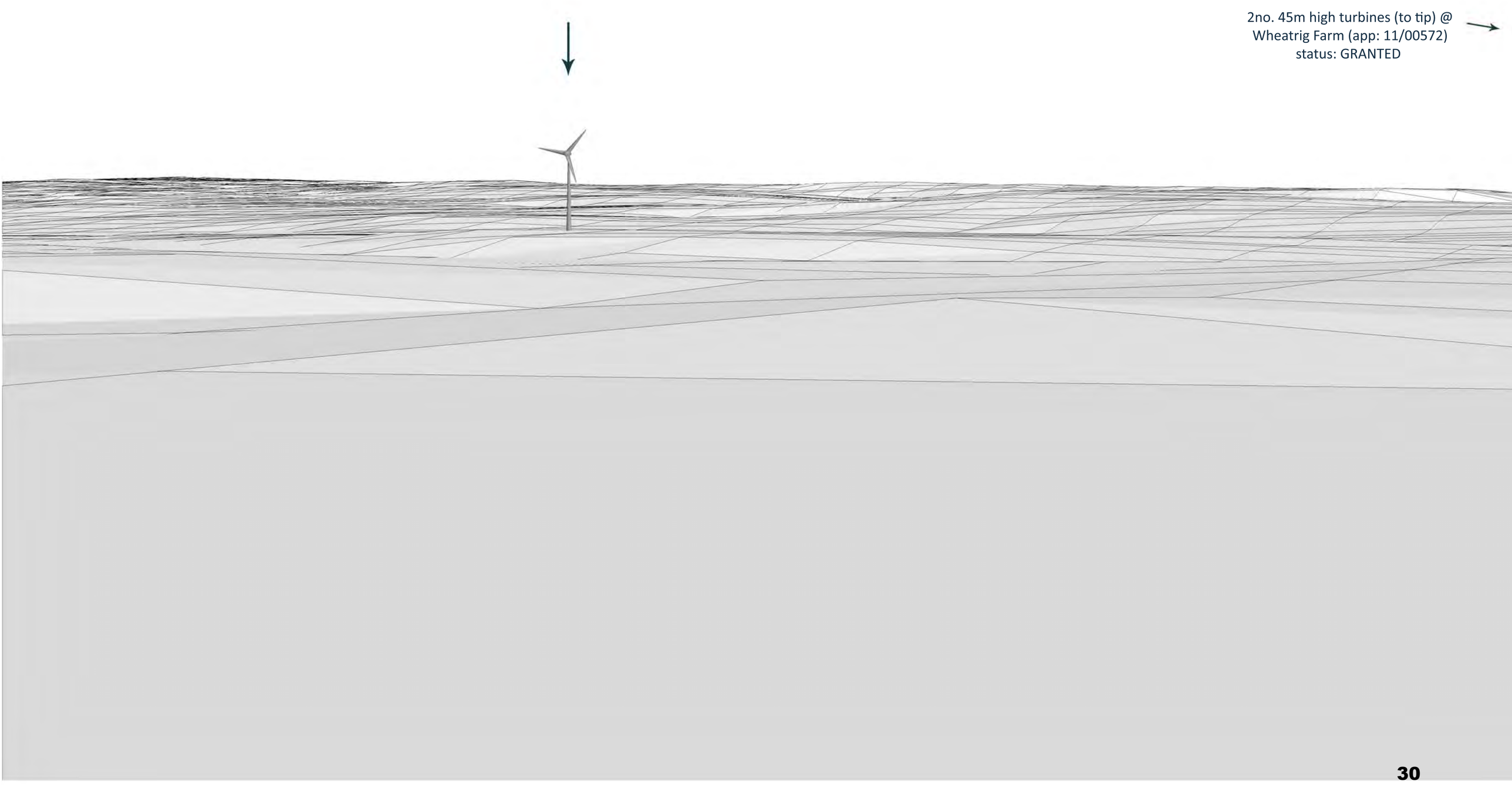
2no. 45m high turbines (to tip) @
Wheatrig Farm (app: 11/00572)
status: GRANTED



VIEW 3 - wireframe

Looking east from B769 at Hillhead Farm entrance

CO-ORDINATES OF VIEW POINT - 238859E, 642929N
DISTANCE TO APPLICATION TURBINES - 0.9Km
ORIENTATION OF VIEW - 75degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:06pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3



VIEW 3

Looking east from B769 at Hillhead Farm entrance

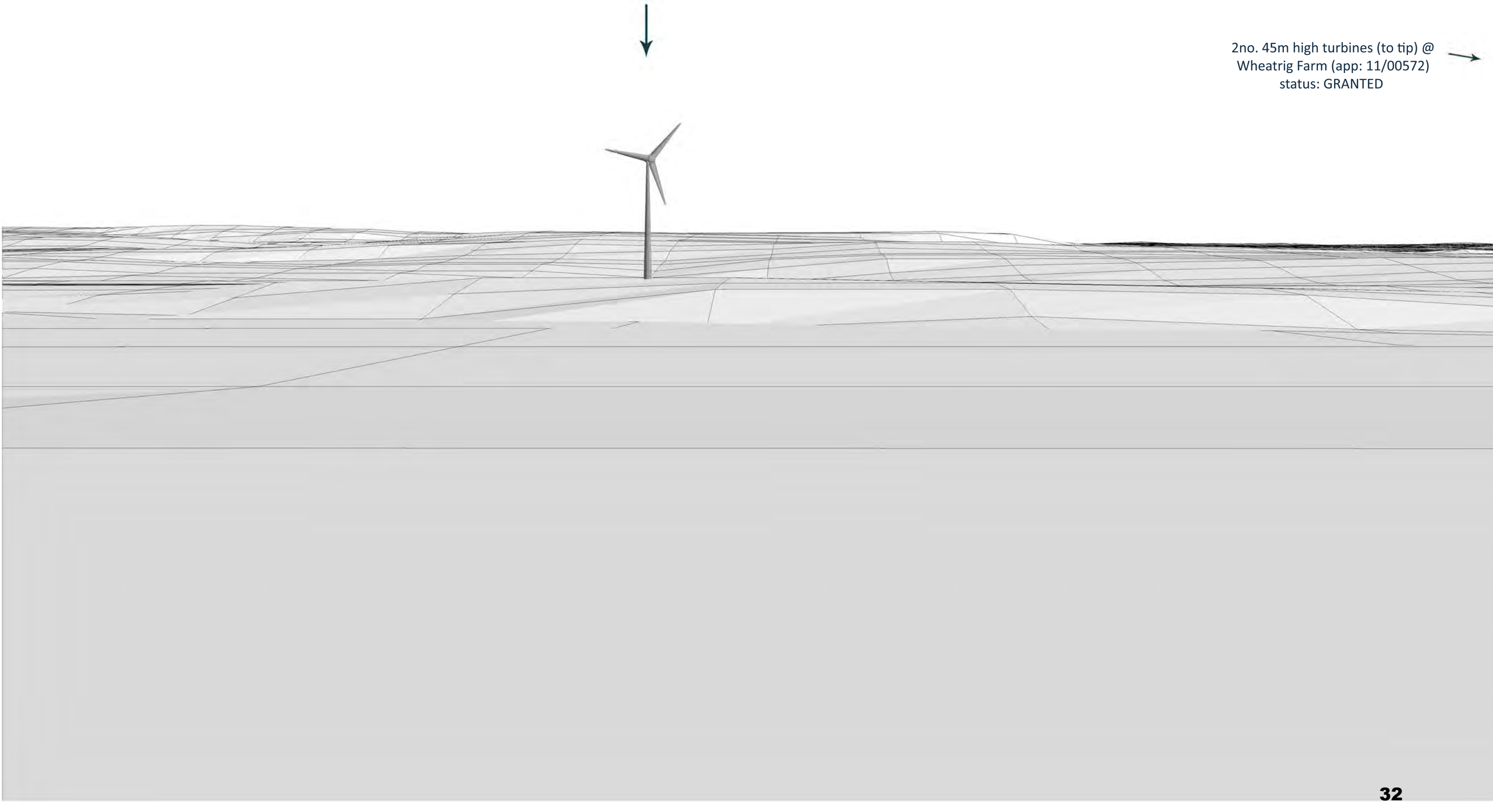
CO-ORDINATES OF VIEW POINT - 238859E, 642929N
DISTANCE TO APPLICATION TURBINES - 0.9Km
ORIENTATION OF VIEW - 75degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:06pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

2no. 45m high turbines (to tip) @
Wheatrig Farm (app: 11/00572)
status: GRANTED

VIEW 4 - wireframe

Looking east from B769 at West Lambroughton

CO-ORDINATES OF VIEW POINT - 239163E, 643235N
DISTANCE TO APPLICATION TURBINES - 0.6Km
ORIENTATION OF VIEW - 85degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:10pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3



VIEW 4

Looking east from B769 at West Lambroughton

CO-ORDINATES OF VIEW POINT - 239163E, 643235N
DISTANCE TO APPLICATION TURBINES - 0.6Km
ORIENTATION OF VIEW - 85degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:10pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

VIEW 5 - wireframe

Looking south-east from B769 at Mid Lambroughton

CO-ORDINATES OF VIEW POINT - 239565E, 643614N
DISTANCE TO APPLICATION TURBINES - 0.45Km
ORIENTATION OF VIEW - 160degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:12pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

2no. 45m high turbines (to tip) @
Wheatrig Farm (app: 11/00572)
status: GRANTED

VIEW 5

Looking south-east from B769 at Mid Lambroughton

CO-ORDINATES OF VIEW POINT - 239565E, 643614N
DISTANCE TO APPLICATION TURBINES - 0.45Km
ORIENTATION OF VIEW - 160degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:12pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

2no. 45m high turbines (to tip) @
Wheatrig Farm (app: 11/00572)
status: GRANTED

VIEW 6 - wireframe

Looking south from B769 at East Lambroughton (crossroads)

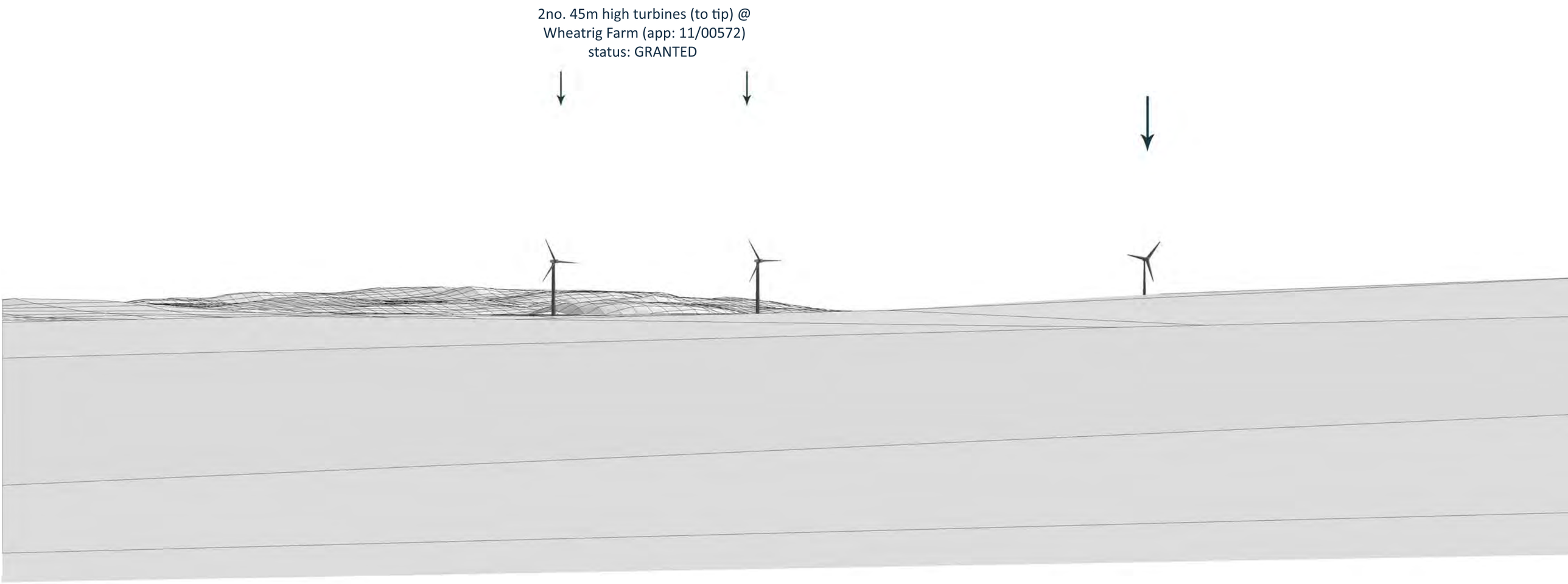
CO-ORDINATES OF VIEW POINT - 239836E, 643885N
DISTANCE TO APPLICATION TURBINES - 0.65Km
ORIENTATION OF VIEW - 185degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:16pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

2no. 45m high turbines (to tip) @
Wheatrig Farm (app: 11/00572)
status: GRANTED

VIEW 6

Looking south from B769 at East Lambroughton (crossroads)

CO-ORDINATES OF VIEW POINT - 239836E, 643885N
DISTANCE TO APPLICATION TURBINES - 0.65Km
ORIENTATION OF VIEW - 185degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:16pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3



VIEW 7 - wireframe

Looking south-west from B769 at Townhead of Lambroughton (application turbine partially obscured by hillridge)

CO-ORDINATES OF VIEW POINT - 240534E, 644403N
DISTANCE TO APPLICATION TURBINES - 1.2Km
ORIENTATION OF VIEW - 210degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:20pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

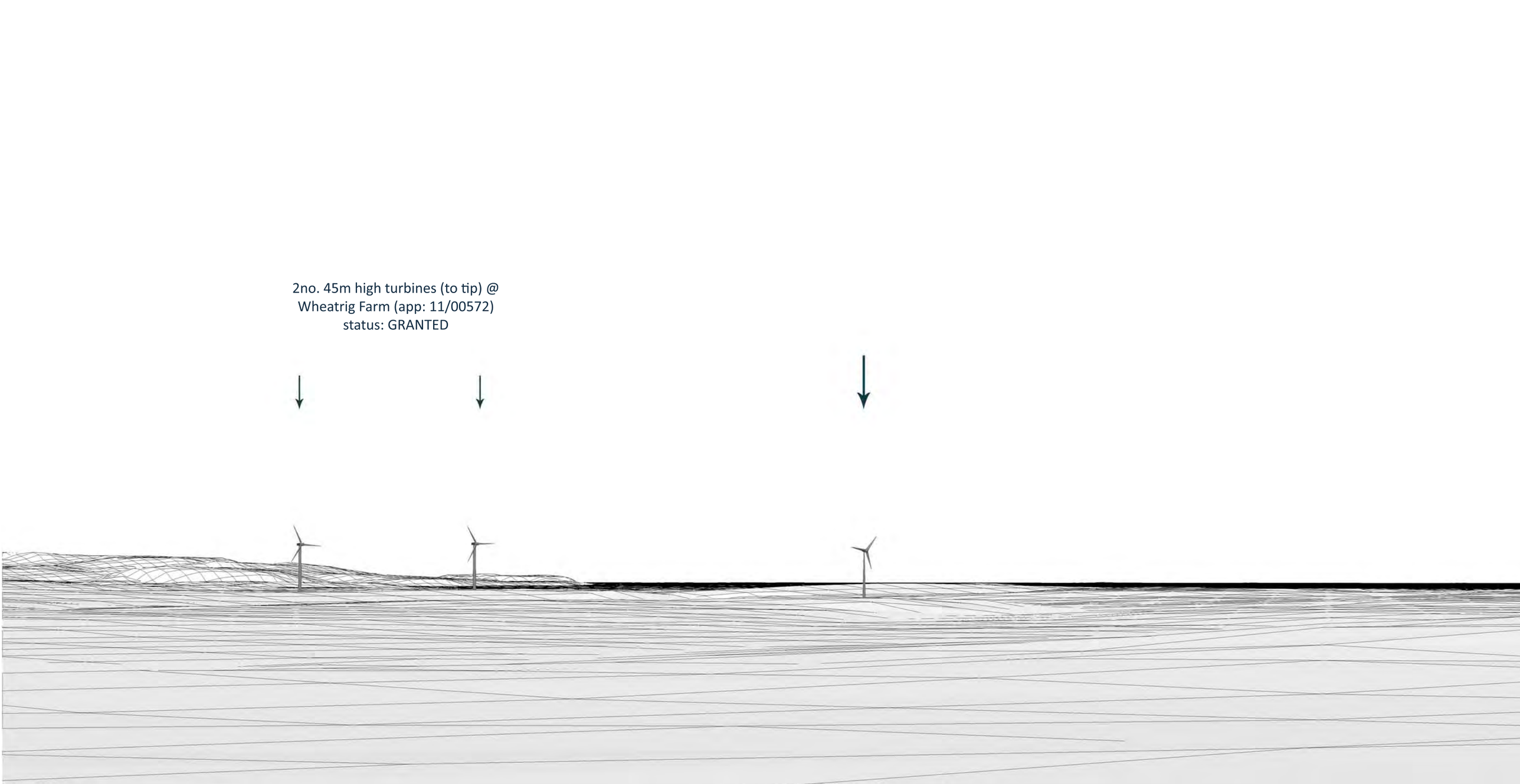
2no. 45m high turbines (to tip) @
Wheatrig Farm (app: 11/00572)
status: GRANTED
(1 turbine obscured by trees)

VIEW 7 - wireframe

Looking south-west from B769 at Townhead of Lambroughton (application turbine partially obscured by hillridge, trees and hedge)

CO-ORDINATES OF VIEW POINT - 240534E, 644403N
DISTANCE TO APPLICATION TURBINES - 1.2Km
ORIENTATION OF VIEW - 210degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:20pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

2no. 45m high turbines (to tip) @
Wheatrig Farm (app: 11/00572)
status: GRANTED



VIEW 8 - wireframe

Looking south-west from B769 at Laigh Castleton

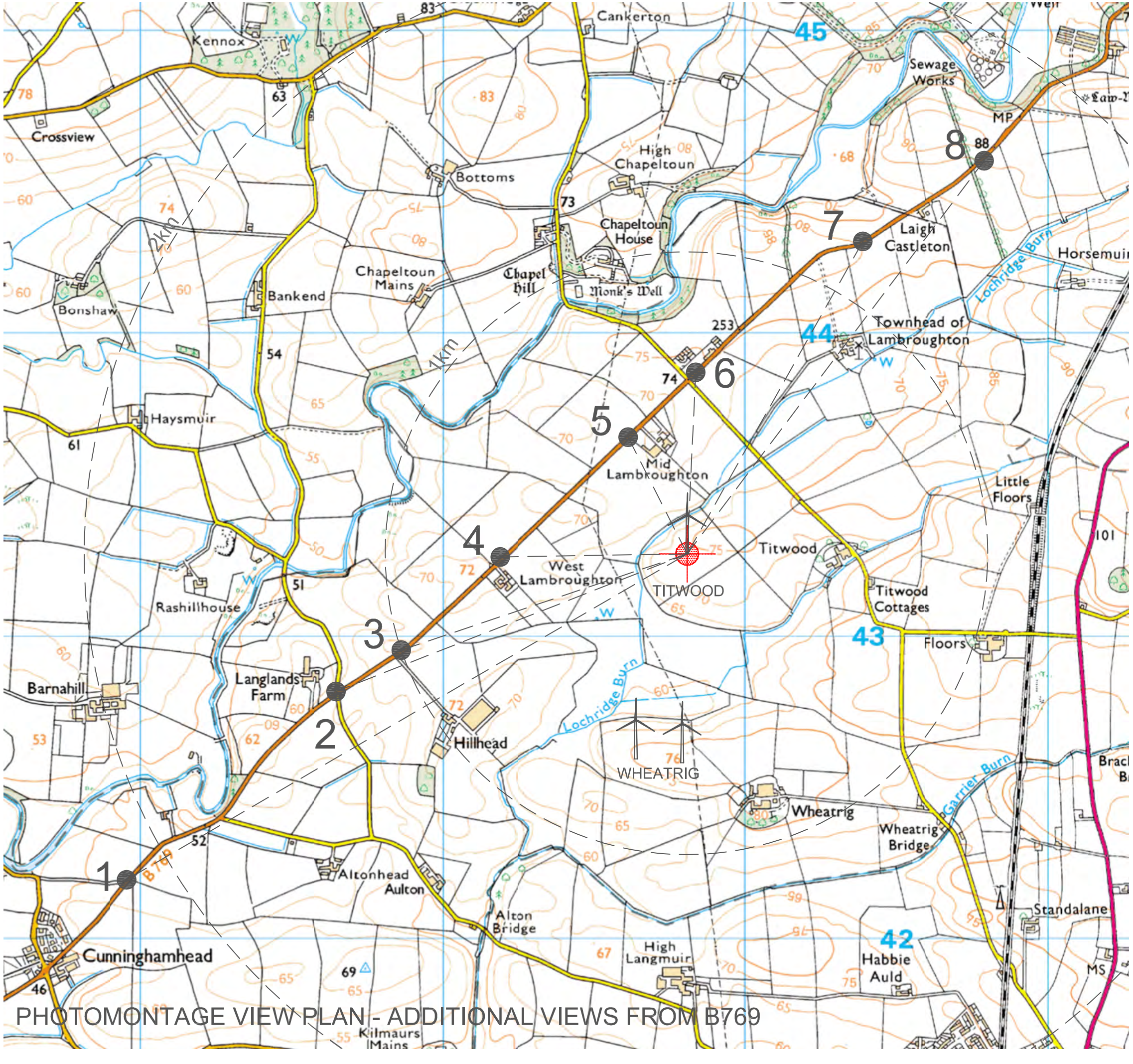
CO-ORDINATES OF VIEW POINT - 240762E, 644563N
DISTANCE TO APPLICATION TURBINES - 1.8Km
ORIENTATION OF VIEW - 220degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:24pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3

2no. 45m high turbines (to tip) @
Wheatrig Farm (app: 11/00572)
status: GRANTED
(turbines obscured by trees)

VIEW 8

Looking south-west from B769 at Laigh Castleton (application turbine obscured by tree-line)

CO-ORDINATES OF VIEW POINT - 240762E, 644563N
DISTANCE TO APPLICATION TURBINES - 1.8Km
ORIENTATION OF VIEW - 220degrees
PHOTOGRAPH DATE - 3rd January 2013 (14:24pm)
CAMERA SET-UP: Pentax K-r DSLR digital camera with an 50mm focal length
RECOMMENDED VIEWING DISTANCE - 305mm @ A3



N

REV	DATE	BY	REASON

fine ENERGY

PROJECT:	Proposed Wind Turbine Installation		
CLIENT:			
ADDRESS:	TITWOOD FARM, KILMAURS		
SITE / CO-ORD:			
DRAWN BY: RJ	SCALE: 1:12500	DATE: 08/01/2013	
TITLE: ADDITIONAL PHOTOMONTAGES		DWG NO: PMV01	

Cunninghame House Friars Croft Irvine KA12 8EE

Tel: 01294 324 319

Fax: 01294 324 372

Email: eplanning@north-ayrshire.gov.uk

Planning Department

Applications cannot be validated until all necessary documentation has been submitted and the required fee has been paid.

Thank you for completing this application form:

ONLINE REFERENCE 000046238-001

The online ref number is the unique reference for your online form only. The Planning Authority will allocate an Application Number when your form is validated. Please quote this reference if you need to contact the Planning Authority about this application.

Type of Application

What is this application for? Please select one of the following: *

We strongly recommend that you refer to the help text before you complete this section.

- [x] Application for Planning Permission (including changes of use and surface mineral working)
- [ ] Application for Planning Permission in Principle
- [ ] Further Application, (including renewal of planning permission, modification, variation or removal of a planning condition etc)
- [ ] Application for Approval of Matters specified in conditions

Description of Proposal

Please describe the proposal including any change of use: * (Max 500 characters)

Erection of an Endurance E-3120 wind turbine with a hub height of 24m and a maximum blade tip height of 35m.

Is this a temporary permission? * [ ] Yes [x] No

If a change of use is to be included in the proposal has it already taken place? (Answer 'No' if there is no change of use.) * [ ] Yes [x] No

Have the works already been started or completed? *

[x] No [ ] Yes - Started [ ] Yes - Completed

Applicant or Agent Details

Are you an applicant, or an agent? * (An agent is an architect, consultant or someone else acting on behalf of the applicant in connection with this application) [ ] Applicant [x] Agent

Agent Details

Please enter Agent details

Company/Organisation:	Fine Energy
Ref. Number:	
First Name: *	Nicola
Last Name: *	Thomson-Jack
Telephone Number: *	
Extension Number:	
Mobile Number:	
Fax Number:	
Email Address: *	

You must enter a Building Name or Number, or both:*

Building Name:	
Building Number:	5
Address 1 (Street): *	Kingsknowe Park
Address 2:	
Town/City: *	Edinburgh
Country: *	Scotland
Postcode: *	EH14 2JQ

Is the applicant an individual or an organisation/corporate entity? *

☑ Individual ☐ Organisation/Corporate entity

Applicant Details

Please enter Applicant details

Title: *	Mr
Other Title:	
First Name: *	M
Last Name: *	Montgomerie
Company/Organisation:	
Telephone Number:	
Extension Number:	
Mobile Number:	
Fax Number:	
Email Address:	

You must enter a Building Name or Number, or both:*

Building Name:	Titwood Farm
Building Number:	
Address 1 (Street): *	Titwood Farm
Address 2:	
Town/City: *	Kilmaurs
Country: *	Scotland
Postcode: *	KA3 2PN

Site Address Details

Full postal address of the site (including postcode where available):

Address 1:	TITWOOD FARM	Address 5:	
Address 2:	KILMAURS	Town/City/Settlement:	KILMARNOCK
Address 3:		Post Code:	KA3 2PN
Address 4:			

Please identify/describe the location of the site or sites.

Northing	643286	Easting	240304

Pre-Application Discussion

Have you discussed your proposal with the planning authority? * ☑ Yes ☐ No

Pre-Application Discussion Details

In what format was the feedback given? *

☐ Meeting ☑ Telephone ☑ Letter ☐ Email

Please provide a description of the feedback you were given and the name of the officer who provided this feedback. If a processing agreement [note 1] is currently in place or if you are currently discussing a processing agreement with the planning authority, please provide details of this. (This will help the authority to deal with this application more efficiently.) * (Max 500 characters)

Screening response.

Title:	Mr	Other title:	
First Name:	A	Last Name:	Hume
Correspondence Reference Number:	12/00242/EIA	Date (dd/mm/yyyy):	30/05/12

Note 1. A processing agreement involves setting out the key stages involved in determining a planning application, identifying what information is required and from whom and setting timescales for the delivery of various stages of the process.

Site Area

Please state the site area: 0.03

Please state the measurement type used: ☑ Hectares (ha) ☐ Square Metres (sq.m)

Existing Use

Please describe the current or most recent use: (Max 500 characters)

Farm land

Access and Parking

Are you proposing a new or altered vehicle access to or from a public road? * ☐ Yes ☑ No

If Yes please describe and show on your drawings the position of any existing, altered or new access points, highlighting the changes you propose to make. You should also show existing footpaths and note if there will be any impact on these.

Are you proposing any changes to public paths, public rights of way or affecting any public rights of access? * ☐ Yes ☑ No

If Yes please show on your drawings the position of any affected areas highlighting the changes you propose to make, including arrangements for continuing or alternative public access.

How many vehicle parking spaces (garaging and open parking) currently exist on the application site? * 2

How many vehicle parking spaces (garaging and open parking) do you propose on the site (i.e. the total of existing and any new spaces or a reduced number of spaces)? * 2

Please show on your drawings the position of existing and proposed parking spaces and identify if these are for the use of particular types of vehicles (e.g. parking for disabled people, coaches, HGV vehicles, cycle spaces).

Water Supply and Drainage Arrangements

Will your proposal require new or altered water supply or drainage arrangements? * ☐ Yes ☑ No

Do your proposals make provision for sustainable drainage of surface water? (e.g. SUDS arrangements) * ☐ Yes ☑ No

Note: -

Please include details of SUDS arrangements on your plans

Selecting 'No' to the above question means that you could be in breach of Environmental legislation.

Are you proposing to connect to the public water supply network? *

☐ Yes

☐ No, using a private water supply

☑ No connection required

If No, using a private water supply, please show on plans the supply and all works needed to provide it (on or off site).

Assessment of Flood Risk

Is the site within an area of known risk of flooding? * ☐ Yes ☑ No ☐ Don't Know

If the site is within an area of known risk of flooding you may need to submit a Flood Risk Assessment before your application can be determined. You may wish to contact your Planning Authority or SEPA for advice on what information may be required.

Do you think your proposal may increase the flood risk elsewhere? * ☐ Yes ☑ No ☐ Don't Know

Trees

Are there any trees on or adjacent to the application site? * ☐ Yes ☑ No

If Yes, please mark on your drawings any trees, known protected trees and their canopy spread close to the proposal site and indicate if any are to be cut back or felled.

Waste Storage and Collection

Do the plans incorporate areas to store and aid the collection of waste (including recycling)? * ☐ Yes ☑ No

If Yes or No, please provide further details:(Max 500 characters)

n/a

Residential Units Including Conversion

Does your proposal include new or additional houses and/or flats? * ☐ Yes ☑ No

All Types of Non Housing Development - Proposed New Floorspace

Does your proposal alter or create non-residential floorspace? * ☐ Yes ☑ No

Schedule 3 Development

Does the proposal involve a form of development listed in Schedule 3 of the Town and Country Planning (Development Management Procedure (Scotland) Regulations 2008 * ☐ Yes ☑ No ☐ Don't Know

If yes, your proposal will additionally have to be advertised in a newspaper circulating in the area of the development. Your planning authority will do this on your behalf but will charge you a fee. Please check the planning authority's website for advice on the additional fee and add this to your planning fee.

If you are unsure whether your proposal involves a form of development listed in Schedule 3, please check the Help Text and Guidance notes before contacting your planning authority.

Planning Service Employee/Elected Member Interest

Is the applicant, or the applicant's spouse/partner, either a member of staff within the planning service or an elected member of the planning authority? * ☐ Yes ☑ No

Certificates and Notices

Certificate and Notice under Regulation 15 8 – Town and Country Planning (General Development Management Procedure) (Scotland) Order 1992 (GDPO 1992) Regulations 2008

One Certificate must be completed and submitted along with this application form. This is most usually Certificate A, Form 1, Certificate B, Certificate C or Certificate E.

Are you/the applicant the sole owner of ALL the land ? * ☑ Yes ☐ No

Is any of the land part of an agricultural holding? * ☑ Yes ☐ No

Do you have any agricultural tenants? * ☐ Yes ☑ No

Certificate Required

The following Land Ownership Certificate is required to complete this section of the proposal:

Certificate E

Land Ownership Certificate

Certificate and Notice under Regulation 15 of the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2008

Certificate E

I hereby certify that –
(1) – No person other than myself/the applicant was the owner of any part of the land to which the application relates at the beginning of the period 21 days ending with the date of the application.

(2) - The land to which the application relates constitutes or forms part of an agricultural holding and there are no agricultural tenants

Or

(1) – No person other than myself/the applicant was the owner of any part of the land to which the application relates at the beginning of the period 21 days ending with the date of the application.

(2) - The land to which the application relates constitutes or forms part of an agricultural holding and there are agricultural tenants.

These People are:

Name:

Address:

Date of Service of Notice: *

(3) - I have/The applicant has taken reasonable steps, as listed below, to ascertain the names and addresses of the other agricultural tenants and *have/has been unable to do so –

Notice of the application has been published in:

On:

Signed: Nicola Thomson-Jack

On behalf of: Mr M Montgomerie

Date: 14/08/2012

☑ Please tick here to certify this Certificate. *

Checklist - Application for Planning Permission

Town and County Planning (Scotland) Act 1997

The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2008

Please take a few moments to complete the following checklist in order to ensure that you have provided all the necessary information in support of your application. Failure to submit sufficient information with your application may result in your application being deemed invalid. The planning authority will not start processing your application until it is valid.

a) If this is a further application where there is a variation of conditions attached to a previous consent, have you provided a statement to that effect? *

☐ Yes ☐ No ☑ Not applicable to this application

b) If this is an application for planning permission, planning permission in principle or a further application and the application is for development belonging to the categories of national or major developments, have you provided a Pre-Application Consultation Report? *

☐ Yes ☐ No ☑ Not applicable to this application

Town and County Planning (Scotland) Act 1997

The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2008

c) If this is an application for planning permission and the application relates to development belonging to the categories of national or major developments and you do not benefit from exemption under Regulation 13 of The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2008, have you provided a Design and Access Statement? *

☐ Yes ☐ No ☑ Not applicable to this application

d) If this is an application for planning permission and relates to development belonging to the category of local developments (subject to regulation 13. (2) and (3) of the Development Management Procedure (Scotland) Regulations 2008) have you provided a Design Statement? *

☐ Yes ☐ No ☑ Not applicable to this application

e) If your application relates to installation of an antenna to be employed in an electronic communication network, have you provided an ICNIRP Declaration? *

☐ Yes ☐ No ☑ Not applicable to this application

f) If this is an application for planning permission, planning permission in principle, an application for approval of matters specified in conditions or an application for mineral development, have you provided any other plans or drawings as necessary:

☑ Site Layout Plan or Block plan.

☑ Elevations.

☑ Floor plans.

☑ Cross sections.

☐ Roof plan.

☑ Master Plan/Framework Plan.

☑ Landscape plan.

☑ Photographs and/or photomontages.

☐ Other.

Provide copies of the following documents if applicable:

A copy of an Environmental Statement. *	☐ Yes	☑ N/A
A Design Statement or Design and Access Statement. *	☐ Yes	☑ N/A
A Flood Risk Assessment. *	☐ Yes	☑ N/A
A Drainage Impact Assessment (including proposals for Sustainable Drainage Systems). *	☐ Yes	☑ N/A
Drainage/SUDS layout. *	☐ Yes	☑ N/A
A Transport Assessment or Travel Plan. *	☐ Yes	☑ N/A
Contaminated Land Assessment. *	☐ Yes	☑ N/A
Habitat Survey. *	☑ Yes	☐ N/A
A Processing Agreement *	☐ Yes	☑ N/A

Other Statements (please specify). (Max 500 characters)

Planning Support Statement

Declare - For Application to Planning Authority

I, the applicant/agent certify that this is an application to the planning authority as described in this form. The accompanying plans/drawings and additional information are provided as a part of this application .

Declaration Name: Nicola Thomson-Jack

Declaration Date: 15/08/2012

Submission Date: 16/08/2012

Payment Details

Cheque: Fine Energy, 100226

Created: 16/08/2012 10:31

PLANNING SITE BOUNDARY

OWNERSHIP BOUNDARY

TOWN & COUNTRY PLANNING (SCOTLAND) ACT 1997

REFUSED

James H Miller

CHIEF DEVELOPMENT MANAGEMENT OFFICER

332.042m

100.14m

146.872m

478.155m

148.357m

643266m

AREA OF PROPOSED SITE
(including all blade overhangs) -
314.16sq.m or 0.031ha

97.292m

239791m

623.669m

LOCATION PLAN 1:2500

REV	DATE	BY	REASON

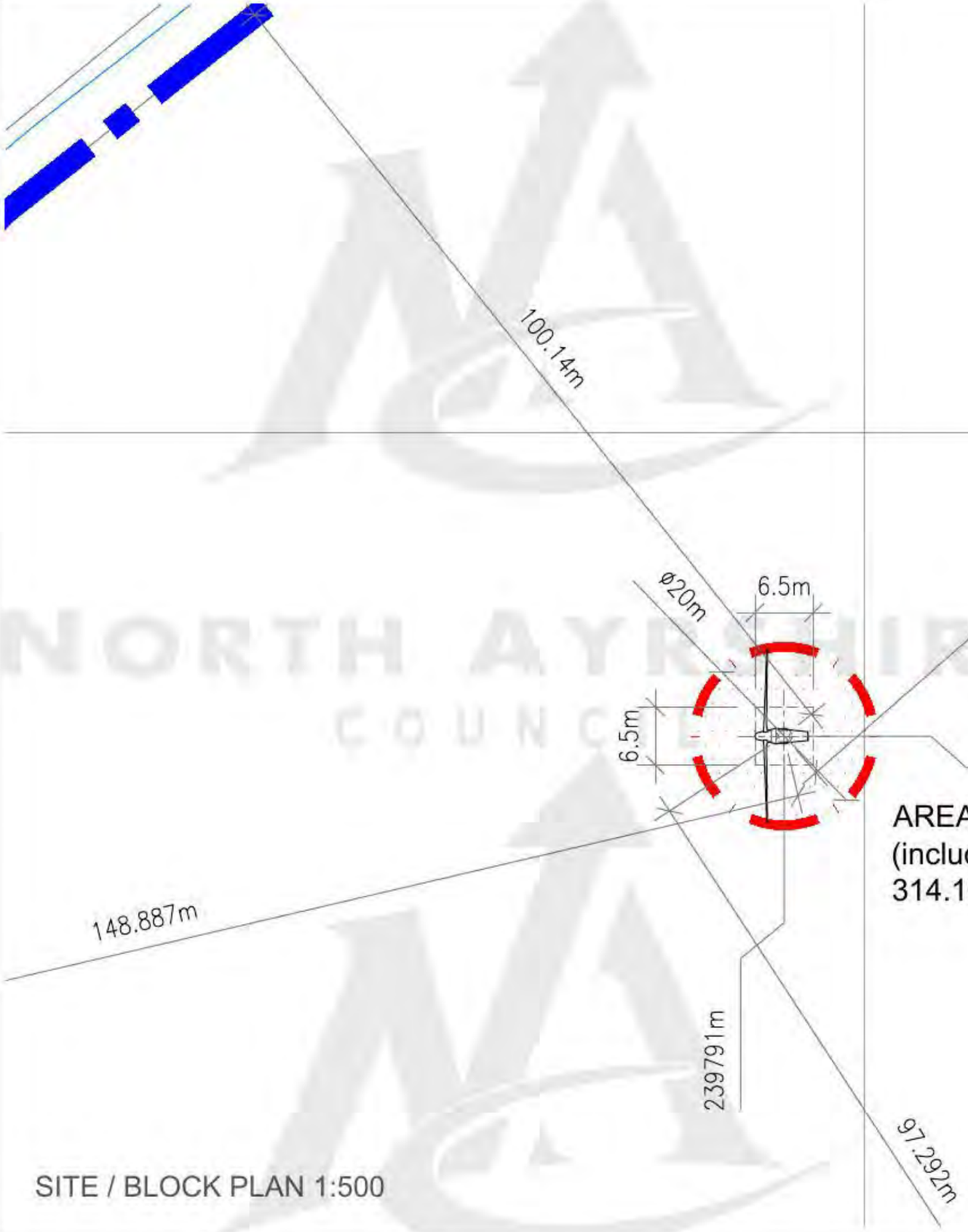
fine ENERGY

PROJECT:	Proposed Wind Turbine Installation
CLIENT:	
ADDRESS:	TITWOOD FARM
SITE / CO-ORD:	239791E, 643266N

DRAWN BY: RJ	SCALE: 1:2500	DATE: 08/06/12
TITLE: LOCATION PLAN 1		DWG NO: 12

NORTH AYRSHIRE COUNCIL

PLANNING SITE BOUNDARY
OWNERSHIP BOUNDARY



AREA OF PROPOSED SITE
(including all blade overhangs) -
314.16sq.m or 0.031ha

SITE / BLOCK PLAN 1:500

TOWN & COUNTRY PLANNING (SCOTLAND) ACT 1997

REFUSED

James H Miller

CHIEF DEVELOPMENT MANAGEMENT OFFICER

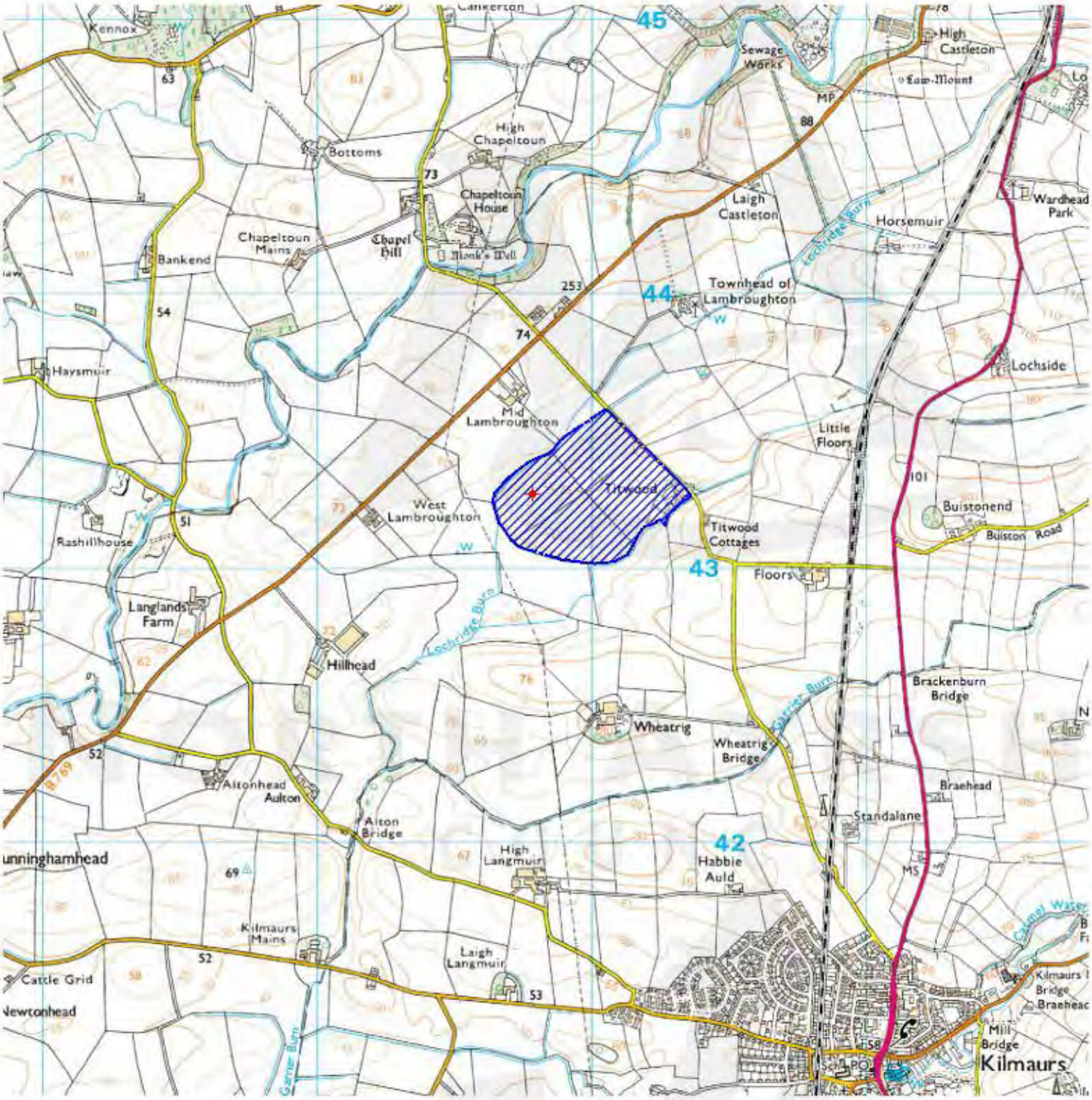
REV	DATE	BY	REASON

fine ENERGY

PROJECT:	Proposed Wind Turbine Installation		
CLIENT:			
ADDRESS:	TITWOOD FARM		
SITE / CO-ORD:	239791E, 643266N		
DRAWN BY: RJ	SCALE: 1:500	DATE: 08/06/12	
TITLE: SITE / BLOCK PLAN		DWG NO: 1	

NORTH AYRSHIRE COUNCIL

OWNERSHIP BOUNDARY



LOCATION PLAN 1:20000

TOWN & COUNTRY PLANNING (SCOTLAND) ACT 1997

REFUSED

James H Miller

CHIEF DEVELOPMENT MANAGEMENT OFFICER

REV	DATE	BY	REASON

fine ENERGY

PROJECT:	Proposed Wind Turbine Installation
CLIENT:	
ADDRESS:	TITWOOD FARM
SITE / CO-ORD:	239791E, 643266N

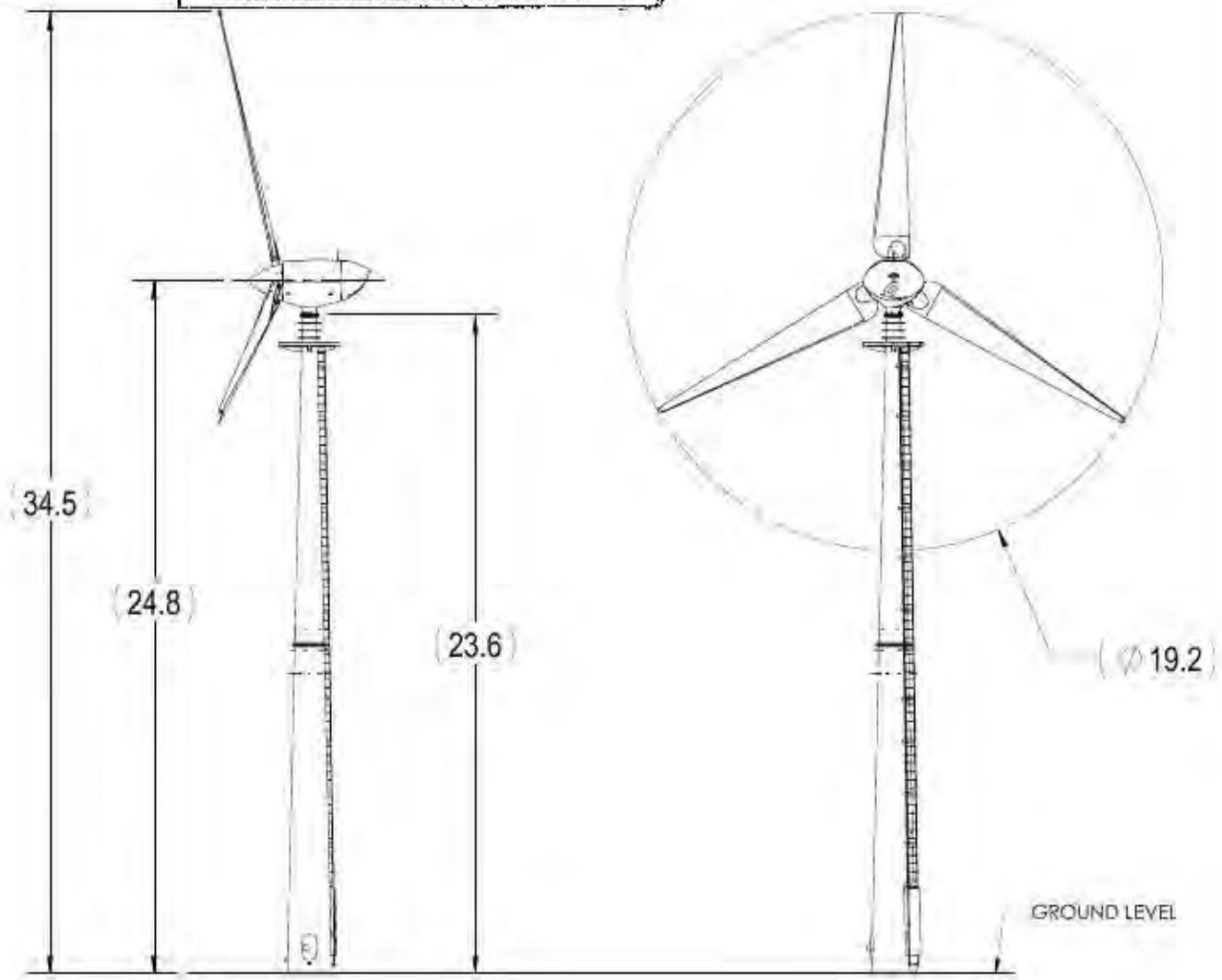
DRAWN BY: RJ	SCALE: 1:20000	DATE: 08/06/12
TITLE: LOCATION PLAN 2		DWG NO: 03

TOWN & COUNTRY PLANNING (SCOTLAND) ACT 1997

REFUSED

James H Miller

CHIEF DEVELOPMENT MANAGEMENT OFFICER



ALL DIMENSIONS ARE IN METERS

DRAWN BY		SCALE	FORMAT
RAJESH (DPT)	2011-10-17	1:250	A4
APPROVED BY			

Endurance wind power

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TITLE			
E-3210 Elevation, 24m, Monopole			
PART NUMBER	REVISION	DATE (PRINTED)	SHEET
001598	1	22/Nov/2011	1 / 1

NOTE:
DIMENSIONS APPROXIMATE AND PROVIDED FOR PLANNING PURPOSE ONLY. FINAL CONSTRUCTION ELEVATIONS ARE AVAILABLE IN A PERMITTING PACKAGE ON A PER-TOWER BASIS.

Protected Species Assessment

Titwood Farm
Kilmaurs
North Ayrshire

Executive Summary

GLM Ecology has been commissioned by Fine Energy Ltd to undertake an extended Phase 1 Habitat Assessment in July 2012 to support and inform a planning application for a small-scale single wind turbine at Titwood Farm, Kilmaurs, North Ayrshire. The survey followed standard methodology as published by the Joint Nature Conservation Committee 1988, a technique for Environmental Audit. The survey aimed to assess the ecological value of the site and record any protected habitats.

The purpose of the assessment was to document the baseline ecological conditions of the site. Desktop studies identified any designated sites within specified zones of impact from site boundaries as published by Scottish National Heritage. Broad habitat types were recorded and mapped. The potential of the site for protected species of conservation interest that would require further survey on the basis they might comprise an ecological constraint to the proposed development was undertaken using standard methodology.

Designated sites were recorded within 20km of the site, however it is considered that the development would have a negligible impact on the integrity of these sites.

The site walkover revealed the presence of a poor variety of habitats present within the survey area. These habitats (grazing fields) are extremely common and widespread in the local area and therefore of negligible conservation concern.

The survey area has very limited potential to support the following protected species and species of conservation concern: badger, bats, otters, water vole and birds.

It is considered that no further surveys are likely to be required on any protected species and that no mitigation is required.

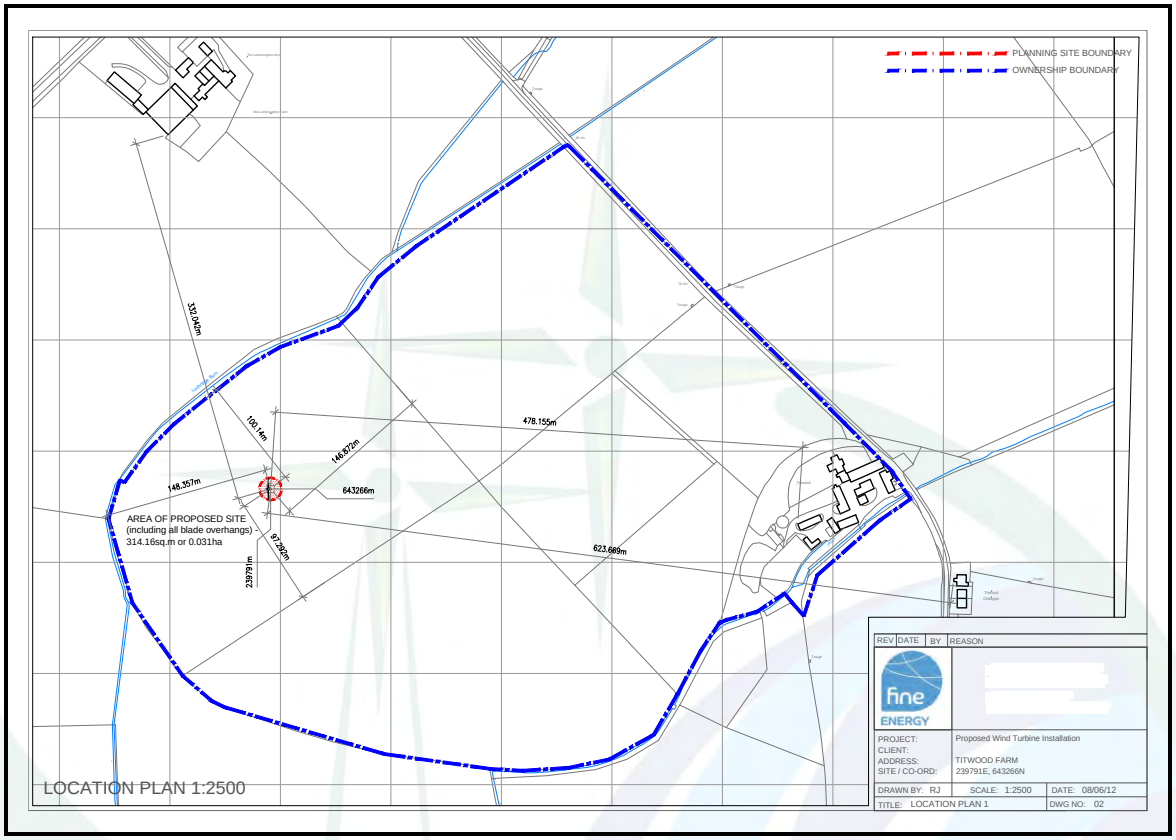


Figure 1. Site map with proposed turbine location

1. INTRODUCTION

1.1 Introduction

GLM Ecology was commissioned in June 2012 by Fine Energy Ltd to carry out a site visit to highlight potential ecological constraints and an assessment of the potential for impacts on protected species and habitats at a proposed one turbine site (24m hub and 19.2m rotor diameter) at land near Titwood Farm, Kilmaurs.

The plans indicate that the access track and turbine (Figure 1) are to be situated in grazing fields in rural farmland. The access track is proposed to cut across grazing field from a minor road.

The assessment aims were as follows:

- To assess the potential ecological constraints to any development of this site;
- To assess the ecological value of such a site;
- To recommend further survey work if required.

This baseline exercise has been undertaken in accordance with the 'Guidelines for Baseline Ecological Assessment (Institute of Environmental Assessment, 1995) and 'Guidelines for Ecological Impact Assessment in the UK' (Institute of Ecology and Environmental Management (IEEM), 2006).

This report identifies approaches likely to be required, subject to formal consultation with Scottish Natural Heritage, Local Planning Authorities and other relevant parties.

The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 require that before consent is granted for certain types of development, an EIA (which includes an ecological and ornithological assessment) must be undertaken. The *EIA Regulations 2011* set out the types of development which must always be subject to an EIA (Schedule 1 development) and other developments which may require EIA if they are above certain thresholds and are likely to give rise to significant environmental impacts (Schedule 2).

1.2 Legislative context

A number of sites, habitats and species are protected under European and UK legislation, and may present constraints to site development.

Principal legislation and guidance which will be considered are:

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) 1992;
- Conservation (Natural Habitat &c.) Regulations 1994 (as amended);
- The Wildlife and Countryside Act 1981 (as amended);
- The Nature Conservation (Scotland) Act 2004; Protection of Badgers Act 1992;

Species that are protected include bats, badgers, otters, water voles, red squirrels and great crested newts. Protected sites and habitats include Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPA) and Special Areas of Conservation (SAC). The legislative issues for some of the species that might be affected at Titwood Farm are discussed below.

OTTERS & WATER VOLES

Otters (*Lutra lutra*)

Otters and their resting places receive protection under The Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations 2004 (the Habitats Regulations) which make it an offence to:

- Intentionally kill, injure or take an otter
- Possess or control any live or dead specimen or anything derived from an otter
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by an otter
- Intentionally or recklessly disturb an otter while it is occupying a structure or place, which it uses for that purpose.

Water Voles (*Arvicola terrestris*)

The water vole has received limited legal protection through its inclusion on Schedule 5 of the Wildlife & Countryside Act 1981 (as amended 2008) in respect of Section 9(4) only. This section of the Act protects the places the water vole uses for shelter or refuge, but the water voles themselves are currently not protected, but are listed on the UK BAP. This legislation is currently being updated to include protection of the voles themselves.

Legal protection makes it an offence to;

- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection
- Intentionally or recklessly disturb water voles whilst occupying a structure or place used for that purpose
- Intentionally kill, injure or take water voles
- Possess or control live or dead water voles or derivatives
- Sell water voles or offer or expose for sale or transport for sale
- Publish or cause to be published any advertisement which conveys the buying or selling of water voles

Bat Legislation

Bats of all species in Britain and their roosts are protected under the Conservation (Natural Habitats, &c) Amendment (Scotland) Regulations 2007. Following recent changes to legislation in Scotland under this law it is illegal intentionally or recklessly to kill or injure a bat, to disturb a roosting bat or to damage, destroy or obstruct access to any bat roost. This applies to both summer and winter roosts, which may be in different structures. Any action, which is likely to disturb or damage a bat roost, requires a license from the Scottish Executive.

1.3 Zone for consideration for ecological features

The zone of sensitivity for ecological features varies, depending on the nature and behaviour of the habitat or species, and also the type of impact that may affect them. As a general rule in this assessment, the impacts on individual habitats or species are considered for the whole of the development area, plus the following distances.

Table 1: Zone of Impact from Site Boundary of Ecological Features

Ecological feature	Zone of impact from site boundary
Internationally designated sites (SPA, SAC, Ramsar)	Within 20km
Nationally designated sites (SSSI, NNR)	Within 5km
Locally designated sites (LNR, WS)	Within 1km
Water voles and otters	Within 500m
Badgers and red squirrels	Within 500m
Bats	Within 500m
Great crested newt	Within 500m
Birds	Within 500m

2. METHODOLOGY

2.1 Data Study

- A data search was done with Magic Map to identify any designated ecological sites within 20km radius of the site

- A short desktop study was carried out via the following resources to identify the presence of any protected species present within the 10km grid square encompassing the survey site.

- NBN Gateway[1]
- RSPB sensitivity maps[2];
- Scottish Natural Heritage (SNH) Sitelink[3];
- Multi Agency Geographic Information for The Countryside[4]

2.2 Field Survey

A field survey was carried out on 15th June 2012 in good weather conditions.

3. RESULTS

3.1.1 Ecological Sites within 20km of Site

Ecological feature	Zone of impact from site boundary	Sites
Internationally designated sites (SPA, Ramsar)	Within 20km	Muirkirk and North Lowther Uplands.
Nationally designated sites (SSSI, NNR)	Within 5km	None
Locally designated sites (LNR, WS)	Within 1km	None

3.2 Data Search Protected Species

Within the 10km grid square encompassing the survey area the following were recorded via National Biodiversity Network;

- Otter *Lutra lutra*
- Red squirrel *Sciurus vulgaris*
- Common pipistrelle *Pipistrellus pipistrellus*
- Brown long eared bat *Plecotus auritus.*
- Soprano pipistrelle *Pipistrellus pygmaeus*
- Daubentons bat *Myotis daubentoni*
- Water vole *Arvicola amphibius*

4 SITE DESCRIPTION

The site at Titwood (see Figure 1) is approximately 3km north of Kilmaurs, Ayrshire. The habitat is predominately improved grazing fields/hay meadows (Figures 2, 3). Hawthorn hedgerows with virtually no mature trees generally delineate fields (Figure 4). To the west and northwest the Lochridge Burn runs along the site boundary (Figure 5). Titwood Farm is a collection of old stone builds and barns with an area of mature deciduous woodland adjacent to the farm (Figure 6).

Figures 2. Grazing fields at Titwood.

Figure 3. Habitat near turbine location.

Figure 4. Hawthorn hedgerows.

Figure 5. Lochridge Burn.

Figure 6. Titwood Farm

5 PHASE 1 HABITAT SURVEY

5.1 Legislation

Legislation exists to protect habitats and floral species from destruction, degradation and loss as a result of development activities and include:

- The Conservation (Natural Habitats, & C.) Regulations 1994;
- Wildlife & Countryside Act 1981 (as amended); and
- The Nature Conservation (Scotland) Act 2004.

5.2 Aims & Objectives

The Phase 1 Habitat Survey aimed to:

- Identify and record broad habitats within the vicinity of the development area;
- Provide a description of habitat distributions and highlight any areas of ecological constraints in relation to the proposed development; and
- Contribute towards informing planning processes.

Whilst not a full botanical survey, the Phase I method enables a suitably experienced ecologist to obtain sufficient understanding of the ecology of a site so that it is possible either:

- To confirm the conservation significance of the site and assess the potential for impacts on habitats /species likely to represent a material consideration in planning terms; or
- To ascertain that further surveys of some aspect(s) of the site's ecology will be required before such confirmation can be made.

5.3 Data Review

An initial pre-visit desk study was conducted for the location of the proposed scheme at Titwood to establish ecological baseline context. These included consultation with Ordnance Survey (OS) maps and web-based satellite aerial imagery to familiarize with the site and to identify potential habitat features of nature conservation importance.

5.4 Survey Methodology

Phase I habitat survey is a standardised method of recording habitat types and characteristic vegetation, as set out in the Handbook for Phase I Habitat Survey – a technique for Environmental Audit[5.] The Phase I habitat survey undertaken in July 2012 covered the whole of the site with a focus on the proposed turbine areas at circa NS 402 432 and encompassed a 500m buffer envelope around this area.

5.5 Results

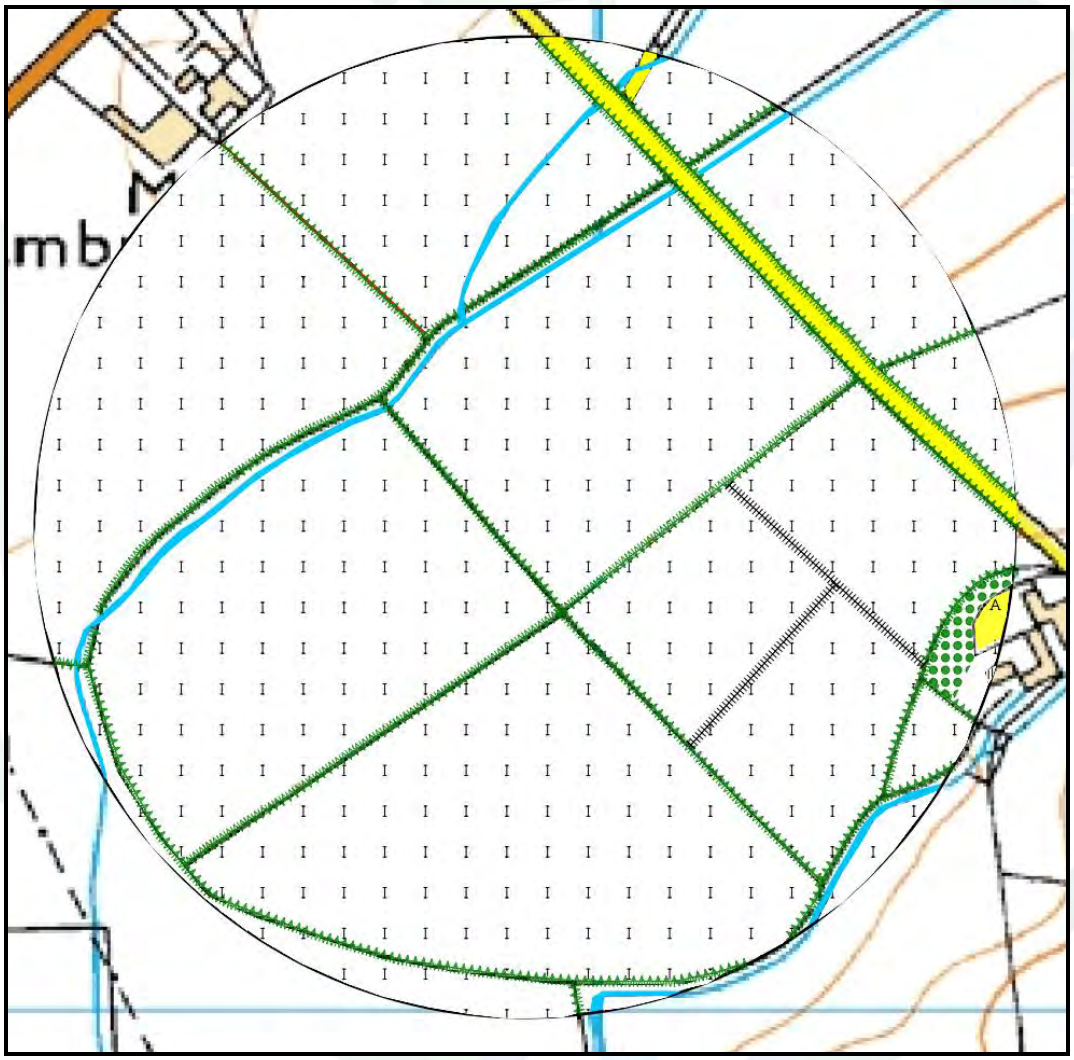
5.5.1 Data Review

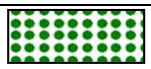
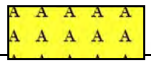
Review of OS maps and aerial imagery indicates the site at Titwood Farm is located within a rural farmland locality approximately 3km to the north of Kilmaurs. The contour information reveals a fairly level topography. Dominant habitats present over the general area comprise grazing fields and hawthorn hedgerows. The habitats present within the 500 meter proposed turbine survey area are presented in Figure 7.

The habitats present within the land boundary of the proposed turbine and track survey area are presented in Table 7.

Phase 1 Habitat Type
A3.1 Broadleaved scattered trees
B4 Improved grassland
G2 Running water
J1.2 Cultivated - amenity grassland
J2.3.1 Hedge with trees - native species-rich
J2.4 Fence
J3.6 Buildings
Road & Farm Tracks

Figure 7. Phase 1 map and appendix



Code	Phase 1 Habitats Description
	A3.1 Broadleaved scattered trees
	B4 Improved grassland
	G2 Running water
	J1.2 Cultivated - amenity grassland
	J3.6 Buildings

Boundary Features

	J2.3.1 Hedge with trees - native species-rich
	J2.4 Fence
	Road & Farm Track

Improved grazing farm fields

The improved grassland grazing fields (B4) are the main habitat on site. The central fields are used for silage as well as being utilised by livestock They contain agriculturally improved grasses, such as, perennial ryegrass (*Lolium perrene*) and also including clover (*Trifolium repens*), creeping buttercup, (*Rannunculus repens*), common daisy (Bellis perennis) and sheeps sorrell (*Rumex acetosella*).

Running water & ditch systems

Running water (G2) can be found as a burn and some of which has been channeled into ditch systems. Some of the burn is bordered with wire & posts fencing (J2.4) to stock proof the burn, including hedging of hawthorn.

Hedging and trees

The field boundaries consist of hawthorn (*Crataegus monygna*) hedging with the occasional beech (*Fagus sylvatica*) tree. Trees (A3.1) are also located at the farm and are of ash (*Fraxinus excelsior*) and beech (*Fagus sylvatica*) with some rowan (*Sorbus aucuparia*), and hawthorn (*Crataegus monygna*).

Road, farm buildings and associated land

There is a main B-road that cuts through to the northeast. Farm buildings are present to the south with a typical farmyard and disturbed land around it consisting of amenity cut grass (J1.2), trees (A3.1) and improved grass field as a horse paddock with horseboxes.

4.6 Discussion

No nationally or internationally protected habitats were identified in this assessment. The habitat around the proposed access and turbine location is predominantly improved grazing fields.

There is the potential of a slight increase in run-off in to ditch systems through the ground disturbance of the construction phase but this is expected to be short lived, minor and further reduced through mitigation.

Some of the impacts predicted as a result of the scheme can be considered generic impacts, which are typically associated with a development of this nature. The development of the wind turbine scheme at Titwood has been assessed as posing no significant impacts on commonly occurring habitats found on site. Therefore no specific prescriptions are recommended other than the general measures recommended below.

5.6.1 Mitigation

The following mitigation measures are proposed:

- Good construction site management should be implemented to minimise generation of litter, dust, noise and vibration. This should be controlled and monitored through the Contractor's Environmental Management Plan. Through adhering to best practices during construction and operation phases, fragmentation, disturbance and pollution to habitats present can be minimised;

- During construction management of excavated soil will focus on preventing silt runoff into the water environment during rainfall periods through careful design and maintenance of drainage/silt traps.

6 Birds

Generally, ornithological surveys on and around the site are required to assess potential impacts of birds throughout the year, which could arise due to:

- Potential loss, fragmentation and degradation of bird habitats arising from the construction of turbine bases, crane pads, access tracks, a sub-station and temporary construction compounds and power lines;
- Potential displacement of hunting or migrating birds through avoidance of turbines, work staff and machinery;
- Disturbance to birds due to noise from operating turbines;
- Potential disturbance to nesting birds (for example, displacement of birds from breeding habitats) resulting from the construction activities; and
- Potential for birds to collide with turbine blades and power lines.

The issues identified above are more likely to be significant for larger wind turbine developments; however, these were considered for this application.

6.1 Discussion

The site is predominantly grazing fields with a lack of mature trees. From an ornithological viewpoint the following protected bird species are considered to be important in the general context of wind farm construction and operations.

- Schedule 1 Raptors
- Birds of Conservation Concern
- Wintering and Migratory Waterfowl
- Any species considered important on a local, national or international scale.

Given the small size of the site, its common farmland habitat, lack of suitable breeding and foraging habitat and distance from any designated sites including Special Protection Areas for birds it is considered that the proposed construction of a single turbine would have a negligible significance of impact on any breeding, migratory or over wintering species.

7 Protected Mammals

Suitable habitat exists on site for otter and water vole along the Lochridge Burn.

7.1 Discussion

No signs of otter or water vole were recorded.

7.1.1 Mitigation

None needed

8 Bats

Grazing fields are known to be poor quality foraging areas for bats. Where the turbine is proposed is in the middle of fields and well away from linear flight paths and commuting routes. Bat foraging areas are likely to be in sheltered woodland margins and along water. No trees are present that would appear to have the potential to support roosts apart from near Titwood Farm. No trees would have to be removed for construction. Titwood Farm would have excellent potential for bat roosts, however this is approximately 480m from the turbine location. Considering the observations noted above, no significant impact on high sensitivity species can be expected. The magnitude of impact is considered to be negligible and overall the significance of impact to be no more than negligible.

8.1 Mitigation

According to the plans the turbine location is approximately 100m from the Lochridge Burn or hedgerows in the middle of a grazing field. No further mitigation is required.

9. DISCUSSION

The purpose of this survey was to gain an understanding of the potential ecological issues that may arise during any development at the site. The survey comprised a walkover of the site to evaluate the likely presence of protected species and or habitats. Specific searching was carried out for these protected species and an evaluation of the potential habitat.

The site is predominantly grazing fields with hedgerows present. Running water is present off site to the west.

Breeding birds of interest in these habitats would be as expected of open fields and would include limited numbers of skylark with common passerines along hedgerows.

The habitat would provide limited summer and winter foraging for buzzard, sparrowhawk and kestrel. I would expect to find no Schedule 1 species breeding or foraging on site. The small size of the site, close proximity to farms and distance from any SPAs would make the site unsuitable for any protected species.

The general area was also surveyed for signs of protected mammals and bats following recognised methodology[6-12.] No signs were recorded of any protected species.

No nationally or internationally protected habitats were identified in the Phase 1 habitat survey.

10 CONCLUSION

The site at Titwood is considered average from an ecology viewpoint. The habitat is predominantly grazing fields with established hedging. It is considered that no protected species or habitats are present on site. In my professional opinion the proposed development would have no adverse impact on any protected species or habitats and that no further survey work is required. It is also considered that the development would have no adverse impact on any designated sites (see Table 3.1.1.) within the accepted zone of impact from site boundary.

REFERENCES

1. National Biodiversity Gateway Database: http://data.nbn.org.uk/
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11. Macdonald. D.W., Mace, G. & Rushton, S. 1998. *Proposals for future monitoring of British mammals*. Department of the Environment, Transport and the Regions, and Joint Nature Conservation Committee, London.
12. JNCC 2004. Common Standards Monitoring Guidance for Mammals. ISSN 1743-8160.

DISCLAIMER

This report has been prepared by Dr Garry Mortimer of GLM Ecology, with all reasonable skill and care within the terms of the agreement with the client. Dr Mortimer disclaims any responsibility to any parties in respect of matters outside this scope.

Best efforts were made to meet the objectives of this study through desktop study and field survey.

Information supplied by the client or any other parties and used in this report is assumed to be correct and GLM Ecology accepts no responsibility for inaccuracies in the data supplied.

It should be noted, that whilst every endeavour is made to meet the client's brief, no site investigation can guarantee absolute assessment or prediction of the natural environment. Numerous species are extremely mobile or only evident at certain times of year and habitats are subject to seasonal and temporal change.

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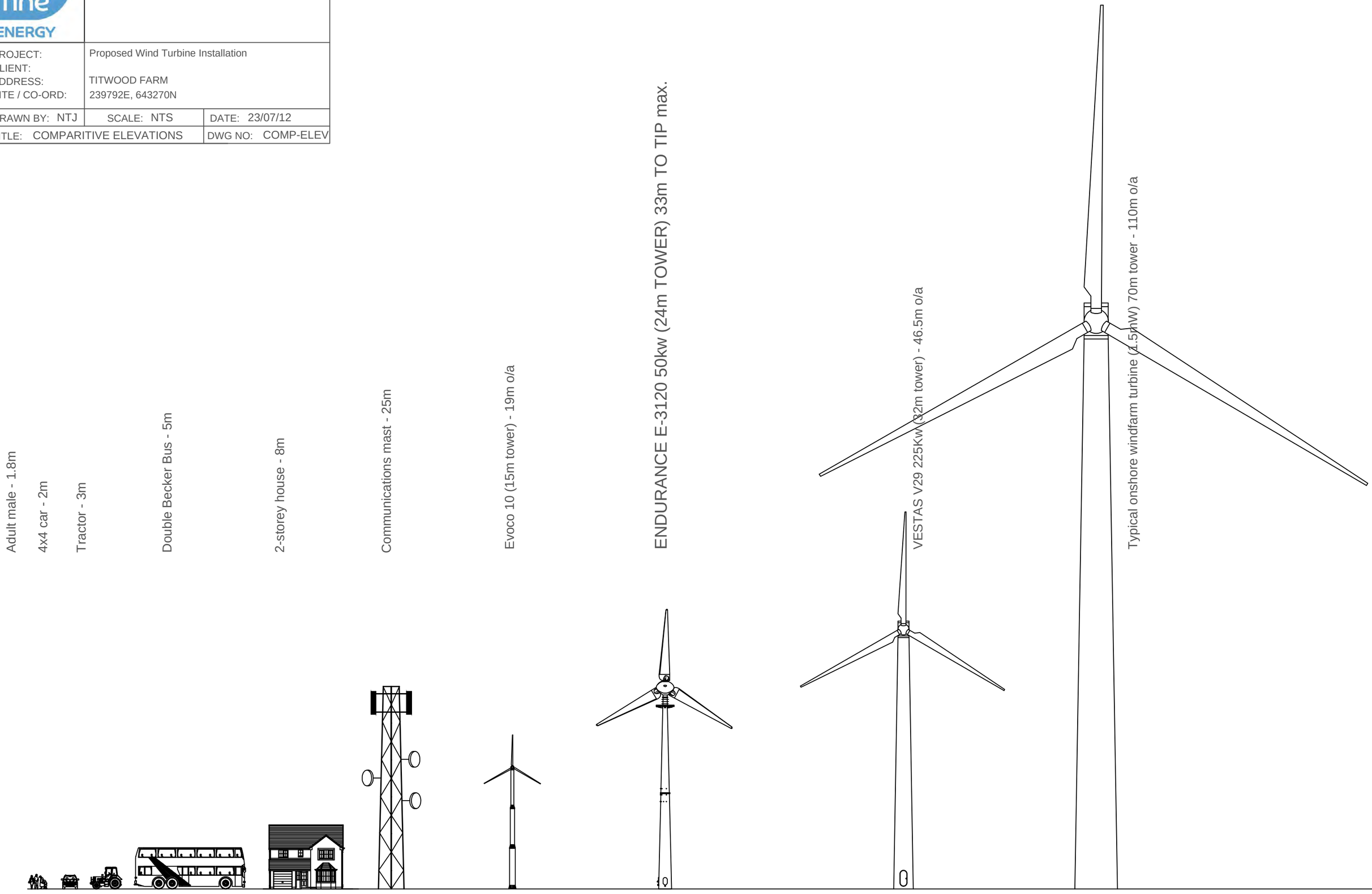
Document Prepared By
Dr Garry Mortimer
GLM Ecology

REV	DATE	BY	REASON

fine ENERGY

PROJECT:	Proposed Wind Turbine Installation
CLIENT:	
ADDRESS:	TITWOOD FARM
SITE / CO-ORD:	239792E, 643270N

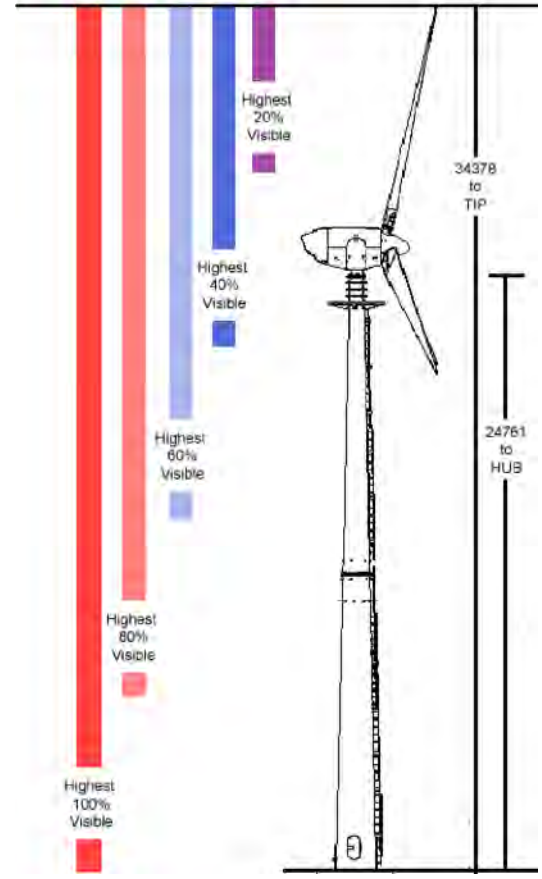
DRAWN BY: NTJ	SCALE: NTS	DATE: 23/07/12
TITLE: COMPARITIVE ELEVATIONS		DWG NO: COMP-ELEV



Legend

Wind Turbine Location

ZVI
% of Turbine Visible



REV	DATE	BY	REASON

fine ENERGY

PROJECT:	Proposed Wind Turbine Installation
CLIENT:	
ADDRESS:	WOODLANDS FARM
SITE/CO-ORD:	E239791 N643266

N

DRAWN BY: AD	SCALE: 1:150,000	DATE: 05.07.2012
TITLE: Zonal Visual Impact Assessment		DWG NO: L01

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CUMULATIVE ZONE OF THEORETICAL VIEW

for Proposed Wind Turbine Installation

NOTE: CURVATURE OF THE EARTH AND LIGHT RELFECTION IS TAKEN INTO ACCOUNT.

APPLICATION SITE IN VIEW ONLY

CUMULATIVE IMPACT SITE IN VIEW ONLY

APPLICATION AND CUMULATIVE SITE BOTH IN VIEW

REV	DATE	BY	REASON

PROJECT:	Proposed Wind Turbine Installation
CLIENT:	
ADDRESS:	TITWOOD FARM
SITE / CO-ORD:	239792E, 643270N

DRAWN BY: NTJ	SCALE: NTS	DATE: 07/08/12
TITLE: CUMULATIVE ZTV		DWG NO: CUM-ZTV01

HISTORIC ASSETS PLAN 1:10000

N

1km

PROPOSED TURBINE

HISTORIC ASSET KEY

- SCHEDULED MONUMENT
- B - LISTED BUILDING (AND GRADE)
- CANMORE DATABASE (NATIONAL) RECORD
- SSMR DATABASE (LOCAL) RECORD

REV	DATE	BY	REASON

fine ENERGY

PROJECT:	Proposed Wind Turbine Installation		
CLIENT:			
ADDRESS:	TITWOOD FARM		
SITE / CO-ORD:	239792E, 643270N		
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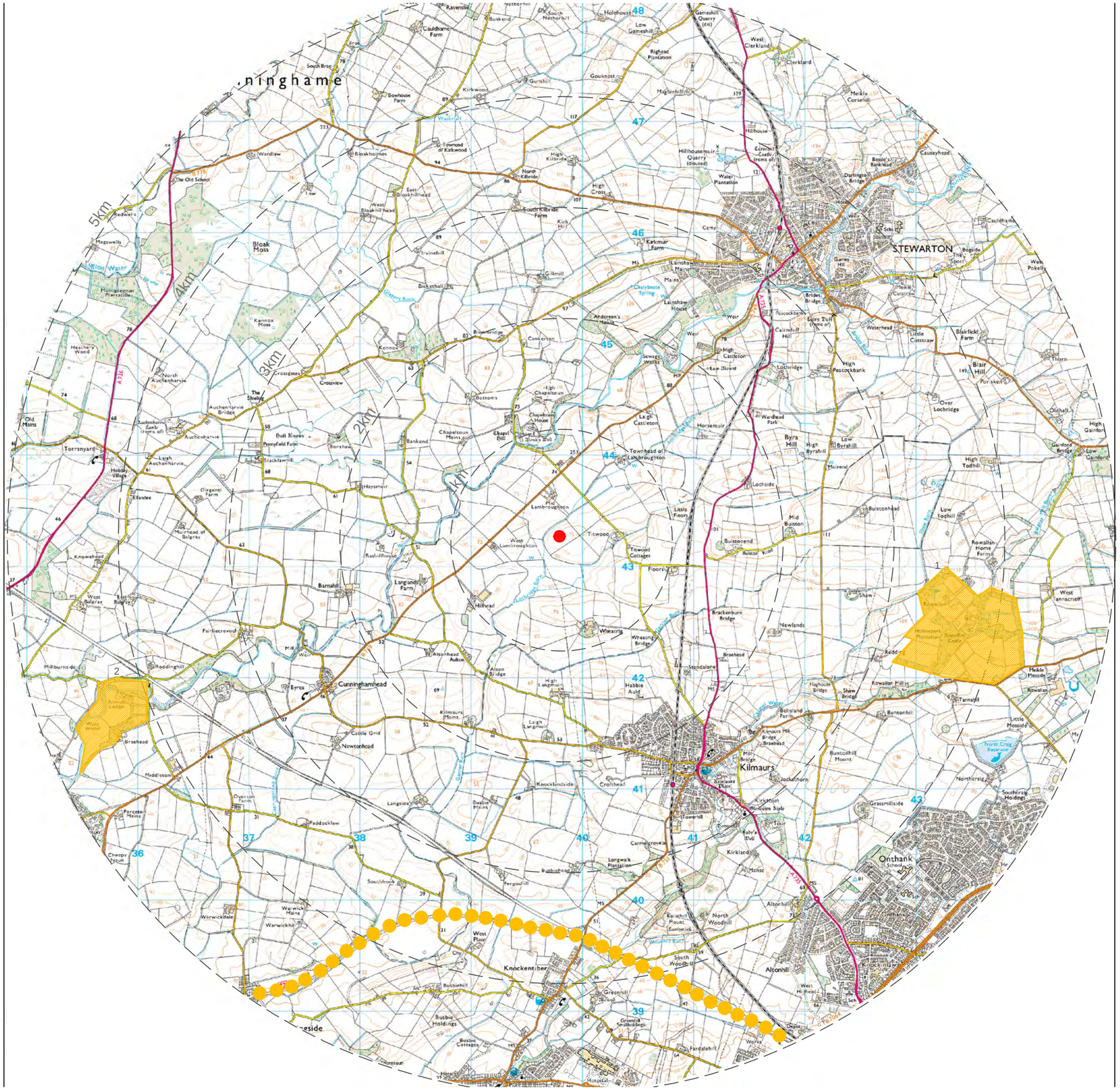
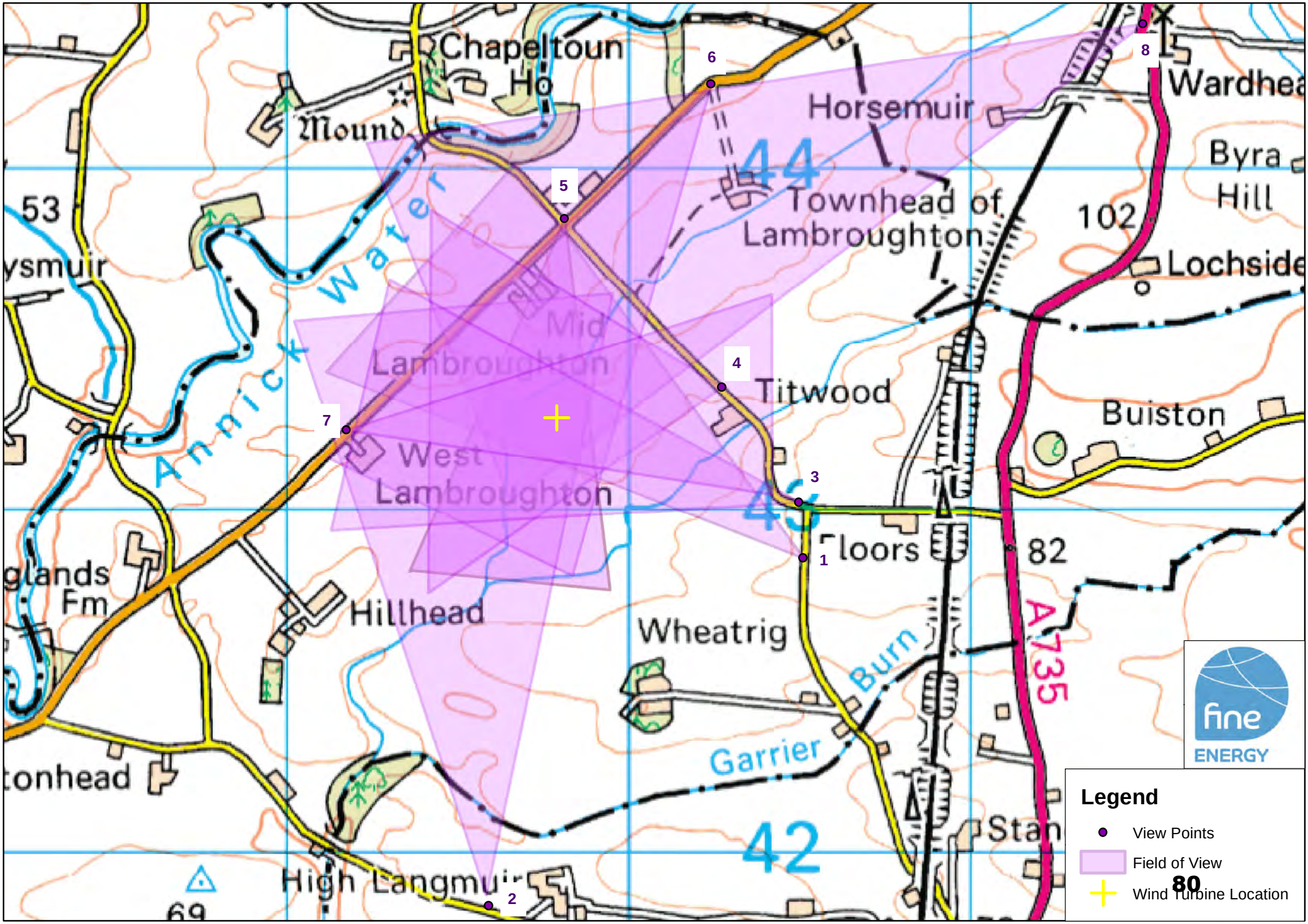
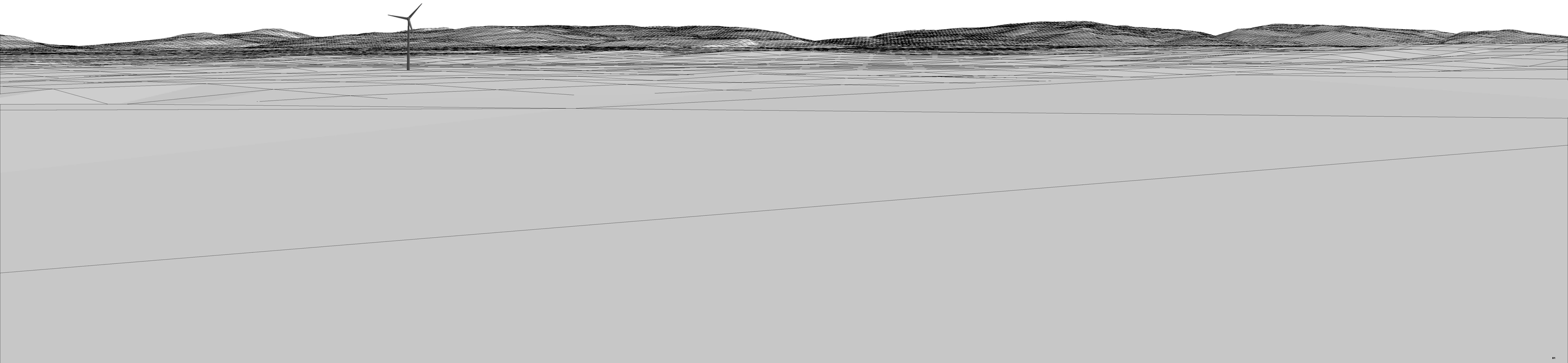

5km
4km
3km
2km
1km
STEWARTON
Kilmaurs
Onthank
Altonhill
Knockentiber
Cunninghamhead
Bloak Moss
Kennox Moss
Titwood
Lochside
Byra Hill
Buistonhead
Dunlop Water
Lugton Water
Annick Water
Glazert Burn
Gruggie Burn
Corsehill Burn
Lochlip Burn
Lainshaw Burn
Carmel Burn
Dubbs Burn
Woodhill Burn
Glazert Water
Gruggie Water
A735
A736
A737
A759
B706
B709
B710
B7081
Darlington Bridge
Brides Bridge
Lainshaw Mains
Lainshaw House
Kirkmuir Farm
Hillhousemuir Quarry (disused)
Water Plantation
Cairn Duff (rems of)
Cairndoff Hill
High Pescockbank
Low Pescockbank
Lochridge
Over Lochridge
Blair Hill
Blairfield Farm
Little Cottstraw
Waterhead
Wardhead Park
Horsemuir
Lagh Castleton
High Casleton
Sewage Works
Anderson's Mount
Chapeltoun House
Chapeltoun Mains
Townhead of Lambroughton
Little Floors
Floors
Titwood Cottages
West Lambroughton
Mid Lambroughton
Lambroughton
Brackenburn Bridge
Wrearigg Bridge
Wrearigg
Newlands
Braehead
Standalane
Alton Bridge
Altonhead
Aulton
Hillhead
Barnahill
Langlands Farm
Rashillhouse
Fairliecrevoch
Millburns-de
Roddinghill
Byres
Brasehead
Middleton
Overton Farm
Percesto Mains
Cheepy Neuk
Paddocklaw
Langside
Busbie Mains
Busbie Holdings
Busbie Cottages
Busbiehill
Greenhill
Greenhill Smallholdings
Fardalehill
Warwick Mains
Warwickdale
Warwickhill
Southbrook
Fergushill
Longwalk Plantation
Busbiehead
Carmelgrove
Kirkland
Croftfoot
Knocklandside
Kilmaurs Mains
Laigh Largmuir
High Largmuir
Habbie Auld
Alton Bridge
Kilmaurs Mill Bridge
Braehead
Belisland Farm
Flaghouse Bridge
Shaw Bridge
Rowallan Pillig
Tannahill
Buntonhill
Buntonhill Mount
Jockathorn
Kirkstone
Grassmillside
Northcraig
Southcraig Holdings
Little Mosside
Meikle Mosside
Rowallan Home Farm
Rowallan
Shaw
Newton Farm
Cattle Grid
Newtonhead
Kilmaurs Mains
Knockentiber
Altonhill
North Woodhill
South Woodhill
West Plane
Barnhill Mount
Earthwork
Greenhill
Busbie Holdings
Busbie Cottages
Fardalehill
Onthank School
Knockentiber School
Hospital
Old Mains
Torranyard
Holiday Village
Auchenharvie
Auchenharvie Bridge
Auchenharvie Castle (rems of)
Loch Auchenharvie
Bull Knowe
Pennyfield Farm
Stacklawhill
Borshaw
Bankend
Haysmuir
Girgenti Farm
Muirhead of Balgray
Knowehead
Ellandee
West Balgray
East Balgray
Heathery Wood
North Auchenharvie
Crossgates
Crossview
The Sheiling
Kennox
Kennoxhead
Bowerhill
Cankerton
Dicksthall
Gillmill
Irvinehill
Megswells
Montgreenan Plantation
Bloakholmes
Wardlaw
The Old School
Townend of Kirkwood
Kirkwood
Gunshill
Bowhouse Farm
Cauldhame Farm
Ravenshill
Bankend
South Nether Hill
Holehouse
Low Gameshill
Gameshill Quarry (dis)
Righead Plantation
Goukrest
Magbiehill
West Clerkland
Clerkland
Meikle Corsehill
Hillhouse
Cerachill Castle (rems of)
Causeyhead
Bossie's Bankhead
Bogside
The Sports
Cauldhame
Meikle Pokellie
Gaiety Hill
Meikle Cuttstraw
Peacockbank
Cairndoff Hill
Thorn
Porskeil
Oldhall
High Gainford
Gainford Bridge
Low Gainford
High Todhill
Low Todhill
Low Byrahill
High Byrahill
Meirend
Mid Buiston
Buistonend
Buiston Wood
Rowallan Home Farm
West Tannacrieff
Tannahill
Little Mosside
North Craig Reservoir
Northcraig
Southcraig Holdings
Grassmillside
Onthank
Altonhill
Knockentiber
Kilmaurs
Newtonhead
Cattle Grid
Kilmaurs Mains
Laigh Largmuir
High Largmuir
Habbie Auld
Alton Bridge
Kilmaurs Mill Bridge
Braehead
Belisland Farm
Flaghouse Bridge
Shaw Bridge
Rowallan Pillig
Tannahill
Buntonhill
Buntonhill Mount
Jockathorn
Kirkstone
Grassmillside
Northcraig
Southcraig Holdings
Little Mosside
Meikle Mosside
Rowallan Home Farm
Rowallan
Shaw
West Tannacrieff
Newlands
Brackenburn Bridge
Wrearigg Bridge
Wrearigg
Braehead
Standalane
Alton Bridge
Altonhead
Aulton
Hillhead
Barnahill
Langlands Farm
Rashillhouse
Fairliecrevoch
Millburns-de
Roddinghill
Byres
Brasehead
Middleton
Overton Farm
Percesto Mains
Cheepy Neuk
Paddocklaw
Langside
Busbie Mains
Busbie Holdings
Busbie Cottages
Busbiehill
Greenhill
Greenhill Smallholdings
Fardalehill
Warwick Mains
Warwickdale
Warwickhill
Southbrook
Fergushill
Longwalk Plantation
Busbiehead
Carmelgrove
Kirkland
Croftfoot
Knocklandside

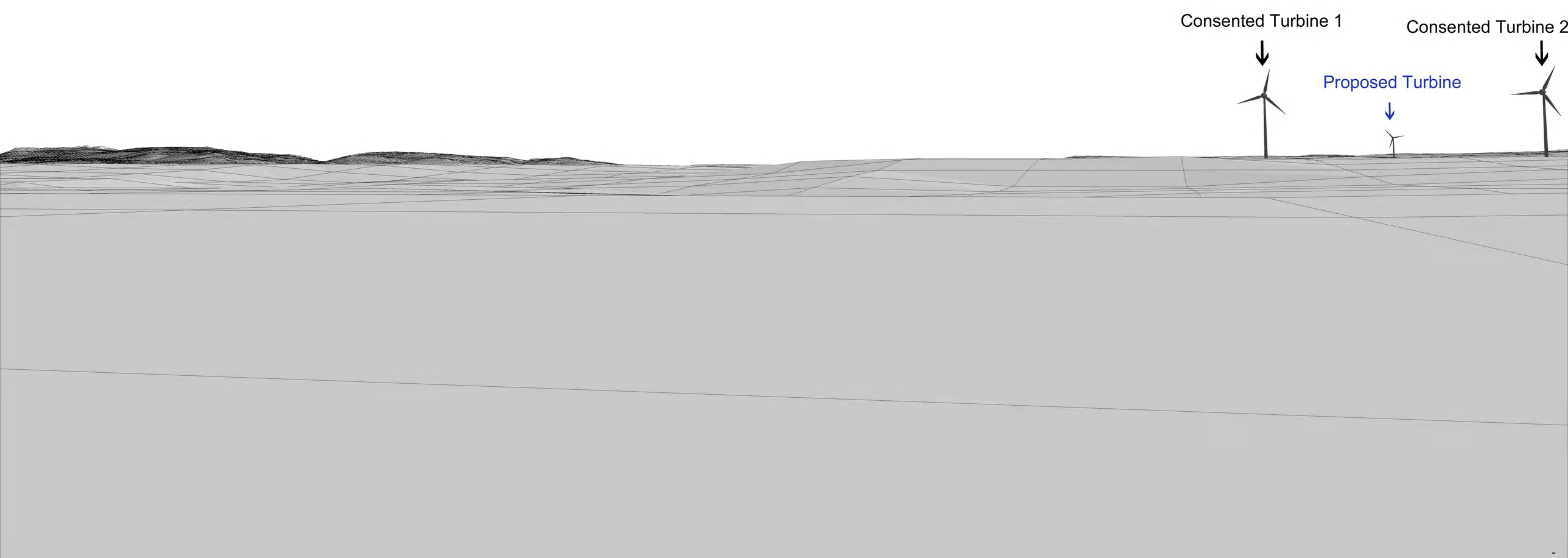

Chapeltoun
Ho
Mound
Horsemuir
Wardhea
Byra
Hill
53
ysmuir
Annick Water
Townhead of
Lambroughton
102
Lochside
Mid
Lambroughton
Titwood
Buiston
West
Lambroughton
floors
82
glands
Fm
Hillhead
Wheatrig
Burn
A735
Garrier
tonhead
High Langmuir
69
42
Stan
1
2
3
4
5
6
7
8
fine
ENERGY
Legend
View Points
Field of View
Wind Turbine Location
80

View Point 1: Looking South West from Standlane road along Titwood Cottages
COORDINATES : E240513 N642856
BEARING : 311.75 degrees
CAMERA SETUP : Pentax K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 90.1 m
FOCAL LENGTH : 40 mm

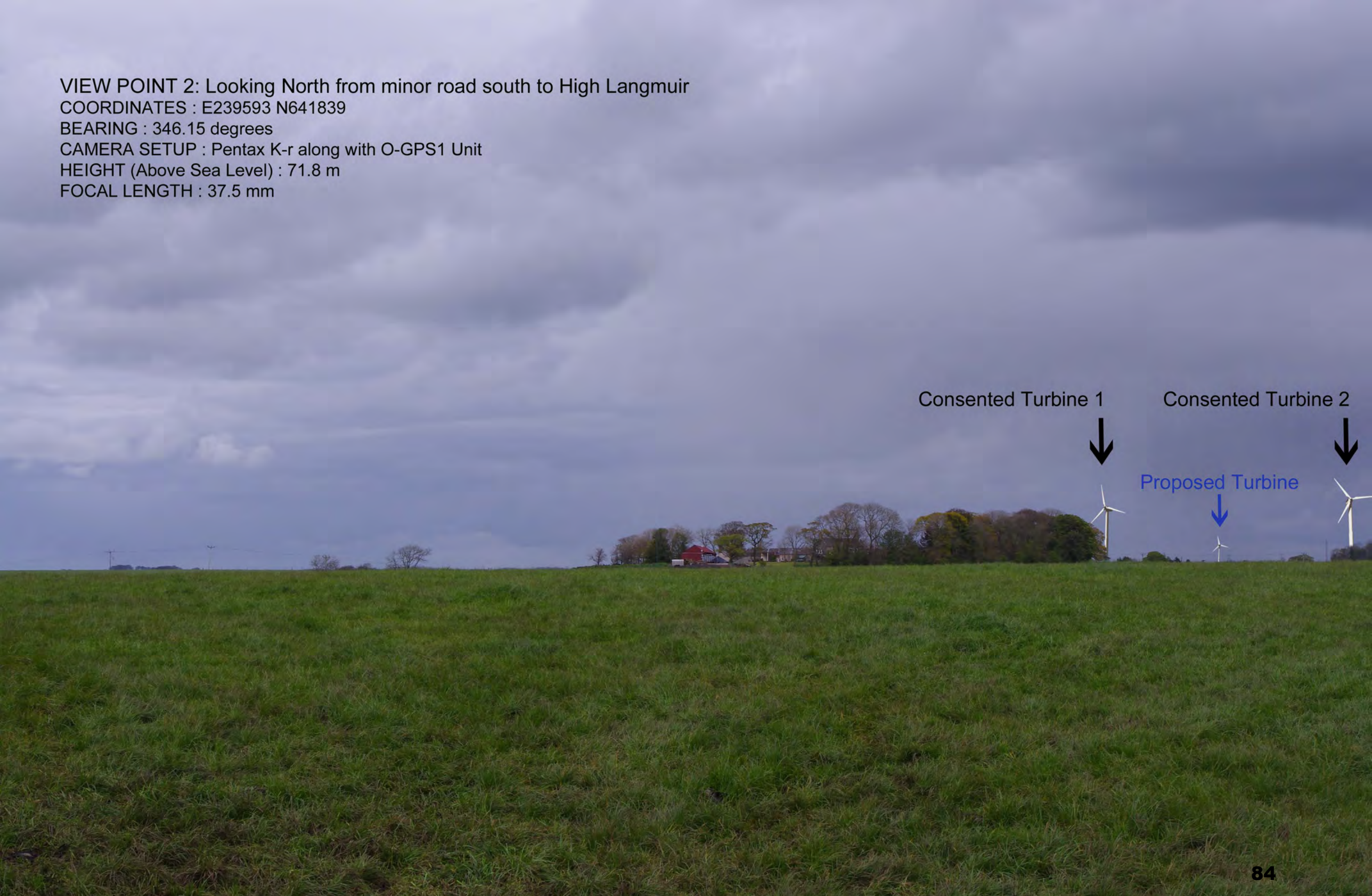


VIEW POINT1 : Looking South West from Standalane road along Titwood Cottages
COORDINATES : E240513 N642856
BEARING : 311.75 degrees
CAMERA SETUP : Pentax K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 90.1 m
FOCAL LENGTH : 40 mm

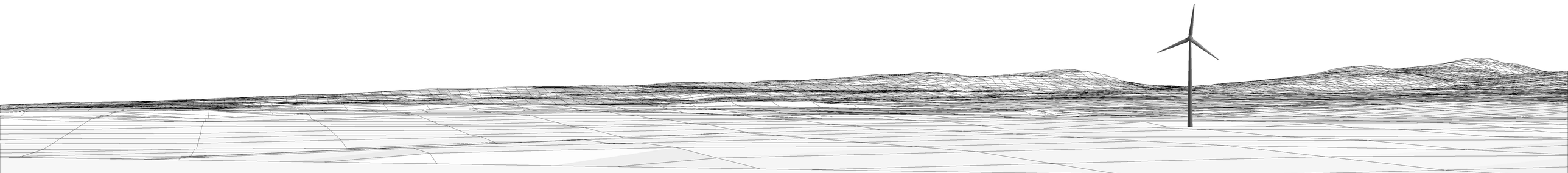
VIEW POINT 2: Looking North from minor road south to High Langmuir
COORDINATES : E239593 N641839
BEARING : 346.15 degrees
CAMERA SETUP : Pentax K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 71.8 m
FOCAL LENGTH : 37.5 mm



VIEW POINT 2: Looking North from minor road south to High Langmuir
COORDINATES : E239593 N641839
BEARING : 346.15 degrees
CAMERA SETUP : Pentax K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 71.8 m
FOCAL LENGTH : 37.5 mm



VIEW POINT 3: Looking South West from Standalane road alongTitwood Cottages
COORDINATES : E240520 N643010
BEARING : 281.17 degrees
CAMERA SETUP : Pentax K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 88 m
FOCAL LENGTH : 42.5 mm



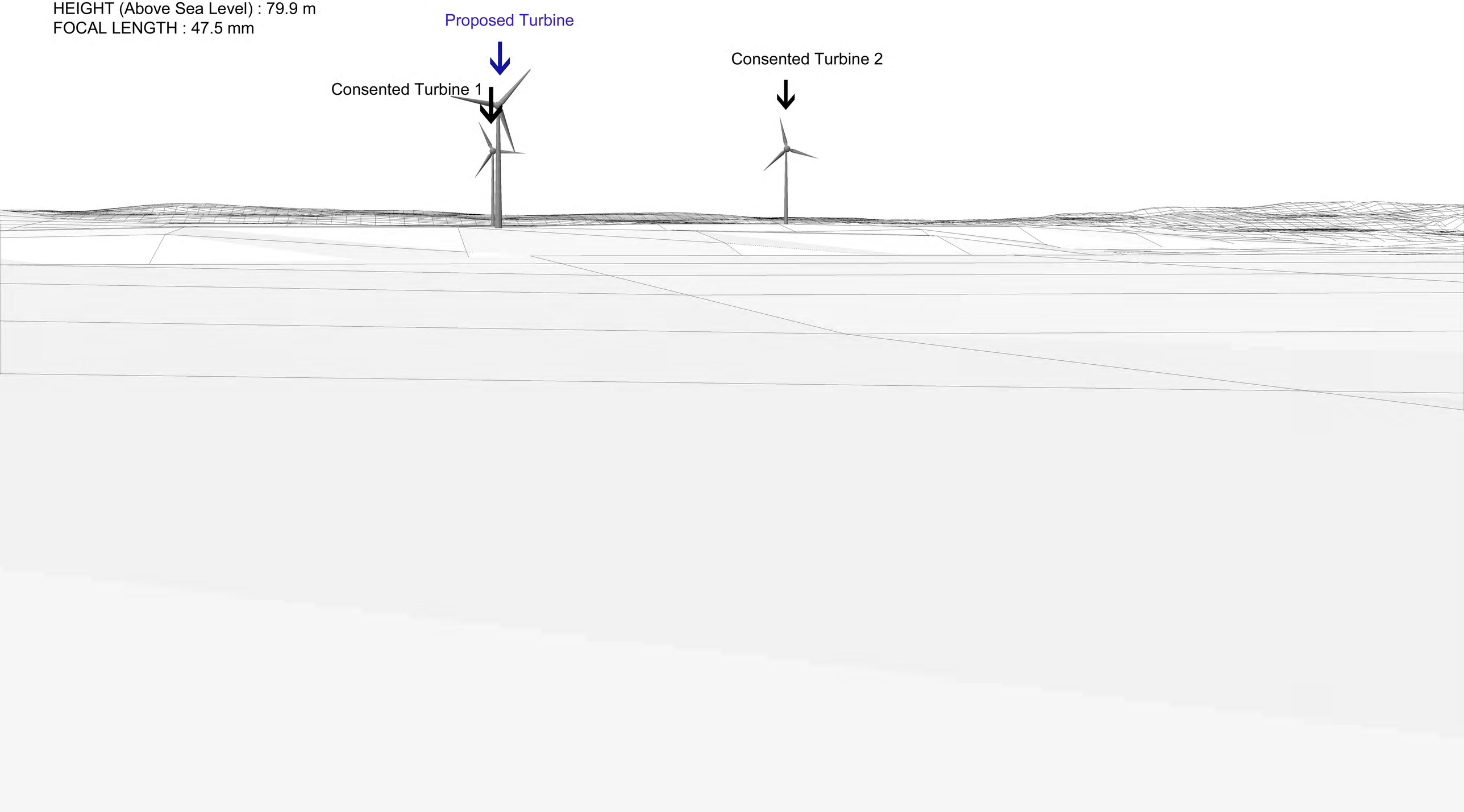
VIEW POINT 3: Looking South West from Standalane road alongTitwood Cottages
COORDINATES : E240520 N643010
BEARING : 281.17 degrees
CAMERA SETUP : Pentax K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 88 m
FOCAL LENGTH : 42.5 mm

Turbine is here

VIEW POINT 4: Looking West from Titwood Cottages
COORDINATES : E 240275 N643356
BEARING : 266.62 degrees
CAMERA SETUP : Pentax K-r along with o-GPS1 Unit
HEIGHT (Above Sea Level) : 78.3 m
FOCAL LENGTH : 18 mm

VIEW POINT 4: Looking West from Titwood Cottages
COORDINATES : E 240275 N643356
BEARING : 266.62 degrees
CAMERA SETUP : Pentax K-r along with o-GPS1 Unit
HEIGHT (Above Sea Level) : 78.3 m
FOCAL LENGTH : 18 mm

VIEW POINT 5: Looking South from road crossing near Mid lambroughton
COORDINATES : E239816 N63849
BEARING : 186.98 degrees
CAMERA SETUP : Pentax k-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 79.9 m
FOCAL LENGTH : 47.5 mm

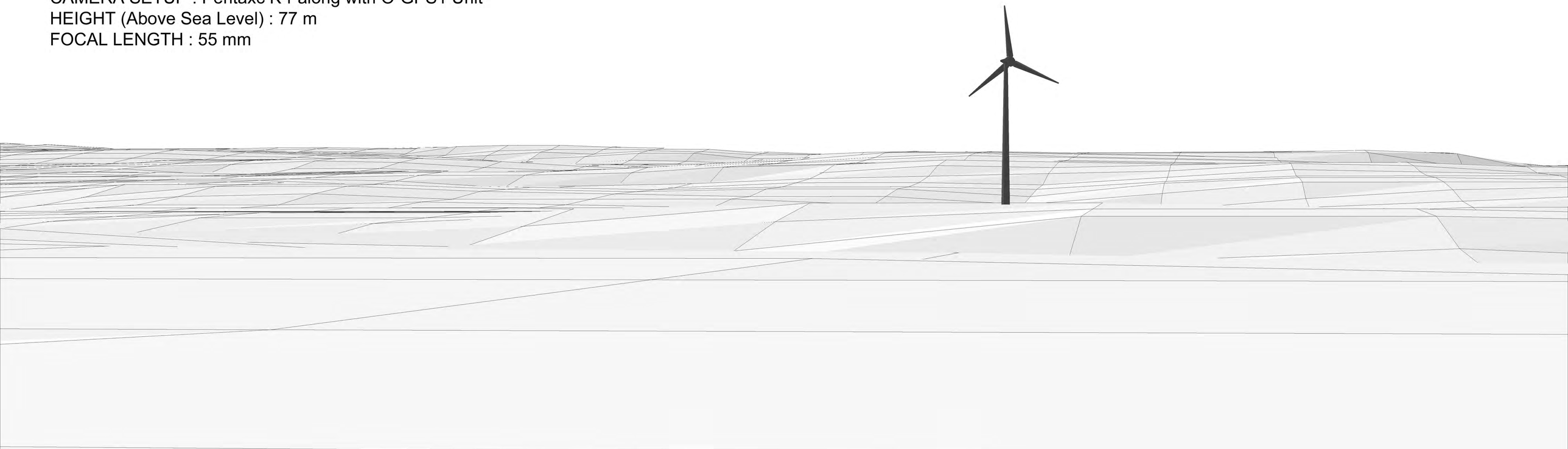


VIEW POINT 5: Looking South from B769 crossing near Mid lambroughton
COORDINATES : E239816 N63849
BEARING : 186.98 degrees
CAMERA SETUP : Pentax k-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 79.9 m
FOCAL LENGTH : 47.5 mm

View Point 6: Looking South from path at Townhead of Lambroughton
COORDINATES : E240244 N644242
BEARING : 209.45 degrees
CAMERA SETUP : Pentax K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 99.6 m
FOCAL LENGTH : 47.5 mm

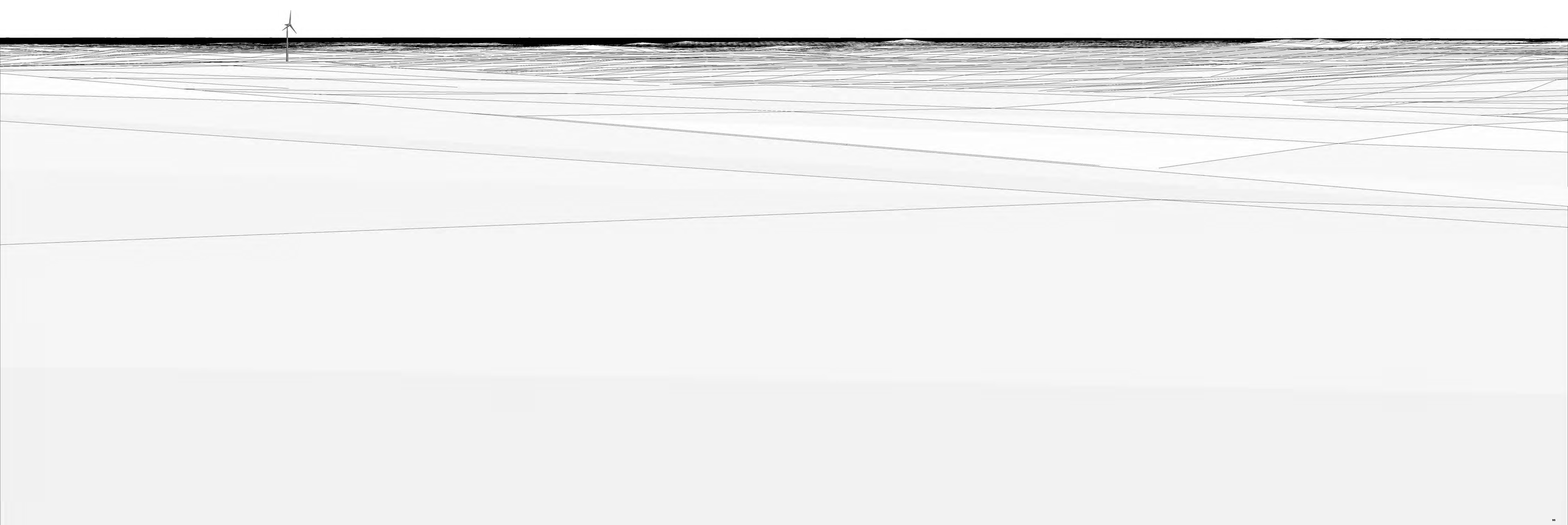
View Point 6: Looking South from path at Townhead of Lambroughton
COORDINATES : E240244 N644242
BEARING : 209.45 degrees
CAMERA SETUP : Pentax K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 99.6 m
FOCAL LENGTH : 47.5 mm

View Point 7: Looking East from West Lambroughton
COORDINATES : E239178 N643231
BEARING : 83.26 degrees
CAMERA SETUP : Pentaxc K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 77 m
FOCAL LENGTH : 55 mm



View Point 7: Looking East from West Lambroughton
COORDINATES : E239178 N643231
BEARING : 83.26 degrees
CAMERA SETUP : Pentaxc K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 77 m
FOCAL LENGTH : 55 mm

View Point 8: Looking South West from Ward Head Park
COORDINATES : E241508 N644419
BEARING : 245.06 degrees
CAMERA SETUP : Pentax K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 106.4 m
FOCAL LENGTH : 47.5 mm



View Point 8: Looking South West from Ward Head Park
COORDINATES : E241508 N644419
BEARING : 245.06 degrees
CAMERA SETUP : Pentax K-r along with O-GPS1 Unit
HEIGHT (Above Sea Level) : 106.4 m
FOCAL LENGTH : 47.5 mm

GH WindFarmer Noise Report
Titwood Farm
16 July 2012

1 Project: Titwood Farm - Turbine types

Turbine type	Endurance E-3120	
Diameter	19	m
Hub height	24	m
Number of blades	3	
Air density for power curve	1.225	kg/m^3
Power regulation	Pitch	
Cut-In windspeed	3.5	m/s
Cut-Out windspeed	25.0	m/s

Hub height wind speed (m/s)	Electrical power (kW)	Thrust coefficient (-)	Rotor speed (rpm)	Reactive power (kVAr)
0.0	0.0	0.000	0.00	0.0
1.0	0.0	0.000	0.00	0.0
2.0	0.0	0.000	0.00	0.0
3.0	1.0	0.650	20.00	0.0
4.0	15.0	0.970	20.00	0.0
5.0	50.0	0.990	20.00	0.0
6.0	100.0	0.950	20.00	0.0
7.0	160.0	0.900	20.00	0.0
8.0	235.0	0.850	20.00	0.0
9.0	360.0	0.780	20.00	0.0
10.0	500.0	0.720	20.00	0.0
11.0	666.0	0.685	20.00	0.0
12.0	750.0	0.635	20.00	0.0
13.0	750.0	0.600	20.00	0.0
14.0	750.0	0.570	20.00	0.0
15.0	750.0	0.540	20.00	0.0
16.0	750.0	0.510	20.00	0.0
17.0	750.0	0.480	20.00	0.0
18.0	750.0	0.460	20.00	0.0
19.0	750.0	0.441	20.00	0.0
20.0	750.0	0.420	20.00	0.0
21.0	750.0	0.400	20.00	0.0
22.0	750.0	0.390	20.00	0.0
23.0	750.0	0.375	20.00	0.0
24.0	750.0	0.350	20.00	0.0
25.0	750.0	0.350	20.00	0.0
26.0	750.0	0.340	20.00	0.0
27.0	750.0	0.330	20.00	0.0
28.0	750.0	0.313	20.00	0.0
29.0	750.0	0.300	20.00	0.0
30.0	750.0	0.290	20.00	0.0
31.0	0.0	0.000	0.00	0.0
32.0	0.0	0.000	0.00	0.0
33.0	0.0	0.000	0.00	0.0
34.0	0.0	0.000	0.00	0.0
35.0	0.0	0.000	0.00	0.0
36.0	0.0	0.000	0.00	0.0
37.0	0.0	0.000	0.00	0.0
38.0	0.0	0.000	0.00	0.0
39.0	0.0	0.000	0.00	0.0
40.0	0.0	0.000	0.00	0.0
41.0	0.0	0.000	0.00	0.0
42.0	0.0	0.000	0.00	0.0
43.0	0.0	0.000	0.00	0.0
44.0	0.0	0.000	0.00	0.0
45.0	0.0	0.000	0.00	0.0
46.0	0.0	0.000	0.00	0.0
47.0	0.0	0.000	0.00	0.0
48.0	0.0	0.000	0.00	0.0
49.0	0.0	0.000	0.00	0.0
50.0	0.0	0.000	0.00	0.0
51.0	0.0	0.000	0.00	0.0

Table 1 - Turbine performance for Endurance E-3120

Turbine noise options

Turbine produces tonal noise	No
Noise in octave bands	Yes

Octave band (Hz)	Sound Power Level (dB(A))
31.5	0.00
63.0	75.60
125.0	84.00
250.0	89.00
500.0	87.90
1000.0	89.20
2000.0	92.10
4000.0	89.80
8000.0	76.80

Table 2 - Sound Power Level for Endurance E-3120

Specify absolute sound power level	No	
Specify variation of sound power level with wind speed	Yes	
Reference height	10.00	m
Reference wind speed	10.00	m/s

Wind speed (m/s)	Difference to Reference (dB(A))
0.0	-94.80
1.0	-94.80
2.0	-94.80
3.0	-7.20
4.0	-7.00
5.0	-6.70
6.0	-6.20
7.0	-5.30
8.0	-3.70
9.0	-1.90
10.0	0.00
11.0	1.10
12.0	1.10
13.0	1.10
14.0	1.10
15.0	1.10
16.0	1.10
17.0	1.10
18.0	1.10
19.0	1.10
20.0	1.10

Table 3 - Noise as a function of windspeed for Endurance E-3120

2 Project: Titwood - Turbines Table

Turbine ID	Turbine label	Turbine type name	Hub height (m)	Rotor diameter (m)	Capacity (kW)
1	<label>	Endurance E-3120	24.0	19.0	50

Table 4 - Turbines Table - Part 1

Turbine ID	Eastings (m)	Northings (m)	Height of base (m)	Nearest turbine ID	Distance to nearest turbine (m)
1	239791.0	643266.0	72	0	0.0

Table 5 - Turbines Table - Part 2

3 Workbook noise options

Form of noise model to be used	Complex (ISO9613) General	
Ground Effect	Porous Ground	
Ground Effect	ISO9613 General	
Ground factor around turbines	0.50	
Ground factor everywhere else	0.50	
Meteorological correction factor Co	0.00	dB
Other attenuations to be considered	2.00	dB
Initial default noise limit to use when placing dwellings	35.00	dB(A)
Relative to background noise	0.00	dB(A)
Calculation grid spacing	10.00	m
Height above ground for noise mapping	1.50	m
Use DTM height data	Yes	
Octave Spreading	Yes	

Octave band (Hz)	Attenuation coefficient (dB/km)
31.5	0.00
63.0	0.10
125.0	0.40
250.0	1.00
500.0	1.90
1000.0	3.70
2000.0	9.70
4000.0	32.80
8000.0	117.00

Table 2 - Atmospheric Attenuation for Octave Bands of Noise

4 Project: Titwood - Dwellings

Dwelling ID	Dwelling name	Distance to nearest turbine (m)	Eastings (m)	Northings (m)	Altitude (m)	Turbine exclusion radius (m)
1	Titwood Cottages	630.2	240412.0	643159.0	73.6	0.0
2	East Lambroughton Cottages	650.6	239868.0	643912.0	72.6	0.0
3	Chapeltoun Terrace	641.0	239790.0	643907.0	72.2	0.0
4	West Lambroughton	557.0	239241.0	643178.0	69.2	0.0
5	Wheatrig	788.0	240042.0	642519.0	76.4	0.0
6	Mid Lambroughton	356.0	239726.0	643616.0	70.0	0.0
7	Hillhead	928.5	239035.0	642727.0	70.0	0.0

Table 7 - Project: Titwood - Dwellings

5 Project: Titwood - Dwellings noise

Dwelling ID	Noise prediction (dB(A))	Noise limit type	Absolute noise limit (dB(A))	Relative to background noise limit (dB(A))	Background noise reference ID
1	24.62	Absolute	35.00	Not applicable	Not applicable
2	24.26	Absolute	35.00	Not applicable	Not applicable
3	24.43	Absolute	35.00	Not applicable	Not applicable
4	26.02	Absolute	35.00	Not applicable	Not applicable
5	22.09	Absolute	35.00	Not applicable	Not applicable
6	30.93	Absolute	35.00	Not applicable	Not applicable
7	20.39	Absolute	35.00	Not applicable	Not applicable

Table 8 - Project: Titwood - Dwellings noise

GH WindFarmer Noise Report
Titwood - Wheatrig Study
16 July 2012

1 Project: Titwood: Wheatrig Study - Turbine types

Turbine type	ACSA A27 (plus 2dB(A) penalty)	
Diameter	27.0	m
Hub height	32.0	m
Number of blades	3	
Air density for power curve	1.225	kg/m^3
Power regulation	Pitch	
Cut-In windspeed	3.5	m/s
Cut-Out windspeed	25.0	m/s

Hub height wind speed (m/s)	Electrical power (kW)	Thrust coefficient (-)	Rotor speed (rpm)	Reactive power (kVAr)
0.0	0.0	0.000	0.00	0.0
1.0	0.0	0.000	0.00	0.0
2.0	0.0	0.000	0.00	0.0
3.0	2.0	0.650	20.00	0.0
4.0	7.0	0.970	20.00	0.0
5.0	21.0	0.990	20.00	0.0
6.0	38.0	0.950	20.00	0.0
7.0	62.0	0.900	20.00	0.0
8.0	92.0	0.850	20.00	0.0
9.0	128.0	0.780	20.00	0.0
10.0	165.0	0.720	20.00	0.0
11.0	196.0	0.685	20.00	0.0
12.0	216.0	0.635	20.00	0.0
13.0	223.0	0.600	20.00	0.0
14.0	225.0	0.570	20.00	0.0
15.0	225.0	0.540	20.00	0.0
16.0	225.0	0.510	20.00	0.0
17.0	225.0	0.480	20.00	0.0
18.0	225.0	0.460	20.00	0.0
19.0	225.0	0.441	20.00	0.0
20.0	225.0	0.420	20.00	0.0
21.0	225.0	0.400	20.00	0.0
22.0	225.0	0.390	20.00	0.0
23.0	225.0	0.375	20.00	0.0
24.0	225.0	0.350	20.00	0.0
25.0	225.0	0.350	20.00	0.0
26.0	0.0	0.000	0.00	0.0
27.0	0.0	0.000	0.00	0.0
28.0	0.0	0.000	0.00	0.0
29.0	0.0	0.000	0.00	0.0
30.0	0.0	0.000	0.00	0.0
31.0	0.0	0.000	0.00	0.0
32.0	0.0	0.000	0.00	0.0
33.0	0.0	0.000	0.00	0.0
34.0	0.0	0.000	0.00	0.0
35.0	0.0	0.000	0.00	0.0
36.0	0.0	0.000	0.00	0.0
37.0	0.0	0.000	0.00	0.0
38.0	0.0	0.000	0.00	0.0
39.0	0.0	0.000	0.00	0.0
40.0	0.0	0.000	0.00	0.0
41.0	0.0	0.000	0.00	0.0
42.0	0.0	0.000	0.00	0.0
43.0	0.0	0.000	0.00	0.0
44.0	0.0	0.000	0.00	0.0
45.0	0.0	0.000	0.00	0.0
46.0	0.0	0.000	0.00	0.0
47.0	0.0	0.000	0.00	0.0
48.0	0.0	0.000	0.00	0.0
49.0	0.0	0.000	0.00	0.0
50.0	0.0	0.000	0.00	0.0
51.0	0.0	0.000	0.00	0.0

Table 1 - Turbine performance for ACSA A27 (plus 2dB(A) penalty)

Turbine noise options:

Turbine produces tonal noise	No
Noise in octave bands	Yes

Octave band (Hz)	Sound Power Level (dB(A))
31.5	0.00
63.0	74.50
125.0	86.30
250.0	93.30
500.0	95.10
1000.0	94.50
2000.0	92.10
4000.0	86.20
8000.0	79.30

Table 2 - Sound Power Level for ACSA A27 (plus 2dB(A) penalty)

Specify absolute sound power level	No	
Specify variation of sound power level with wind speed	Yes	
Reference height	10.00	m
Reference wind speed	10.00	m/s

Wind speed (m/s)	Difference to Reference (dB(A))
0.0	-100.50
1.0	-100.50
2.0	-100.50
3.0	-100.50
4.0	-2.50
5.0	-2.10
6.0	-1.80
7.0	-1.10
8.0	-0.70
9.0	-0.40
10.0	0.00
11.0	0.40
12.0	7.00
13.0	1.10
14.0	1.40
15.0	1.80
16.0	2.10
17.0	2.50
18.0	2.80
19.0	3.20
20.0	3.50

Table 3 - Noise as a function of windspeed for ACSA A27 (plus 2dB(A) penalty)

2 Project: Titwood: Wheatrig Study - Turbines Table

Turbine ID	Turbine label	Turbine type name	Hub height (m)	Rotor diameter (m)	Capacity (kW)
1	Wheatrig turbine	ACSA A27 (plus 2dB(A) penalty)	32.0	27.0	225
2	Wheatrig Turbine	ACSA A27 (plus 2dB(A) penalty)	32.0	27.0	225

Table 4 - Turbines Table - Part 1

Turbine ID	Eastings (m)	Northings (m)	Height of base (m)	Nearest turbine ID	Distance to nearest turbine (m)
1	239765.0	642605.0	70	0	0.0
2	239643.0	642623.0	71	0	0.0

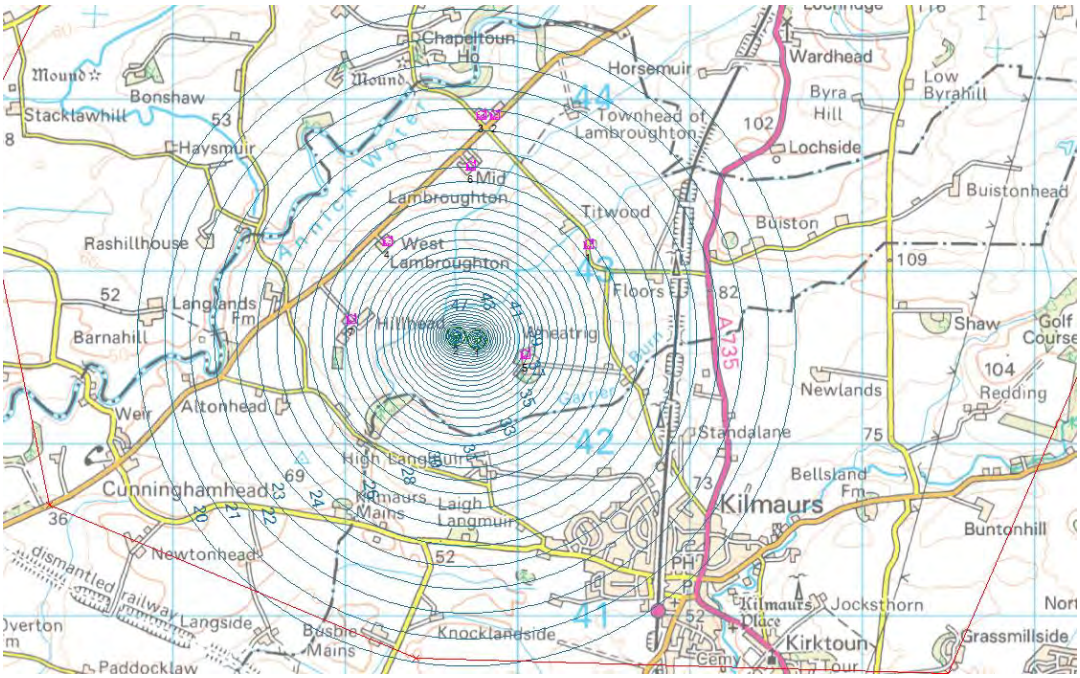
Table 5 - Turbines Table - Part 2

3 Workbook noise options

Form of noise model to be used	Complex (ISO9613) General	
Ground Effect	Porous Ground	
Ground Effect	ISO9613 General	
Ground factor around turbines	0.50	
Ground factor everywhere else	0.50	
Meteorological correction factor Co	0.00	dB
Other attenuations to be considered	2.00	dB
Initial default noise limit to use when placing dwellings	35.00	dB(A)
Relative to background noise	0.00	dB(A)
Calculation grid spacing	10.00	m
Height above ground for noise mapping	1.50	m
Use DTM height data	Yes	
Octave Spreading	Yes	

Octave band (Hz)	Attenuation coefficient (dB/km)
31.5	0.00
63.0	0.10
125.0	0.40
250.0	1.00
500.0	1.90
1000.0	3.70
2000.0	9.70
4000.0	32.80
8000.0	117.00

Table 6 - Atmospheric Attenuation for Octave Bands of Noise



4 Project: Titwood: Wheatrig Study - Dwellings

Dwelling ID	Dwelling name	Distance to nearest turbine (m)	Eastings (m)	Northings (m)	Altitude (m)	Turbine exclusion radius (m)
1	Titwood Cottages	851.8	240412.0	643159.0	73.6	0.0
2	East Lambroughton Cottages	1308.5	239868.0	643912.0	72.6	0.0
3	Chapeltoun Terrace	1292.4	239790.0	643907.0	72.2	0.0
4	West Lambroughton	685.3	239241.0	643178.0	69.2	0.0
5	Wheatrig	290.0	240042.0	642519.0	76.4	0.0
6	Mid Lambroughton	996.5	239726.0	643616.0	70.0	0.0
7	Hillhead	616.8	239035.0	642727.0	70.0	0.0

Table 7 - Project: Titwood: Wheatrig Study - Dwellings

5 Project: Titwood: Wheatrig Study - Dwellings noise

Dwelling ID	Noise prediction (dB(A))	Noise limit type	Absolute noise limit (dB(A))	Relative to background noise limit (dB(A))	Background noise reference ID
1	28.21	Absolute	35.00	Not applicable	Not applicable
2	24.17	Absolute	35.00	Not applicable	Not applicable
3	24.27	Absolute	35.00	Not applicable	Not applicable
4	30.46	Absolute	35.00	Not applicable	Not applicable
5	38.47	Absolute	35.00	Not applicable	Not applicable
6	26.88	Absolute	35.00	Not applicable	Not applicable
7	31.34	Absolute	35.00	Not applicable	Not applicable

Table 8 - Project: Titwood: Wheatrig Study - Dwellings noise

GH WindFarmer Cumulative Noise Report
Titwood Farm.wow
16 July 2012

1 Project: Titwood - Turbine types

Turbine type	Endurance -E3120	
Diameter	19.2	m
Hub height	24	m
Number of blades	3	
Air density for power curve	1.225	kg/m^3
Power regulation	Pitch	
Cut-In windspeed	3.5	m/s
Cut-Out windspeed	25.0	m/s

Hub height wind speed (m/s)	Electrical power (kW)	Thrust coefficient (-)	Rotor speed (rpm)	Reactive power (kVAr)
0.0	0.0	0.000	0.00	0.0
1.0	0.0	0.000	0.00	0.0
2.0	0.0	0.000	0.00	0.0
3.0	1.0	0.650	20.00	0.0
4.0	15.0	0.970	20.00	0.0
5.0	50.0	0.990	20.00	0.0
6.0	100.0	0.950	20.00	0.0
7.0	160.0	0.900	20.00	0.0
8.0	235.0	0.850	20.00	0.0
9.0	360.0	0.780	20.00	0.0
10.0	500.0	0.720	20.00	0.0
11.0	666.0	0.685	20.00	0.0
12.0	750.0	0.635	20.00	0.0
13.0	750.0	0.600	20.00	0.0
14.0	750.0	0.570	20.00	0.0
15.0	750.0	0.540	20.00	0.0
16.0	750.0	0.510	20.00	0.0
17.0	750.0	0.480	20.00	0.0
18.0	750.0	0.460	20.00	0.0
19.0	750.0	0.441	20.00	0.0
20.0	750.0	0.420	20.00	0.0
21.0	750.0	0.400	20.00	0.0
22.0	750.0	0.390	20.00	0.0
23.0	750.0	0.375	20.00	0.0
24.0	750.0	0.350	20.00	0.0
25.0	750.0	0.350	20.00	0.0
26.0	750.0	0.340	20.00	0.0
27.0	750.0	0.330	20.00	0.0
28.0	750.0	0.313	20.00	0.0
29.0	750.0	0.300	20.00	0.0
30.0	750.0	0.290	20.00	0.0
31.0	0.0	0.000	0.00	0.0
32.0	0.0	0.000	0.00	0.0
33.0	0.0	0.000	0.00	0.0
34.0	0.0	0.000	0.00	0.0
35.0	0.0	0.000	0.00	0.0
36.0	0.0	0.000	0.00	0.0
37.0	0.0	0.000	0.00	0.0
38.0	0.0	0.000	0.00	0.0
39.0	0.0	0.000	0.00	0.0
40.0	0.0	0.000	0.00	0.0
41.0	0.0	0.000	0.00	0.0
42.0	0.0	0.000	0.00	0.0
43.0	0.0	0.000	0.00	0.0
44.0	0.0	0.000	0.00	0.0
45.0	0.0	0.000	0.00	0.0
46.0	0.0	0.000	0.00	0.0
47.0	0.0	0.000	0.00	0.0
48.0	0.0	0.000	0.00	0.0
49.0	0.0	0.000	0.00	0.0
50.0	0.0	0.000	0.00	0.0
51.0	0.0	0.000	0.00	0.0

Table 1 - Turbine performance for Endurance E-3120

Turbine noise options:

Turbine produces tonal noise	No
Noise in octave bands	Yes

Octave band (Hz)	Sound Power Level (dB(A))
31.5	0.00
63.0	75.60
125.0	84.00
250.0	89.00
500.0	87.90
1000.0	89.20
2000.0	92.10
4000.0	89.80
8000.0	76.80

Table 2 - Sound Power Level for Endurance E-3120

Specify absolute sound power level	No	
Specify variation of sound power level with wind speed	Yes	
Reference height	10.00	m
Reference wind speed	10.00	m/s

Wind speed (m/s)	Difference to Reference (dB(A))
0.0	-94.80
1.0	-94.80
2.0	-94.80
3.0	-7.20
4.0	-7.00
5.0	-6.70
6.0	-6.20
7.0	-5.30
8.0	-3.70
9.0	-1.90
10.0	0.00
11.0	1.10
12.0	1.10
13.0	1.10
14.0	1.10
15.0	1.10
16.0	1.10
17.0	1.10
18.0	1.10
19.0	1.10
20.0	1.10

Table 2 - Noise as a function of windspeed for Endurance E-3120

Turbine type	ACSA A27 (plus 2dB(A) penalty)	
Diameter	27.0	m
Hub height	32.0	m
Number of blades	3	
Air density for power curve	1.225	kg/m^3
Power regulation	Pitch	
Cut-In windspeed	3.5	m/s
Cut-Out windspeed	25.0	m/s

Hub height wind speed (m/s)	Electrical power (kW)	Thrust coefficient (-)	Rotor speed (rpm)	Reactive power (kVAr)
0.0	0.0	0.000	0.00	0.0
1.0	0.0	0.000	0.00	0.0
2.0	0.0	0.000	0.00	0.0
3.0	2.0	0.650	20.00	0.0
4.0	7.0	0.970	20.00	0.0
5.0	21.0	0.990	20.00	0.0
6.0	38.0	0.950	20.00	0.0
7.0	62.0	0.900	20.00	0.0
8.0	92.0	0.850	20.00	0.0
9.0	128.0	0.780	20.00	0.0
10.0	165.0	0.720	20.00	0.0
11.0	196.0	0.685	20.00	0.0
12.0	216.0	0.635	20.00	0.0
13.0	223.0	0.600	20.00	0.0
14.0	225.0	0.570	20.00	0.0
15.0	225.0	0.540	20.00	0.0
16.0	225.0	0.510	20.00	0.0
17.0	225.0	0.480	20.00	0.0
18.0	225.0	0.460	20.00	0.0
19.0	225.0	0.441	20.00	0.0
20.0	225.0	0.420	20.00	0.0
21.0	225.0	0.400	20.00	0.0
22.0	225.0	0.390	20.00	0.0
23.0	225.0	0.375	20.00	0.0
24.0	225.0	0.350	20.00	0.0
25.0	225.0	0.350	20.00	0.0
26.0	0.0	0.000	0.00	0.0
27.0	0.0	0.000	0.00	0.0
28.0	0.0	0.000	0.00	0.0
29.0	0.0	0.000	0.00	0.0
30.0	0.0	0.000	0.00	0.0
31.0	0.0	0.000	0.00	0.0
32.0	0.0	0.000	0.00	0.0
33.0	0.0	0.000	0.00	0.0
34.0	0.0	0.000	0.00	0.0
35.0	0.0	0.000	0.00	0.0
36.0	0.0	0.000	0.00	0.0
37.0	0.0	0.000	0.00	0.0
38.0	0.0	0.000	0.00	0.0
39.0	0.0	0.000	0.00	0.0
40.0	0.0	0.000	0.00	0.0
41.0	0.0	0.000	0.00	0.0
42.0	0.0	0.000	0.00	0.0
43.0	0.0	0.000	0.00	0.0
44.0	0.0	0.000	0.00	0.0
45.0	0.0	0.000	0.00	0.0
46.0	0.0	0.000	0.00	0.0
47.0	0.0	0.000	0.00	0.0
48.0	0.0	0.000	0.00	0.0
49.0	0.0	0.000	0.00	0.0
50.0	0.0	0.000	0.00	0.0
51.0	0.0	0.000	0.00	0.0

Table 3 - Turbine performance for ACSA A27 (plus 2dB(A) penalty)

Turbine noise options:

Turbine produces tonal noise	No
Noise in octave bands	Yes

Octave band (Hz)	Sound Power Level (dB(A))
31.5	0.00
63.0	74.50
125.0	86.30
250.0	93.30
500.0	95.10
1000.0	94.50
2000.0	92.10
4000.0	86.20
8000.0	79.30

Table 4 - Sound Power Level for ACSA A27 (plus 2dB(A) penalty)

Specify absolute sound power level	No	
Specify variation of sound power level with wind speed	Yes	
Reference height	10.00	m
Reference wind speed	10.00	m/s

Wind speed (m/s)	Difference to Reference (dB(A))
0.0	-100.50
1.0	-100.50
2.0	-100.50
3.0	-100.50
4.0	-2.50
5.0	-2.10
6.0	-1.80
7.0	-1.10
8.0	-0.70
9.0	-0.40
10.0	0.00
11.0	0.40
12.0	7.00
13.0	1.10
14.0	1.40
15.0	1.80
16.0	2.10
17.0	2.50
18.0	2.80
19.0	3.20
20.0	3.50

Table 5 - Noise as a function of windspeed for ACSA A27 (plus 2dB(A) penalty)

2 Project: Titwood - Turbines Table

Turbine ID	Turbine label	Turbine type name	Hub height (m)	Rotor diameter (m)	Capacity (kW)
1	Proposed Turbine	Endurance E-3120	24.0	19.0	50
2	Wheatrig Turbine	ACSA A27 (plus 2dB(A) penalty)	32.0	27.0	225
3	Wheatrig Turbine	ACSA A27 (plus 2dB(A) penalty)	32.0	27.0	225

Table 6 - Turbines Table - Part 1

Turbine ID	Eastings (m)	Northings (m)	Height of base (m)	Nearest turbine ID	Distance to nearest turbine (m)
1	239791.0	643266.0	72	0	0.0
2	239765.0	642605.0	70	0	0.0
3	239643.0	642623.0	71	0	0.0

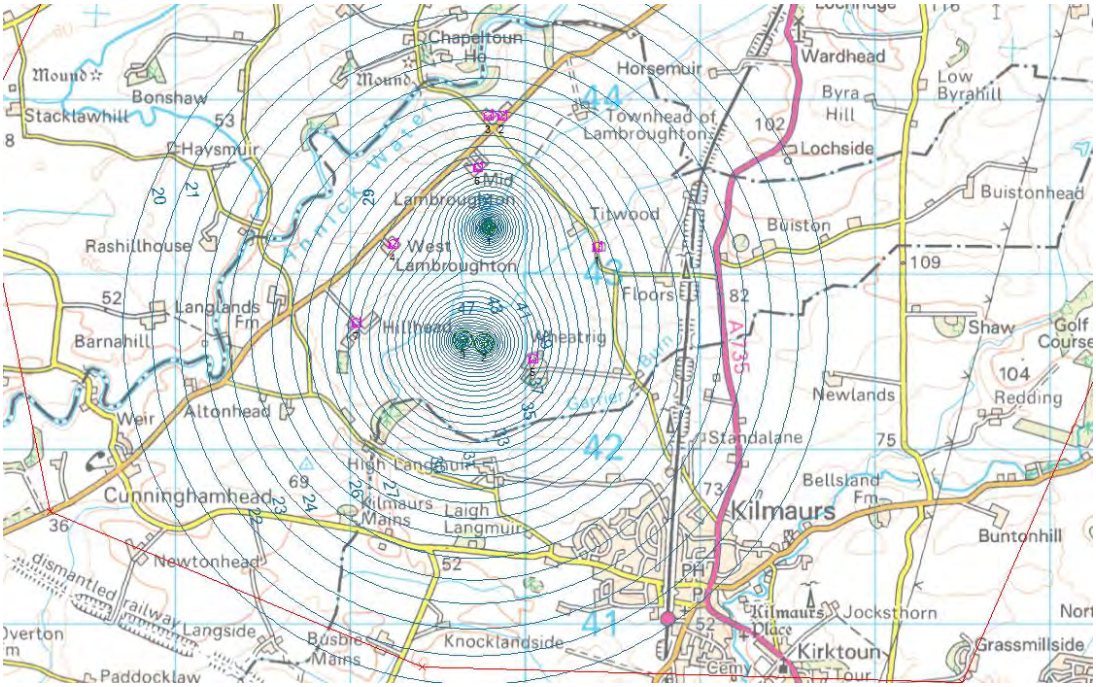
Table 7 - Turbines Table - Part 2

3 Workbook noise options

Form of noise model to be used	Complex (ISO9613) General	
Ground Effect	Porous Ground	
Ground Effect	ISO9613 General	
Ground factor around turbines	0.50	
Ground factor everywhere else	0.50	
Meteorological correction factor Co	0.00	dB
Other attenuations to be considered	2.00	dB
Initial default noise limit to use when placing dwellings	35.00	dB(A)
Relative to background noise	0.00	dB(A)
Calculation grid spacing	10.00	m
Height above ground for noise mapping	1.50	m
Use DTM height data	Yes	
Octave Spreading	Yes	

Octave band (Hz)	Attenuation coefficient (dB/km)
31.5	0.00
63.0	0.10
125.0	0.40
250.0	1.00
500.0	1.90
1000.0	3.70
2000.0	9.70
4000.0	32.80
8000.0	117.00

Table 8 - Atmospheric Attenuation for Octave Bands of Noise



4 Project: Project Name - Dwellings

Dwelling ID	Dwelling name	Distance to nearest turbine (m)	Eastings (m)	Northings (m)	Altitude (m)	Turbine exclusion radius (m)
1	Titwood Cottages	630.2	240412.0	643159.0	73.6	0.0
2	East Lambroughton Cottages	650.6	239868.0	643912.0	72.6	0.0
3	Chapeltoun Terrace	641.0	239790.0	643907.0	72.2	0.0
4	West Lambroughton	557.0	239241.0	643178.0	69.2	0.0
5	Wheatrig	290.0	240042.0	642519.0	76.4	0.0
6	Mid Lambroughton	356.0	239726.0	643616.0	70.0	0.0
7	Hillhead	616.8	239035.0	642727.0	70.0	0.0

Table 9 - Project: Titwood - Dwellings

5 Project: Titwood - Dwellings noise

Dwelling ID	Noise prediction (dB(A))	Noise limit type	Absolute noise limit (dB(A))	Relative to background noise limit (dB(A))	Background noise reference ID
1	29.79	Absolute	35.00	Not applicable	Not applicable
2	27.23	Absolute	35.00	Not applicable	Not applicable
3	27.36	Absolute	35.00	Not applicable	Not applicable
4	31.79	Absolute	35.00	Not applicable	Not applicable
5	38.57	Absolute	35.00	Not applicable	Not applicable
6	32.37	Absolute	35.00	Not applicable	Not applicable
7	31.67	Absolute	35.00	Not applicable	Not applicable

Table 10 - Project: Titwood - Dwellings noise

6 Summary

Noise Prediction Calculation carried out on WindFarmer (GL Garrad Hassan) Version 4.2.20.0 based on the Complex ISO9613-2:1996(E) General model, in accordance with ETSU-R-97. A copy of the methodology is included within these appendices.

Overall Sound Power Level to be used for the Endurance turbine is weighted sound level (LWAref) of 90.6 dB plus 1.6dB(A) uncertainty = 92.2dB(A) total for the Endurance E-3120. These levels are confirmed in the Hays Mackenzie Report HM:2300/R1 (6th April 2011) in table 5, page 9 and for uncertainty, table 7 on page 12 of the same report . This section also confirms that the above measurements result at a wind speed 8m/s.

In order to be in compliance with paragraph 25 of the executive summary of ETSU-R-97 (where it is confirmed that a 10m/s wind speed is to be tested), we have had to extrapolate an extra 3.7dB(A) (1.85dB(A) increase for every extra 1m/s – as per table 5, page 9 of the Hays Mackenzie Report. This gives us a final overall Sound Power Level of 95.9dB(A) – i.e. 90.6+1.6+3.7dB(A).

To allow this penalty to be used with the Complex (ISO9613) General method of calculation (which requires the sound to be attenuated as an octave spread) we have added the required 5.3dB to every Octave Sound Power value specified in the above test documents' octave table – which, when added, arrives at the overall Sound Power Level (SPL) of 95.9dB.

Please note we have included a ground attenuation factor of 0.5 (guidance published in the March/April 2009 IOA bulletin suggests that the ISO 9613 method for predicting noise from wind turbines gives a more accurate result when either hard ground G=0 or semi porous G=0.5 ground attenuation factors are used) – we have used a porous ground effect in the calculations above. We have included a satellite image of the site and surroundings in support of this confirmation of porous ground.

We confirm that all the above Sound Levels and calculations are dB(A)eq, and we have taken 2dB reduction in to account at all the dwellings for the conversion between the LAeq and LA90, 10min descriptors. This LA90, 10min descriptor is required to be in accordance with paragraph 14 of the executive summary of ETSU-R-97.

We have also included the Hays Mackenzie Report HM:2300/R1 (6th April 2011) .

PAN45 / ETSU-R-97 states that an acceptable sound pressure level received at the exterior of a neighbouring noise sensitive property must be no greater than 35dB during daylight hours.

Overall Sound Power Level to be used for the ACSA turbines is weighted sound level (LWAref) of 97.8 dB plus 2dB(A) uncertainty = 99.8dB(A) total for the ACSA A27.

In order to be in compliance with paragraph 25 of the executive summary of ETSU-R-97 (where it is confirmed that a 10m/s wind speed is to be tested), we have had to extrapolate an extra 1.2dB(A) (0.6dB(A) increase for every extra 1m/s – as per the table to section 6a of the excerpted page 21 of the Acoustica Report P8.005.94 (June 9th 1994). This gives us a final overall Sound Power Level of 101dB(A) – i.e. 97.8+2+1.2dB(A).

To allow this penalty to be used with the Complex (ISO9613) General method of calculation (which requires the sound to be attenuated as an octave spread) we have added the required 3.2dB to every Octave Sound Power value specified in the above test documents' octave table – which, when added, arrives at the overall Sound Power Level (SPL) of 101dB.

Please note we have included a ground attenuation factor of 0.5 (guidance published in the March/April 2009 IOA bulletin suggests that the ISO 9613 method for predicting noise from wind turbines gives a more accurate result when either hard ground G=0 or semi porous G=0.5 ground attenuation factors are used) – we have used a porous ground effect in the calculations above. We have included a satellite image of the site and surroundings in support of this confirmation of porous ground.

We confirm that all the above Sound Levels and calculations are dB(A)eq, and we have taken 2dB reduction in to account at all the dwellings for the conversion between the LAeq and LA90, 10min descriptors. This LA90, 10min descriptor is required to be in accordance with paragraph 14 of the executive summary of ETSU-R-97.

PAN45 / ETSU-R-97 states that an acceptable sound pressure level received at the exterior of a neighbouring noise sensitive property must be no greater than 35dB during daylight hours.

From the above results, it is clear that we do not surpass these levels in all neighbouring properties in exception of Wheatrig Farm. As it stands the farm currently receives noise in the region of 38.47dB from the two consented ACSA turbines on the farm. Having now examined the cumulative noise impact of the Endurance turbine along with the 2 ACSA turbines, the noise level at Wheatrig farm rises to 38.58dB (an increase of 0.11dB). All accoustic specialists agree that a change in noise level of 1dB or lower in imperceptible to the human ear.

HAYES MCKENZIE

PARTNERSHIP

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Endurance E-3120 Wind Turbine Acoustic Performance Test

Report HM: 2300/R1

6th April 2011

ENDURANCE E-3120 WIND TURBINE

ACOUSTIC PERFORMANCE TEST

Report HM : 2300/R1

6th April 2011

Final Version

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1. Introduction

1.1 A turbine noise performance test has been carried out on a Endurance E-3120 wind turbine at East Ash Farm located approximately 2.5km NNE of Bradworthy, Devon, in the UK.

1.2 The turbine has a hub height of 25m and a downwind rotor with a diameter of 19.2m. The wind turbine is passive stall regulated and has a rated power of 50 kW, which is achieved at a wind speed of approximately 9.5 m/s at hub height.

1.3 The objective of this test was to measure the noise performance characteristics of the wind turbine. The test consisted of measurement of the sound power level and tonal characteristics.

1.4 This noise test was conducted in accordance with IEC 61400-11 (2006) *Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques*.

1.5 The noise measurements were carried out on 1st and 2nd February 2011.

1.6 Analysis of the data was carried out according to Method 2: *determination of wind speed with an anemometer* described in IEC 61400-11, as it was not possible to derive the wind speed from the power output of the turbine.

2. Turbine Specification

2.1 The wind turbine is a three-bladed, passive stall regulated (constant speed) downwind turbine. The turbine's specification, as required by IEC 61400-11 and supplied by the manufacturer, is shown in Table 1 below.

Table 1 - Turbine Specifications

Parameter	Value/Feature
Manufacturer	Endurance Wind Power
Model Number	E-3120
Serial Number	EWP-E-01-00123
Type (upwind/downwind)	Downwind, horizontal axis
Hub Height	25m
Rotor Diameter	19.2m
Tower Type	Free-standing Monopole
Turbine Control (stall/pitch)	Passive stall
Rotational Speed	Constant, 43 rpm
Rated Power	50 kW (at 9.5 m/s at rotor centre)
Cut-in Wind Speed	3.5 m/s
Cut-out Wind Speed	25 m/s
Control Software Version	PLC Phoenix Contact - PLC Code version 1.4.11
Rotor Control Devices	Full blade pitching (centrifugally activated)
Blade Type	Fibreglass / epoxy
Number of Blades	3
Gearbox Manufacturer	Flender
Gearbox Type	3 parallel stages
Generator Manufacturer	ABB
Generator Rotational Speed	1500 rpm

3. Measurement

Site Layout and Measurement Position

3.1 The site layout is shown at Appendix A. The site was characterised as open farmland bordered by hedgerows, which includes occasional trees. The E-3120 turbine which was the subject of these tests is the only wind turbine on this site.

3.2 IEC 61400-11 (2006) *Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques* [1] specifies that the microphone used for the noise tests is to be mounted on a 1 m diameter ground-mounted board, facing in the direction of the wind turbine under test, at a distance corresponding to the tip height of the turbine (+/- 20%) directly downwind of the turbine. According to [1], measured noise data is valid as long as the board is within the downwind sector (i.e. +/- 15° of the directly downwind direction). Photos of the noise monitoring equipment set up are shown at Appendix B.

3.3 The microphone was fitted inside a primary hemispherical open cell foam wind shield of 90 mm in diameter laid flat on the board. The primary wind shield was surrounded by a secondary hemispherical foam wind shield of 450 mm diameter and 50 mm thickness. The insertion loss of the secondary wind shield is shown at Appendix C. The ground board was 20mm plywood with a diameter of 1000mm.

3.4 An anemometer was positioned approximately 45m upwind of the rotor of the turbine to measure wind speed. This is within the 2 to 4 D range specified by IEC 61400-11, where D is the rotor diameter of the wind turbine (here D = 19.2 m). Wind speed values are valid as long as the anemometer position is within the upwind sector (i.e. +/- 30° of the directly upwind direction), and the anemometer was moved during the survey to ensure that it was within allowable tolerances.

3.5 Wind speed and wind direction measurements, time-synchronised to the noise measurements, were made using a Second Wind C3 anemometer and an NRG #200P wind vane mounted at 10 m height connected to a Nomad 2 GSM data logger.

3.6 The microphone and the met mast position were within the acceptable ranges relative to the position of the nacelle, specified by IEC 61400-11 as discussed at paragraph 3.2, throughout the whole measurement period.

3.7 Table 2 details the measurement positions. $R_{0,i}$ is the reference distance on each measurement day and is the horizontal distance from the microphone to the nacelle. R_1 is the resultant slant distance from the measurement position to the nacelle.

Table 2 - Distances and Reference Values

Parameter	Symbol	Value
Hub Height	H	25.3 m[1]
Rotor Diameter	D	19.2 m
Reference Distance day 1	$R_{0,1}$	31.5 m
Reference Distance day 2	$R_{0,2}$	31.5 m
Slant Distance day 1	R_1	40.4 m
Slant Distance day 2	R_2	40.4 m
Reference Roughness Length	z_{0ref}	0.05 m
Anemometer Height	z	10 m

3.8 During the noise tests the wind turbine was shut down for certain periods to allow for background noise measurements in order to establish the level of contribution from other noise sources.

3.9 Whilst on site, the average 1-minute electrical power output of the turbine was noted down from the turbine operational data once a minute during noise measurements; although at present there is not a power curve available to determine the 10m-height wind speed from the power output. Method 2 described in IEC 61400-11 has therefore been used to determine the sound power level output of the turbine. It would be possible to re-analyse the data with wind speed derived from the electrical power output of the turbine once a power curve (measured according to IEC 61400-12) is available for this turbine.

3.10 Amendment 1 (2006) to IEC 61400-11 states that where the hub height is lower than 30m, wind speed may be taken from an anemometer between 10m and hub height.

[1] Including concrete base

4. Instrumentation

4.1 Noise measurements were carried out using the following equipment:

General
Bruel & Kjær Type 4231 calibrator (Serial No. 2218188)

Reference Position

01dB Symphonie Measurement System (Serial No. 00587)

PCB Microphone (Serial No. 377A02)

G.R.A.S. Type 26AK Pre-Amplifier (Serial No. 22826)

Secondary Windshield – Performance detailed at Appendix C

4.2 Meteorological measurements were carried out using the following equipment:

Logger
Second Wind Nomad II (S/N 05587)

Anemometer and Wind Vane

Second Wind C3 Anemometer (S/N 05531)
NRG #200P Wind Vane (S/N AV1102)

Temperature and Pressure Sensors

Second Wind Thermistor Temperature Probe (S/N TH84)

Setra Model 276 Barometric Pressure Sensor (S/N 4404452)

4.3 The noise measurement equipment was field calibrated prior to each measurement being performed and checked at the end. There was no recorded drift in the calibration of the equipment for any measurements. All equipment was within its laboratory calibration period.

4.4 Noise and wind measurements were time-synchronised to GMT, and all measurements were averaged over one minute, with the exception of the air pressure which was sampled every one minute.

Non-Acoustic Data

4.5 Table 3 below details the non-acoustic data reported as required by IEC 61400-11.

Table 3 – Non-acoustic Data

Wind speed determination method	Measured 10m height
Roughness length	0.05m
Air temperature, day 1	5.9 - 9.1ºC
Air temperature, day 2	6.3 - 9.5 ºC
Atmospheric pressure, day 1	1000.0 – 1002.0 mB
Atmospheric pressure, day 2	995.6 – 999.5 mB
Wind direction range, day 1	254.4 – 332.7º
Wind direction range, day 2	238.0 – 280.7º

5. Results

Measured Noise Levels

5.1 The measured 1-minute average L_{Aeq} noise data was plotted against the measured average 1-minute 10m height wind speed for operational periods and separately for shutdown periods. All noise data has been filtered such that any 1-minute period that was affected by specific extraneous noises such as vehicles passing on local roads, and any other anomalies, have been removed from the assessment.

5.2 Appendix D shows the measured operational noise and measured background noise at the microphone position, plotted against the measured 10m-height wind speed. Table 4 below details the number of operational data points in each wind speed range measured over the 2 days.

5.3 Appendix D also shows the measured 1-minute average L_{Aeq} noise data was plotted against electrical power output of the turbine.

Table 4 – Number of 1-minute Noise Data Points Recorded per Wind Speed Bin

Period		2	3	4	5	6	7	8	9	10	11	12	Total
1st February 2011	Turbine Operational	2	33	31	16	14	1	0	0	0	0	0	97
	Background Noise	0	14	20	10	2	0	0	0	0	0	0	46
2nd February 2011	Turbine Operational	0	0	0	1	12	20	19	9	16	12	5	94
	Background Noise	0	0	0	0	5	13	7	9	4	8	5	51
Totals	Turbine Operational	2	33	31	17	26	21	19	9	16	12	5	191
	Background Noise	0	14	20	10	7	13	7	9	4	8	5	97

Calculation of $L_{WA,k}$

5.4 IEC 61400-11 requires that a 4th order regression line is plotted through the measured operational data. A 3rd order polynomial regression line has been plotted thorough the turbine shutdown noise data, as it fits the data better than a 4th order regression line.

5.5 The $L_{WA,k}$ has been calculated using the formula below specified in IEC 61400-11. A correction has been applied to account for secondary wind shield, which has been calculated from the measured 1/3 octave band levels across wind speeds from 3-12 m/s.

$$L_{WA,k} = L_{Aeq,c,k} - 6 + lg\left[\frac{4\pi R_1^2}{S_0}\right]$$

Where

$L_{Aeq,c,k}$ is the background corrected A-weighted sound pressure level at the integer wind speeds and under reference conditions

R_1 is the slant distance in meters from the rotor centre to the microphone as shown

S_0 is a reference area, $S_0 = 1m^2$

5.6 The results are plotted at Appendix E and in tabular form below at Table 5. Note that the results shown at Appendix E are not corrected for the presence of the secondary wind shield.

Table 5 - Calculation of Sound Power Level using 4th Order Regression Line

10m-height wind speed (m/s)	3	4	5	6	7	8	9	10	11	12
Total Measured Operational Noise Levels (dB L_{Aeq})	49.8	50.1	50.3	50.8	51.8	53.4	55.4	57.3	58.6	58.6
Background Noise Level (dB L_{Aeq})	35.9	35.8	36.6	38.2	40.3	42.9	45.8	48.6	51.4	53.8
Difference Between Total and Background Noise (dB)	13.9	14.3	13.7	12.6	11.5	10.5	9.6	8.7	7.3	4.8
Background Corrected Sound Pressure Level, $L_{Aeq,c,k}$ (dB L_{Aeq})	49.6	49.9	50.1	50.5	51.5	53.0	54.9	56.7	57.7	57.3
Secondary Wind Shield Correction	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5
Apparent Sound Power Level, $L_{WA,k}$ (dB L_{WA})	**87.1**	**87.3**	**87.6**	**88.1**	**89.0**	**90.6**	**92.4**	**94.3**	**95.4**	**94.9***

5.7 It should be noted that the difference between the total measured noise and measured turbine shutdown noise levels at 12m/s is less than 6dB. Therefore 1.3dB has been subtracted from the measured turbine noise as required by IEC 61400-11 and the result marked with an '*'.

1/3 Octave Band Data

5.8 As required by IEC 61400-11, the three one minute average periods closest to each integer wind speed have been used to calculate the energy average 1/3 octave band spectra between 20 and 10kHz for the operational turbine noise. The average background noise spectra have also been calculated from the nearest three nearest 1-minute average background noise periods closest to each integer wind speed. The results are plotted at Appendix F, which also shows the octave band levels. The data has been corrected for the insertion loss of the secondary wind shield.

5.9 It should be noted that there were only two 1-minute periods available for the operational wind speed of 12m/s. It should also be noted that only two 1-minute periods were available for the shutdown periods wind speed of 6, 8, and 10 m/s, and no data available for a wind speed of 7m/s.

5.10 The sound power level has been calculated for wind speeds for 6-8m/s as required by IEC 61400-11 for each 1/3 octave as measured and the results are shown in Appendix G, which also shows the octave band levels. The operational turbine noise spectra have been corrected for the presence of background noise by subtracting the average background noise. Note that the 6m/s background noise has been subtracted from the 7m/s spectrum as there was no background noise data for 7m/s. Where the difference between the measured turbine noise and measured background noise levels is less than 6dB the measured turbine noise has been corrected for background noise by subtracting 1.3dB as required by IEC 61400-11 and the result marked with an '*'.

5.11 It should be noted that it has not been possible to calculate the 1/3 octave sound power levels for wind speeds above 8m/s due to the influence of background noise.

Narrow Band Analysis

5.12 The presence of tones has been determined for wind speeds of 6-10 m/s following the procedure set out in IEC 61400-11, with the results presented at Appendix H. Note that the data has not been A-weighted or corrected for the insertion loss of the secondary wind shield.

5.13 The results of the narrow band analysis identified the presence of tones at 6m/s wind speed. No tones were identified at any other wind speed.

6. Other Acoustic Characteristics

6.1 The operational noise from the turbine can be characterised by aerodynamic noise from the blades rotating, together with a mechanical component from the gearbox.

6.2 It should be noted that the wind turbine tower is fitted with an external ladder and safety line. At wind speeds above about 8m/s a tonal noise was noted during the background noise measurements due to wind passing the ladder and safety line. This can be seen on the narrowband analysis charts shown Appendix H for wind speeds of 8-10 m/s at frequencies of 840 and 1015 Hz.

6.3 An audible pulse was noted from the wind turbine at higher wind speeds as the turbine blades pass the wake caused by wind around the tower. No assessment of impulsivity has been carried out, as it was not deemed significant enough to warrant further analysis.

7. Uncertainty

7.1 An assessment of measurement uncertainty has been carried out, based on the procedure outlined in Annex D of IEC 61400-11, as follows: Type A uncertainties are evaluated from the extent to which the measured values vary around the derived mean based on the regression analysis; Type B uncertainties are a measure of the assumed accuracy of various factors in the measurements procedure and have been based on the factors shown at the Annex D. The total uncertainty U_C is evaluated from the square root of the sum of the squares of each individual component.

7.2 The standard uncertainty of the apparent sound power is calculated in Table 6 using Equation D.1 in Annex D of IEC 61400-11. The total uncertainty of the measured L_{WA} calculated from all uncertainties, as given in Table 7, is ± 1.6 dB for the Reference Position.

Table 6 - Calculation of L_{WA} Uncertainty U_A

Number of Elements	191
Standard Error U_A	0.728

Table 7 - Calculation of Uncertainty U_C

Type A Uncertainty	
Standard Error of L_{WA} Estimate from Regression Analysis	0.728
Type B Uncertainty	
Calibration	0.2
Instrument	0.2
Board & Mounting	0.3
Distance	0.2
Impedance	0.1
Turbulence	0.4
Wind Speed Measured	1.2
Background	0.3
Total Uncertainty	
Total, U_C	1.6

8. Conclusions

8.1 A noise test has been carried out, according to IEC 61400-11 on an Endurance E-3120 Wind Turbine at East Ash Farm, Bradworthy, Devon, to measure the sound power level and tonal characteristics.

8.2 The apparent sound power level of the wind turbine was calculated over a range of wind speeds from 3-12m/s together with the one third octave band levels for wind speeds of 6-8 m/s. It was not possible to calculate the 1/3 octave sound power levels above 8m/s due to the contrition of background noise.

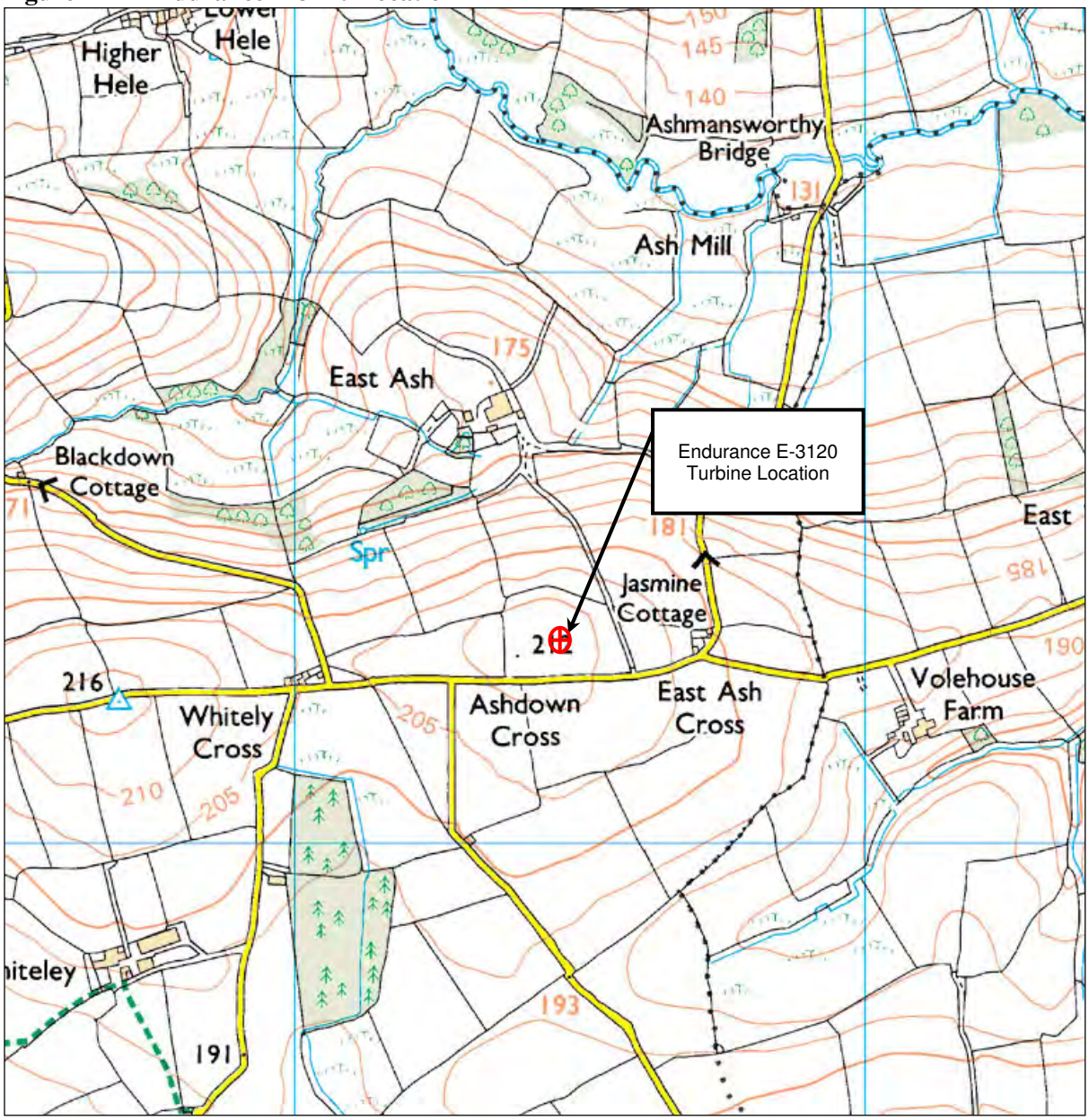
8.3 The tonal output from the Endurance E-3120 turbine has been assessed using the methodology prescribed by IEC 61400-11 for wind speeds of 6-10 m/s and has been determined to be not tonal, except at a wind speed of 6m/s where tones were identified.

9. References

[1] BS EN 61400-11 *Wind turbine generator systems – Part 11: Acoustic noise measurement techniques*, (Amendment 1 May 2006), International Electrotechnical Commission

Appendix A
Site Layout

Figure A1 – Endurance E-3120 Location



Appendix B
Site Photos

Figure B1 –Photo Showing Turbine and 10m Meteorological Mast

Figure B2 –Photo Showing View of Ground Board fromTurbine

Figure B3 –Photo Showing Noise Measurement Location

Figure B4 –Photo Showing Detail of Ground Board Location

Appendix C
Secondary Wind Shield Insertion Loss

TEST REPORT No : MI/04/04 **DATE OF ISSUE : 21 September 2004**

Measurement of the Insertion Loss of Microphone Windshields

CLIENT:	Haynes M°Kenzie Partnership Lintrathen House West Dean Salisbury SP5 1JL
JOB NUMBER:	A04/65
TEST SAMPLE:	Double skin tripod mounted and secondary windshields
MANUFACTURER:	None specified
DATE RECEIVED:	1 September 2004
DATE OF TEST:	17 September 2004

D J M°Caul
Laboratory Manager

G Kerry
Technical Manager

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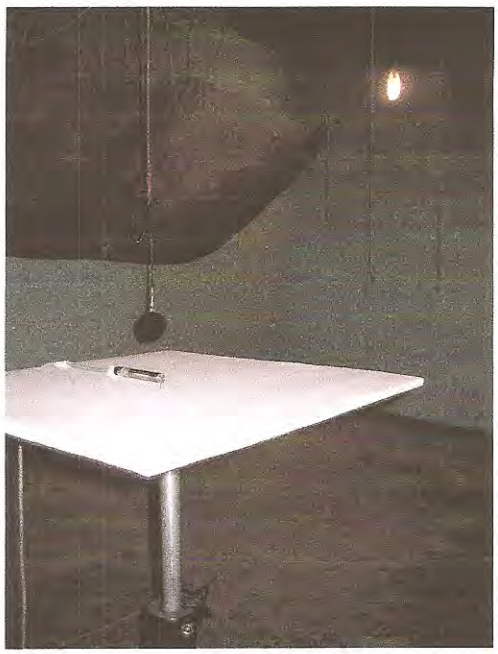
FOR HIGHER AND FURTHER EDUCATION
2000

TEST SAMPLES

Description of Test Samples

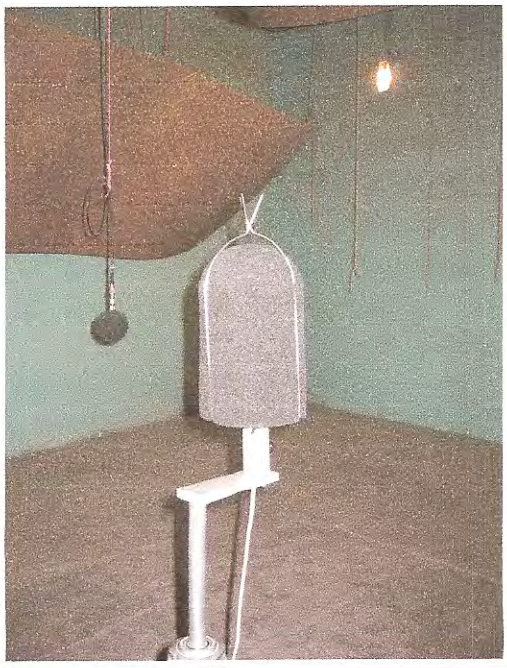
Test Ref: MI/04/09/03

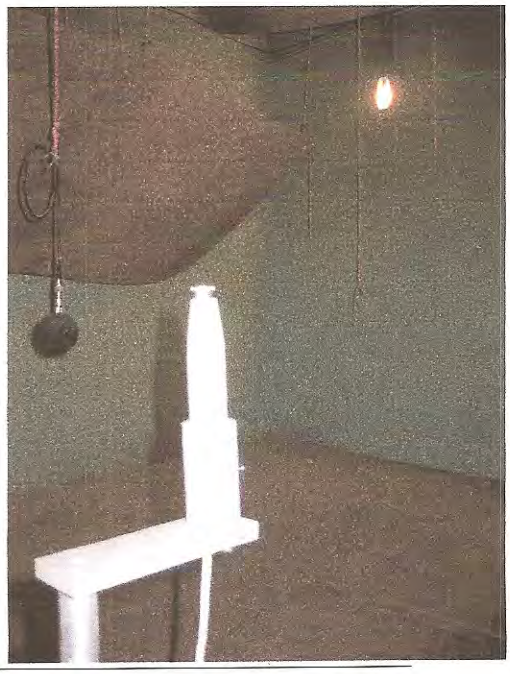
Secondary windshield, external diameter 450mm, mounted on a section of plasterboard with dimensions: 480mm x 480mm x 12.5mm and weighing 2.5kg.



Test Ref: MI/04/09/04

Double skin tripod mounted windshield, external diameter 120mm.





DESCRIPTION OF TEST PROCEDURE

Description of Test Facility

The tests were carried out in the large reverberation room at the University of Salford. The room has been designed with hard surfaces and non-parallel walls to give long empty room reverberation times with uniform decays. It has the shape of a truncated wedge. In addition 11 plywood panels, each panel 1.22m x 2.44m, were hung in the room to improve the diffusivity of the sound field. The test sample was placed in the centre of the room and >1100mm above the floor of the room. The excitation signal comprised wide band random noise played into the room via a loudspeaker system mounted in a cabinet facing a corner. The room is 7.4m long x ~6.6m wide x 4.5m high. It has a volume of 225m^3 and a total surface area of 243m^2.

Test Procedure

Measurements were made over a frequency range of 20Hz to 20,000Hz in one-third octave bands with and without the test object in place. Measurements were carried out consecutively to avoid significant changes in relative humidity and temperature that influence air absorption at higher frequencies. The measurement period was 60 seconds. The insertion loss of the test object was determined by subtracting the level with the test object in place from the level without the test object in place:

$$\text{insertion loss} = \text{unoccluded} - \text{occluded} \qquad \text{(dB)}$$

A total of 12 measurements for each situation were taken, six each for two loudspeaker positions. These were then averaged.

3 EQUIPMENT

Item	Departmental Record No.
Norwegian Electronics 1/3 octave band real time analyser type 840 with in-built random noise generator	RTA2
Quad 510 power amplifier	PA7
Bruel &Kjaer microphone power supply type 2804	1848095
2 off broadband loudspeakers	LS3 & LS4
1 off G.R.A.S. random incidence condenser microphones type 40AP in the receiving room	M16
1 off Norsonic Multiplexer type 834A	MP2
HP Brio Pentium personal computer and related peripheral equipment (printer, plotter, monitor etc.)	COM6
Yamaha GQ1031BII graphic equalizer	GEQ1

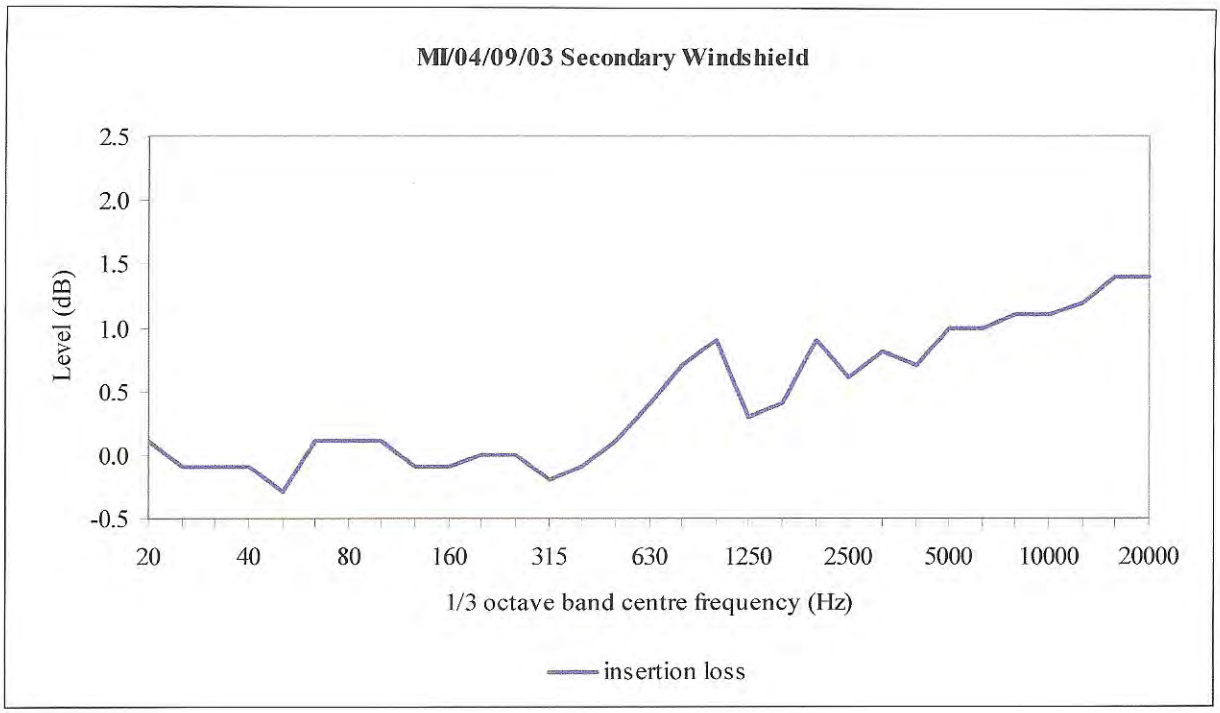
RESULTS

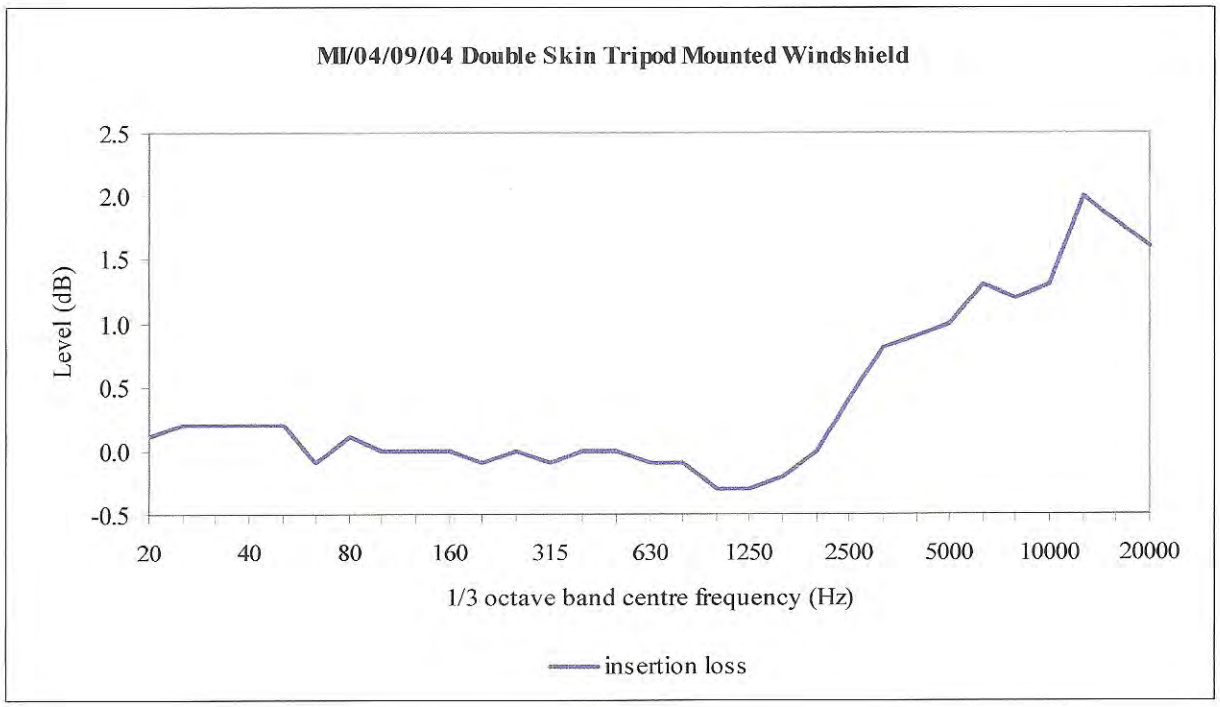
The insertion loss values at one third octave band intervals are given in the tables overleaf.

	MI/04/09/03	MI/04/09/04
Temperature in reverberation room °C:	22.5	22.6
Relative humidity in reverberation room %:	46.6	46.2

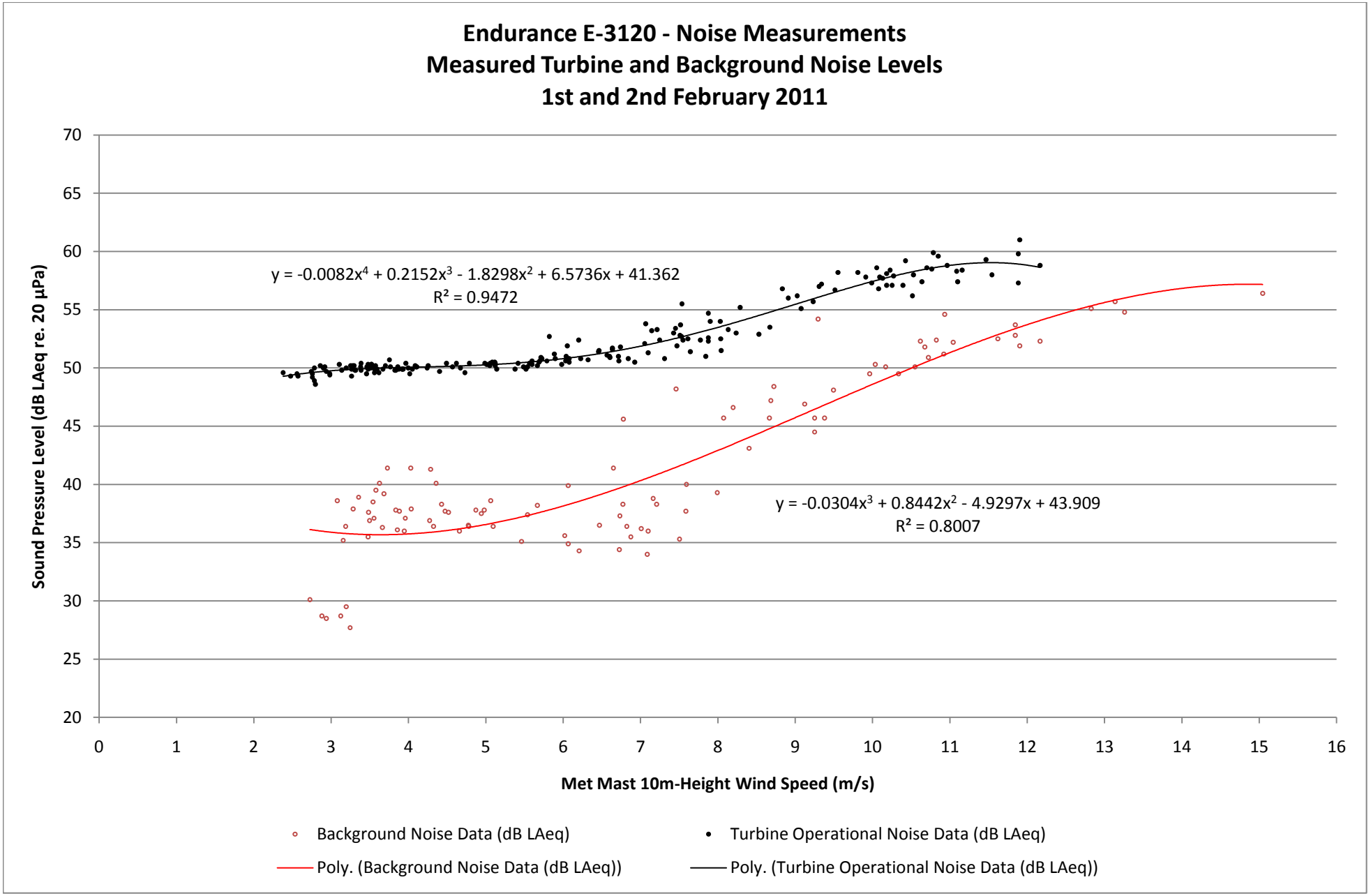
The results here presented relate only to the items tested and described in this report.

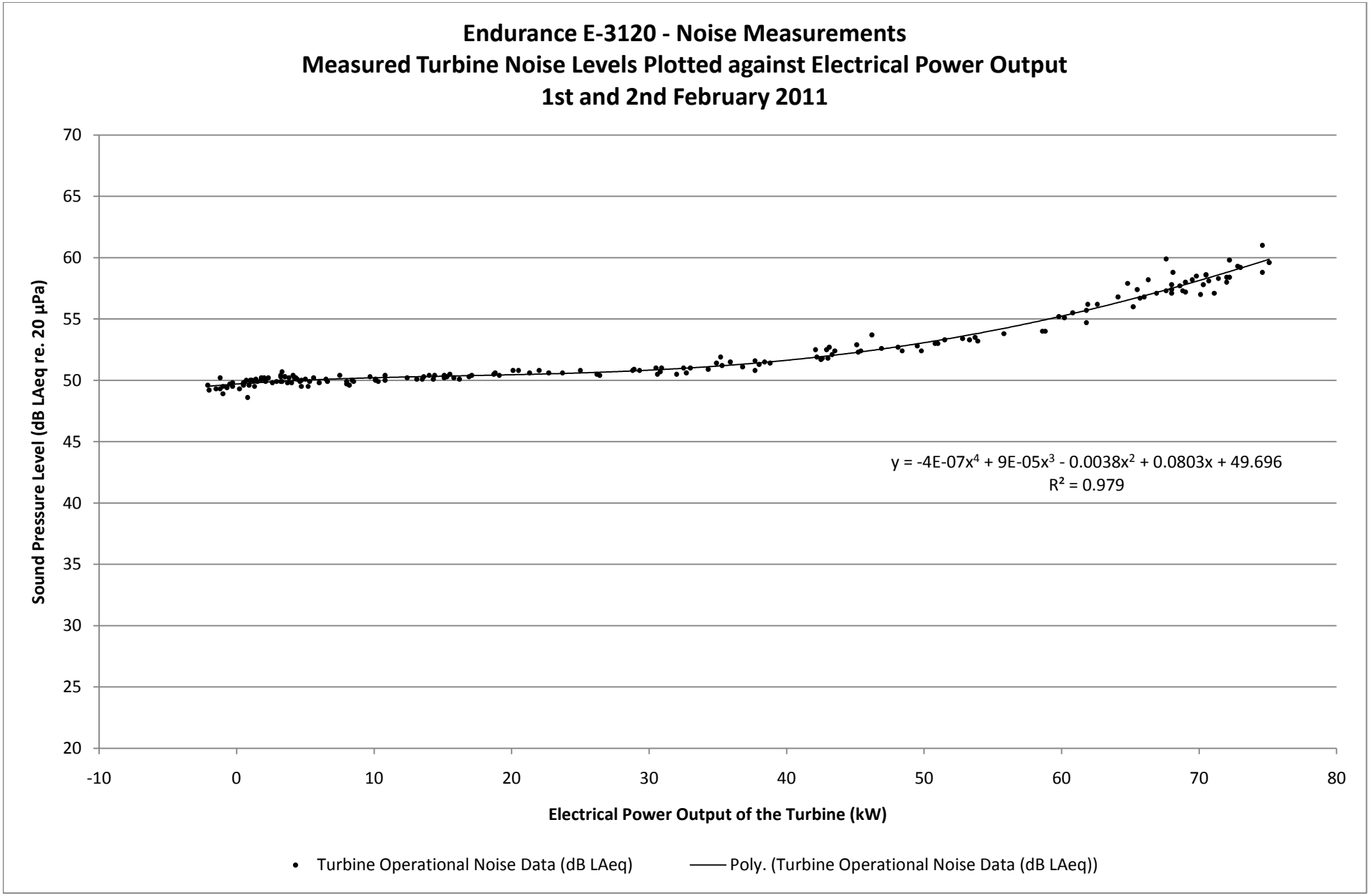
1/3	MI/04/09/03			MI/04/09/04		
OBCF (Hz)	unocc (dB)	occ (dB)	insertion loss (dB)	unocc (dB)	occ (dB)	insertion loss (dB)
20	53.6	53.5	0.1	53.1	53.0	0.1
25	60.2	60.3	-0.1	59.5	59.3	0.2
31.5	74.4	74.5	-0.1	75.1	74.9	0.2
40	79.6	79.7	-0.1	80.1	79.9	0.2
50	79.5	79.8	-0.3	79.7	79.5	0.2
63	80.8	80.7	0.1	81.2	81.3	-0.1
80	78.4	78.3	0.1	78.7	78.6	0.1
100	85.8	85.7	0.1	85.3	85.3	0.0
125	88.9	89.0	-0.1	87.7	87.7	0.0
160	86.0	86.1	-0.1	85.3	85.3	0.0
200	85.8	85.8	0.0	85.6	85.7	-0.1
250	87.7	87.7	0.0	86.3	86.3	0.0
315	88.7	88.9	-0.2	86.1	86.2	-0.1
400	89.1	89.2	-0.1	85.6	85.6	0.0
500	90.2	90.1	0.1	86.9	86.9	0.0
630	89.4	89.0	0.4	86.5	86.6	-0.1
800	88.1	87.4	0.7	85.4	85.5	-0.1
1000	88.6	87.7	0.9	85.9	86.2	-0.3
1250	88.8	88.5	0.3	86.1	86.4	-0.3
1600	88.7	88.3	0.4	86.1	86.3	-0.2
2000	89.5	88.6	0.9	86.7	86.7	0.0
2500	89.2	88.6	0.6	86.7	86.3	0.4
3150	87.9	87.1	0.8	85.9	85.1	0.8
4000	88.9	88.2	0.7	86.2	85.3	0.9
5000	89.1	88.1	1.0	86.5	85.5	1.0
6300	73.1	72.1	1.0	70.8	69.5	1.3
8000	63.1	62.0	1.1	60.9	59.7	1.2
10000	61.2	60.1	1.1	59.4	58.1	1.3
12500	59.7	58.5	1.2	58.4	56.4	2.0
16000	53.8	52.4	1.4	51.4	49.6	1.8
20000	44.4	43.0	1.4	40.3	38.7	1.6


MI/04/09/03 Secondary Windshield
Level (dB)
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
20
40
80
160
315
630
1250
2500
5000
10000
20000
1/3 octave band centre frequency (Hz)
insertion loss

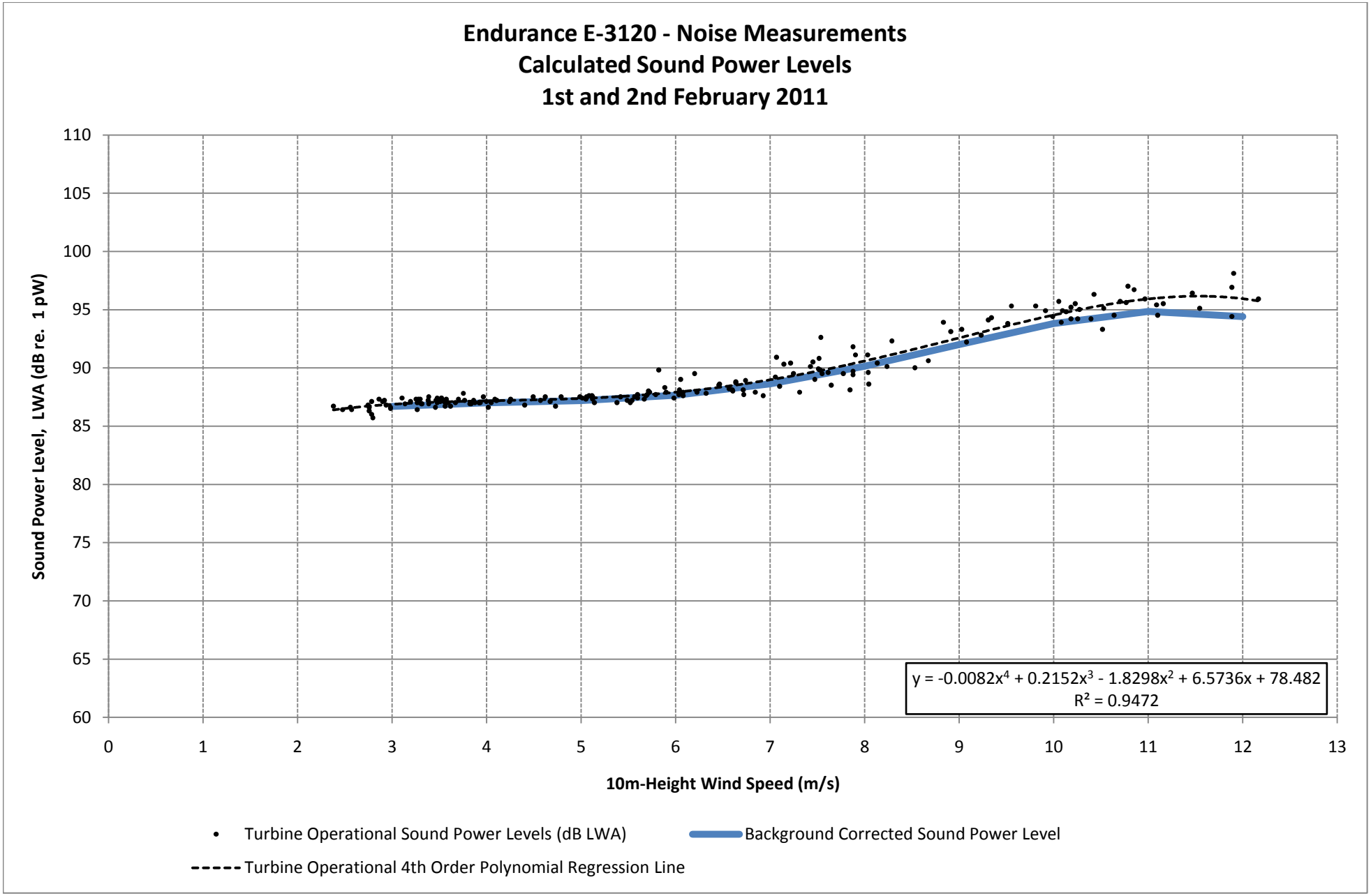

MI/04/09/04 Double Skin Tripod Mounted Windshield
Level (dB)
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
20
40
80
160
315
630
1250
2500
5000
10000
20000
1/3 octave band centre frequency (Hz)
insertion loss

Appendix D
Measured Turbine and Background Data


Endurance E-3120 - Noise Measurements
Measured Turbine and Background Noise Levels
1st and 2nd February 2011
Sound Pressure Level (dB LAeq re. 20 µPa)
Met Mast 10m-Height Wind Speed (m/s)
y = -0.0082x4 + 0.2152x3 - 1.8298x2 + 6.5736x + 41.362
R² = 0.9472
y = -0.0304x3 + 0.8442x2 - 4.9297x + 43.909
R² = 0.8007
Background Noise Data (dB LAeq)
Turbine Operational Noise Data (dB LAeq)
Poly. (Background Noise Data (dB LAeq))
Poly. (Turbine Operational Noise Data (dB LAeq))


Endurance E-3120 - Noise Measurements
Measured Turbine Noise Levels Plotted against Electrical Power Output
1st and 2nd February 2011
Sound Pressure Level (dB LAeq re. 20 µPa)
70
65
60
55
50
45
40
35
30
25
20
-10
0
10
20
30
40
50
60
70
80
y = -4E-07x4 + 9E-05x3 - 0.0038x2 + 0.0803x + 49.696
R² = 0.979
Electrical Power Output of the Turbine (kW)
Turbine Operational Noise Data (dB LAeq)
Poly. (Turbine Operational Noise Data (dB LAeq))

Appendix E
Calculation of Sound Power Level

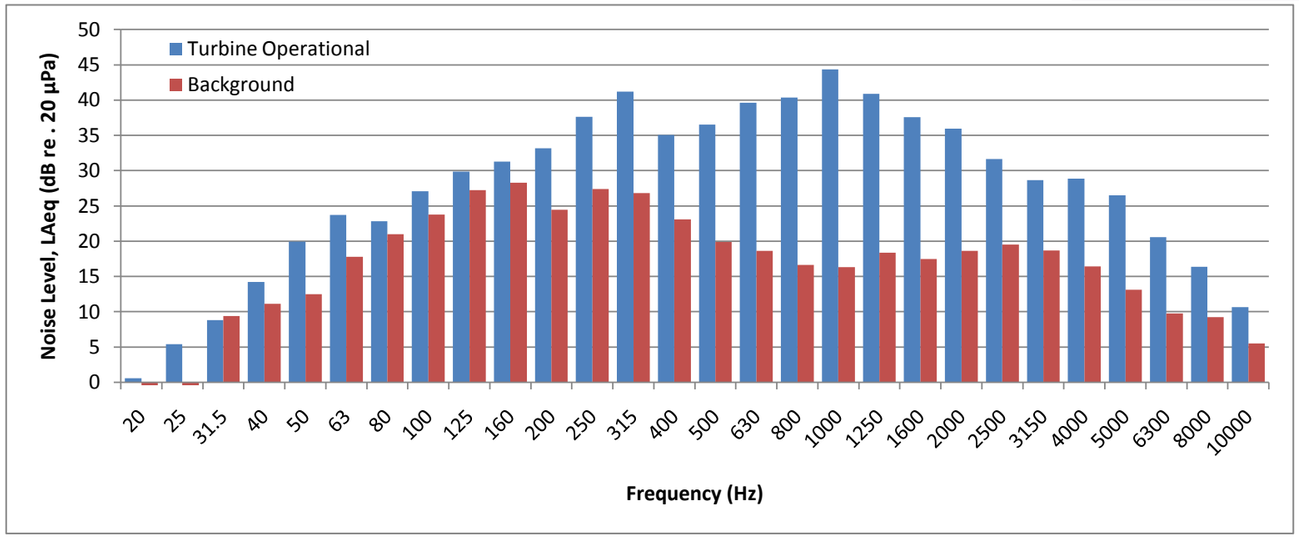

Endurance E-3120 - Noise Measurements
Calculated Sound Power Levels
1st and 2nd February 2011
Sound Power Level, LWA (dB re. 1 pW)
110
105
100
95
90
85
80
75
70
65
60
0
1
2
3
4
5
6
7
8
9
10
11
12
13
10m-Height Wind Speed (m/s)
y = -0.0082x⁴ + 0.2152x³ - 1.8298x² + 6.5736x + 78.482
R² = 0.9472
Turbine Operational Sound Power Levels (dB LWA)
Background Corrected Sound Power Level
Turbine Operational 4th Order Polynomial Regression Line

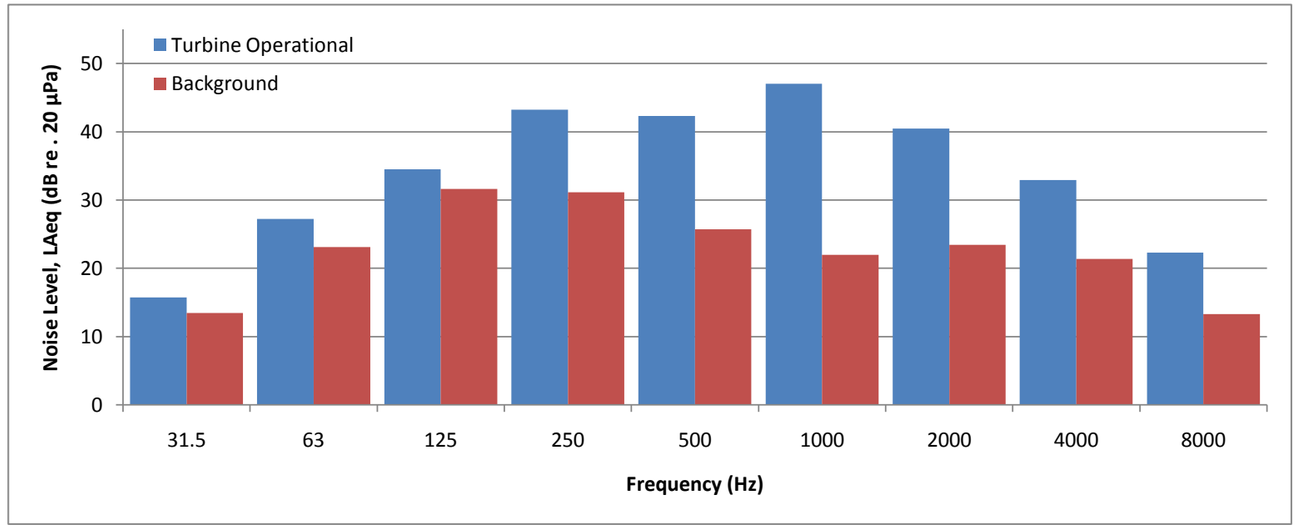
Appendix F
Measured One Third Octave Levels

HM:2300/R1

Endurance E-3120 Wind Turbine
Wind Speed - 3 m/s

	Turbine Operational		Background	
Frequency (Hz)	1/3 Octave Band (dB(A))	Octave Band (dB (A))	1/3 Octave Band (dB(A))	Octave Band (dB (A))
20	0.6		-10.0	
25	5.4	15.7	-2.8	13.5
31.5	8.8		9.4	
40	14.2		11.1	
50	20.0	27.2	12.5	23.1
63	23.7		17.8	
80	22.8		21.0	
100	27.1	34.5	23.8	31.6
125	29.9		27.3	
160	31.3		28.3	
200	33.2	43.2	24.5	31.2
250	37.6		27.4	
315	41.2		26.8	
400	35.1	42.3	23.1	25.7
500	36.5		19.9	
630	39.6		18.6	
800	40.3	47.0	16.6	22.0
1000	44.3		16.3	
1250	40.9		18.4	
1600	37.6	40.5	17.5	23.4
2000	36.0		18.6	
2500	31.6		19.6	
3150	28.7	32.9	18.7	21.4
4000	28.9		16.4	
5000	26.5		13.1	
6300	20.6	22.3	9.8	13.3
8000	16.4		9.2	
10000	10.7		5.5	
Overall	50.2		35.9	

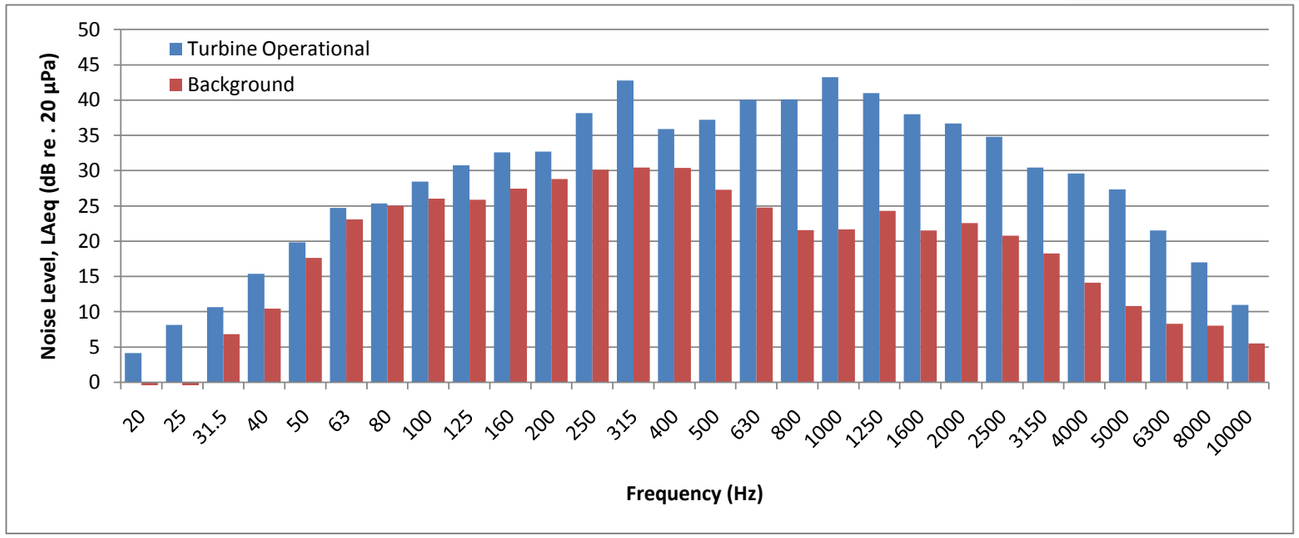


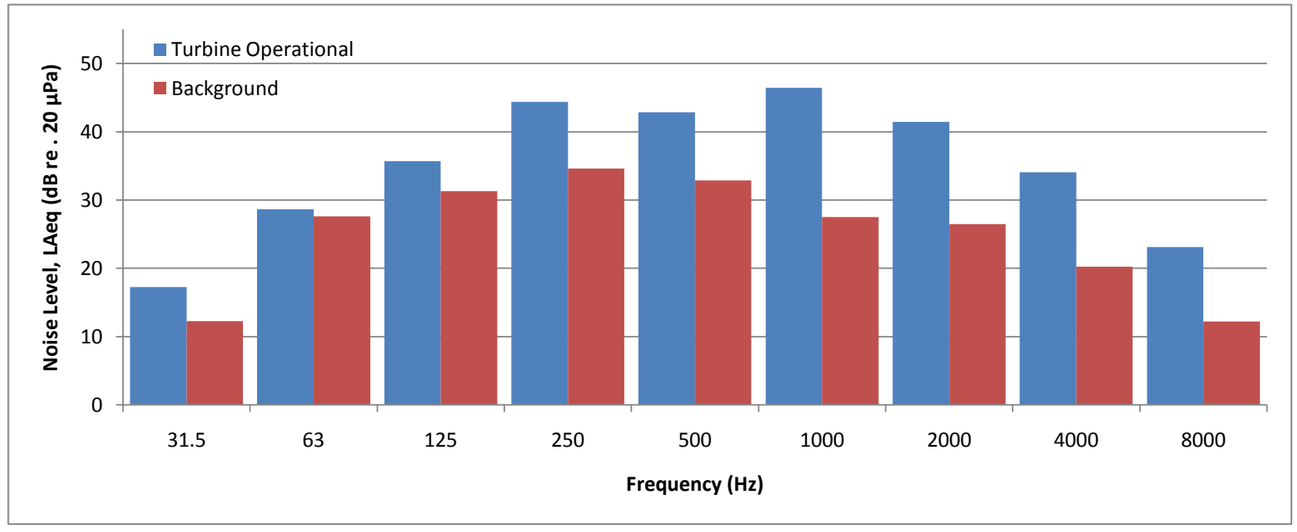


HM:2300/R1

Endurance E-3120 Wind Turbine
Wind Speed - 4 m/s

	Turbine Operational		Background	
Frequency (Hz)	1/3 Octave Band (dB(A))	Octave Band (dB (A))	1/3 Octave Band (dB(A))	Octave Band (dB (A))
20	4.2		-9.0	
25	8.1	17.2	-1.1	12.2
31.5	10.6		6.8	
40	15.4		10.5	
50	19.8	28.7	17.6	27.6
63	24.7		23.1	
80	25.4		25.0	
100	28.5	35.7	26.1	31.3
125	30.8		25.9	
160	32.6		27.4	
200	32.7	44.4	28.8	34.6
250	38.2		30.1	
315	42.8		30.5	
400	35.9	42.8	30.4	32.9
500	37.2		27.3	
630	40.0		24.8	
800	40.1	46.4	21.6	27.5
1000	43.3		21.7	
1250	41.0		24.3	
1600	38.0	41.5	21.5	26.5
2000	36.7		22.6	
2500	34.8		20.8	
3150	30.4	34.1	18.3	20.2
4000	29.6		14.1	
5000	27.3		10.8	
6300	21.5	23.1	8.3	12.2
8000	17.0		8.0	
10000	11.0		5.5	
Overall	50.5		39.0	

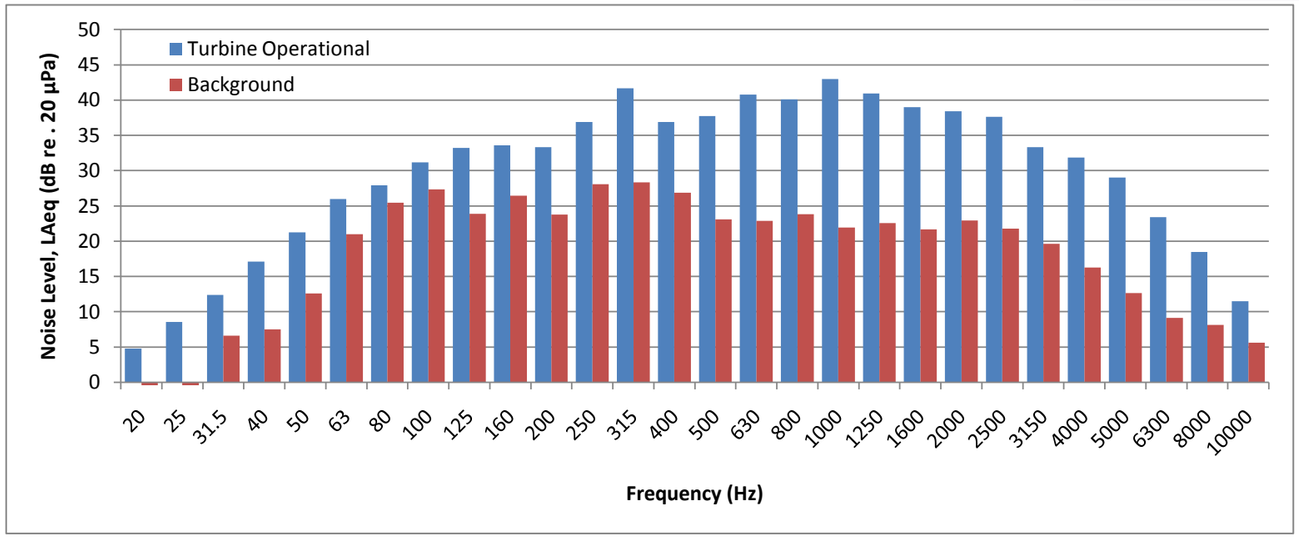


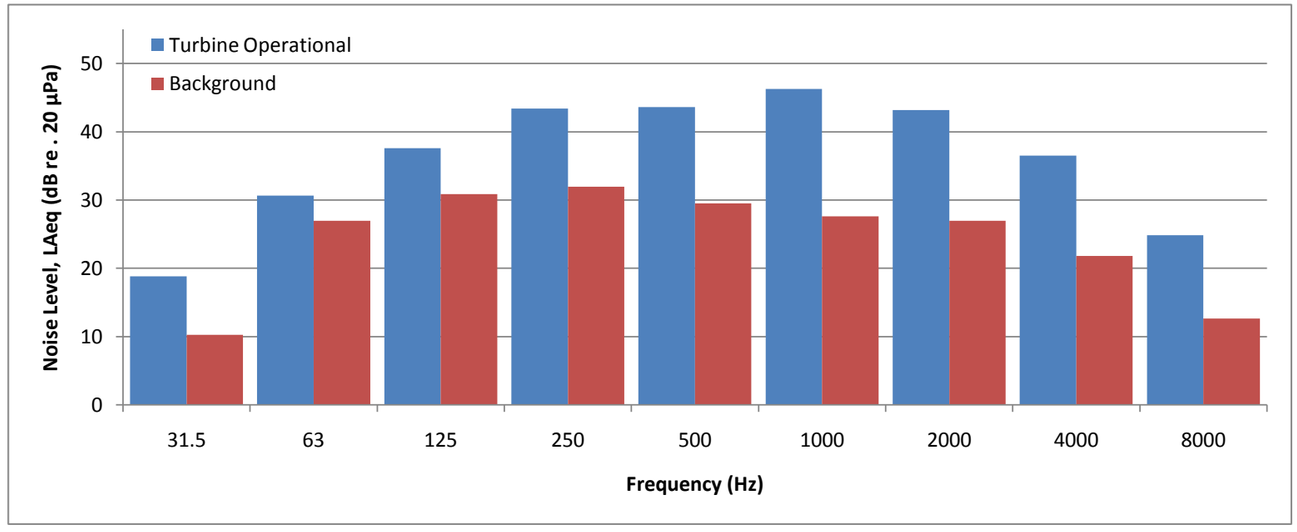


HM:2300/R1

Endurance E-3120 Wind Turbine
Wind Speed - 5 m/s

	Turbine Operational		Background	
Frequency (Hz)	1/3 Octave Band (dB(A))	Octave Band (dB (A))	1/3 Octave Band (dB(A))	Octave Band (dB (A))
20	4.8		-10.8	
25	8.5	18.8	-4.6	10.2
31.5	12.4		6.6	
40	17.1		7.5	
50	21.3	30.6	12.6	27.0
63	26.0		21.0	
80	27.9		25.5	
100	31.2	37.6	27.3	30.9
125	33.2		23.9	
160	33.6		26.4	
200	33.4	43.4	23.8	32.0
250	36.9		28.1	
315	41.7		28.4	
400	36.9	43.6	26.9	29.5
500	37.7		23.1	
630	40.8		22.9	
800	40.1	46.3	23.8	27.6
1000	43.0		22.0	
1250	41.0		22.6	
1600	39.0	43.2	21.7	27.0
2000	38.4		22.9	
2500	37.7		21.8	
3150	33.3	36.5	19.6	21.8
4000	31.9		16.2	
5000	29.0		12.6	
6300	23.4	24.8	9.1	12.6
8000	18.5		8.1	
10000	11.5		5.6	
Overall	50.8		37.4	

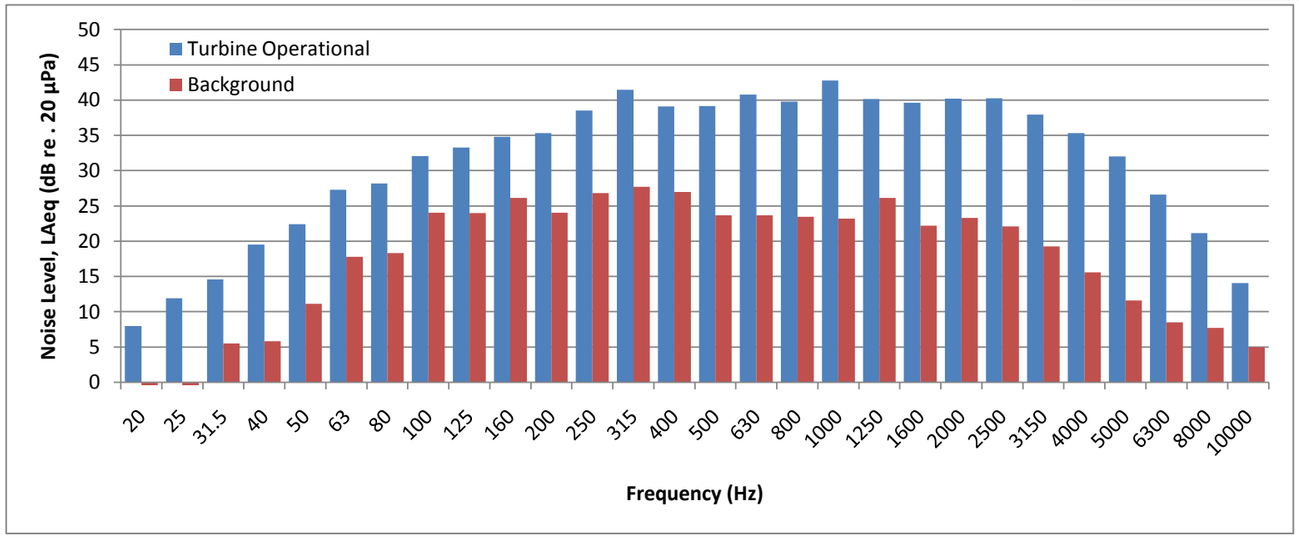


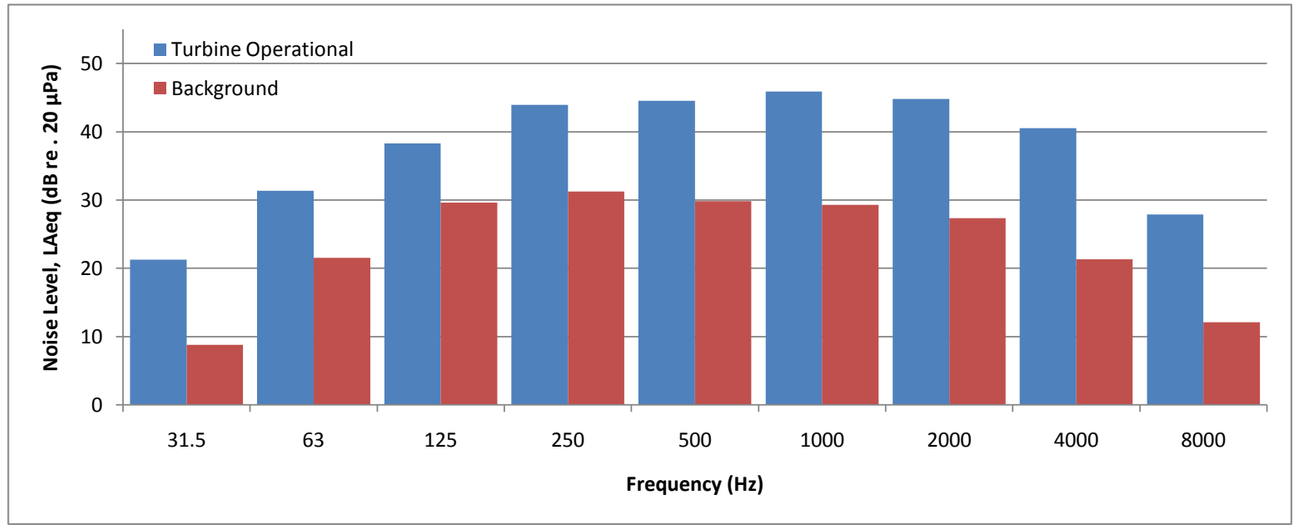


HM:2300/R1

Endurance E-3120 Wind Turbine
Wind Speed - 6 m/s

	Turbine Operational		Background	
Frequency (Hz)	1/3 Octave Band (dB(A))	Octave Band (dB (A))	1/3 Octave Band (dB(A))	Octave Band (dB (A))
20	8.0		-12.7	
25	11.9	21.3	-6.5	8.8
31.5	14.6		5.5	
40	19.5		5.8	
50	22.4	31.4	11.2	21.5
63	27.3		17.8	
80	28.2		18.3	
100	32.1	38.3	24.0	29.6
125	33.3		24.0	
160	34.8		26.2	
200	35.3	43.9	24.0	31.2
250	38.5		26.8	
315	41.5		27.7	
400	39.1	44.5	27.0	29.8
500	39.1		23.7	
630	40.8		23.6	
800	39.8	45.9	23.5	29.3
1000	42.8		23.2	
1250	40.1		26.2	
1600	39.7	44.8	22.2	27.3
2000	40.2		23.3	
2500	40.3		22.1	
3150	38.0	40.5	19.3	21.3
4000	35.3		15.6	
5000	32.0		11.6	
6300	26.6	27.9	8.5	12.1
8000	21.1		7.7	
10000	14.1		5.0	
Overall	51.5		36.9	





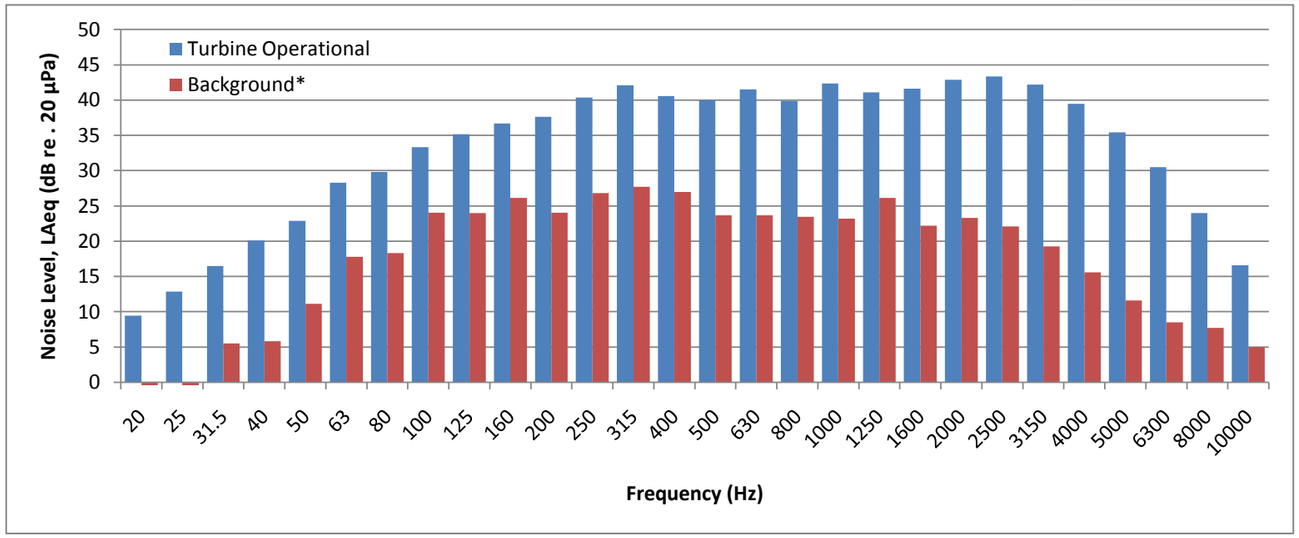
HM:2300/R1

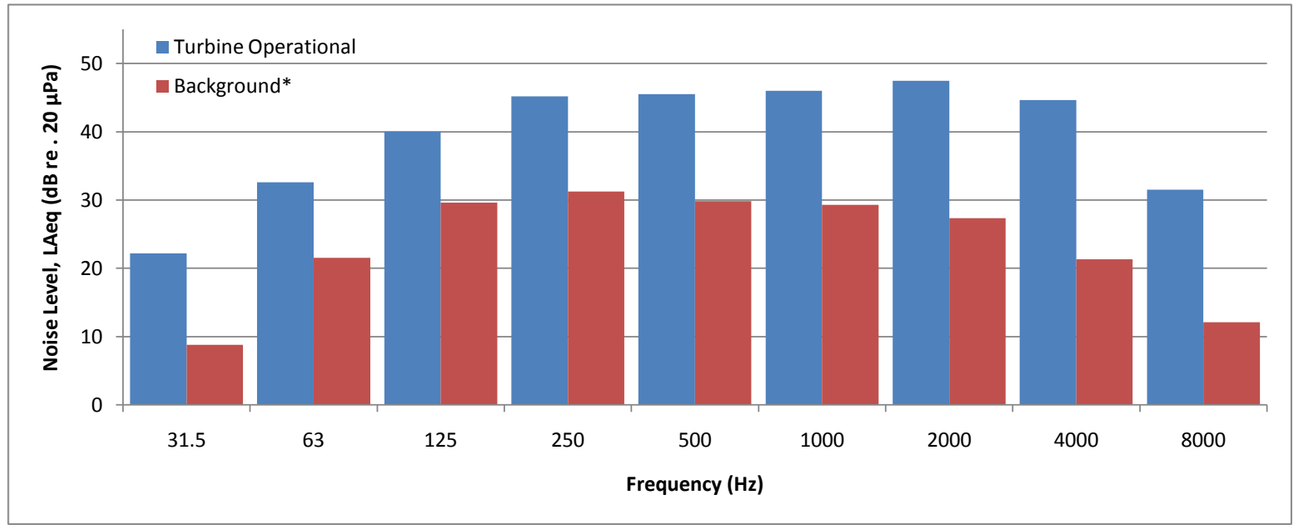
Endurance E-3120 Wind Turbine
Wind Speed - 7 m/s

	Turbine Operational		Background*	
Frequency (Hz)	1/3 Octave Band (dB(A))	Octave Band (dB (A))	1/3 Octave Band (dB(A))	Octave Band (dB (A))
20	9.4		-12.7	
25	12.9	22.2	-6.5	8.8
31.5	16.5		5.5	
40	20.1		5.8	
50	22.9	32.6	11.2	21.5
63	28.3		17.8	
80	29.8		18.3	
100	33.3	40.0	24.0	29.6
125	35.2		24.0	
160	36.7		26.2	
200	37.7	45.2	24.0	31.2
250	40.4		26.8	
315	42.1		27.7	
400	40.6	45.5	27.0	29.8
500	40.0		23.7	
630	41.5		23.6	
800	39.9	46.0	23.5	29.3
1000	42.4		23.2	
1250	41.1		26.2	
1600	41.6	47.5	22.2	27.3
2000	42.9		23.3	
2500	43.4		22.1	
3150	42.2	44.6	19.3	21.3
4000	39.5		15.6	
5000	35.4		11.6	
6300	30.5	31.5	8.5	12.1
8000	24.0		7.7	
10000	16.6		5.0	

Overall	53.2	36.9

*Background taken from 6m/s

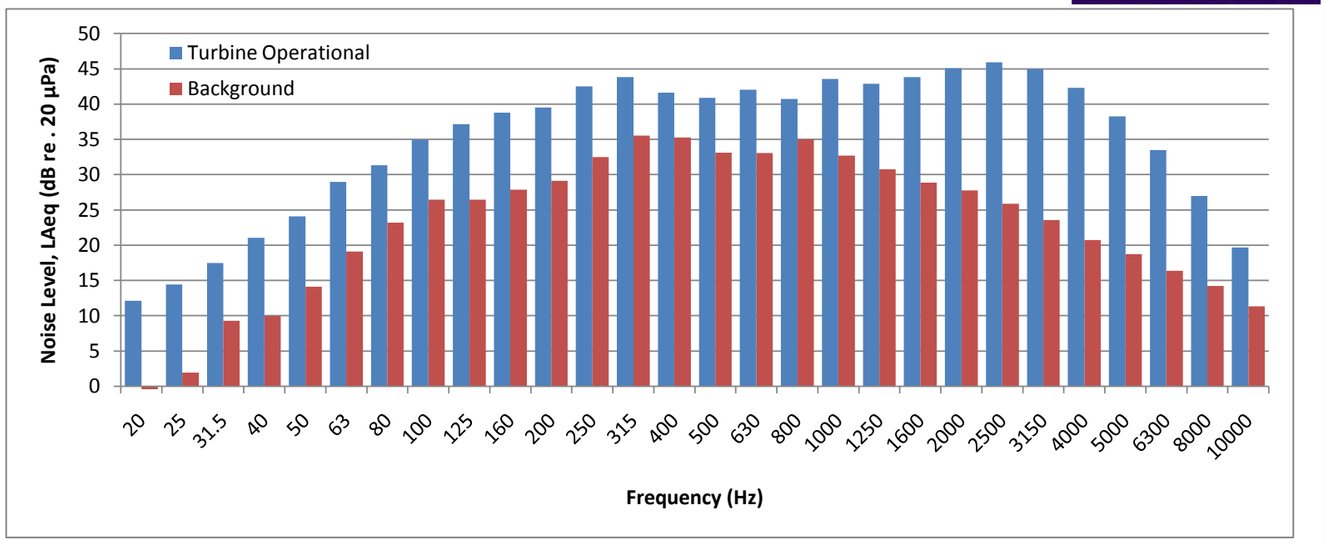


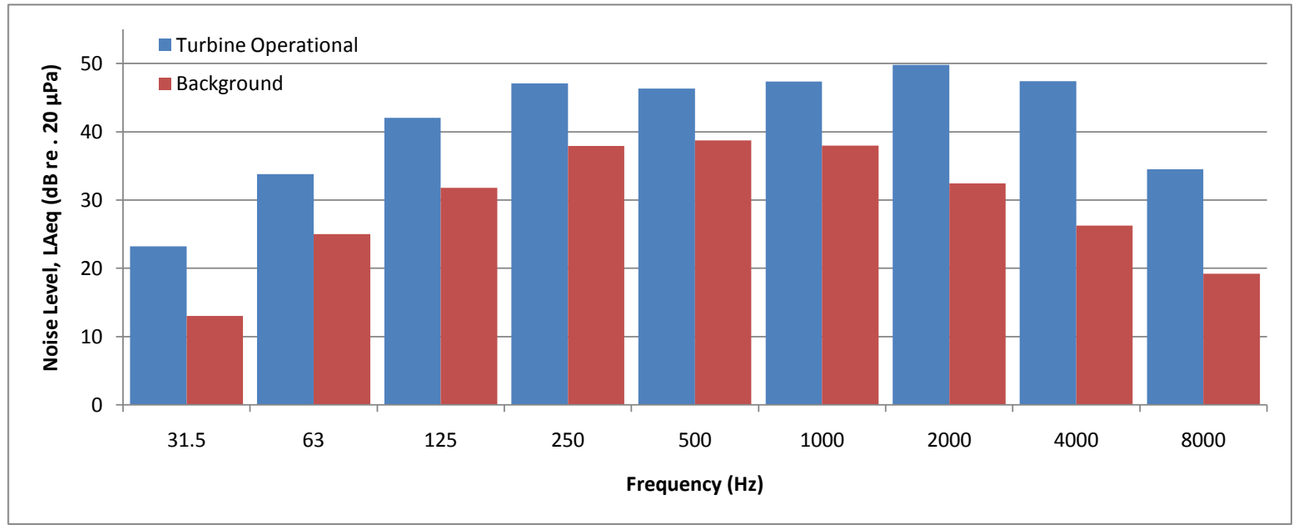


HM:2300/R1

Endurance E-3120 Wind Turbine
Wind Speed - 8 m/s

	Turbine Operational		Background	
Frequency (Hz)	1/3 Octave Band (dB(A))	Octave Band (dB (A))	1/3 Octave Band (dB(A))	Octave Band (dB (A))
20	12.1		-1.9	
25	14.5	23.2	2.0	13.0
31.5	17.5		9.3	
40	21.0		10.0	
50	24.1	33.8	14.1	25.0
63	29.0		19.1	
80	31.3		23.2	
100	35.0	42.0	26.5	31.8
125	37.2		26.5	
160	38.8		27.9	
200	39.5	47.1	29.2	37.9
250	42.5		32.5	
315	43.8		35.5	
400	41.6	46.3	35.3	38.7
500	40.9		33.1	
630	42.1		33.1	
800	40.7	47.3	35.0	38.0
1000	43.6		32.7	
1250	42.9		30.8	
1600	43.8	49.8	28.9	32.5
2000	45.1		27.8	
2500	45.9		25.9	
3150	45.0	47.4	23.6	26.2
4000	42.3		20.7	
5000	38.3		18.7	
6300	33.5	34.5	16.4	19.2
8000	27.0		14.2	
10000	19.7		11.3	
Overall	55.1		43.8	



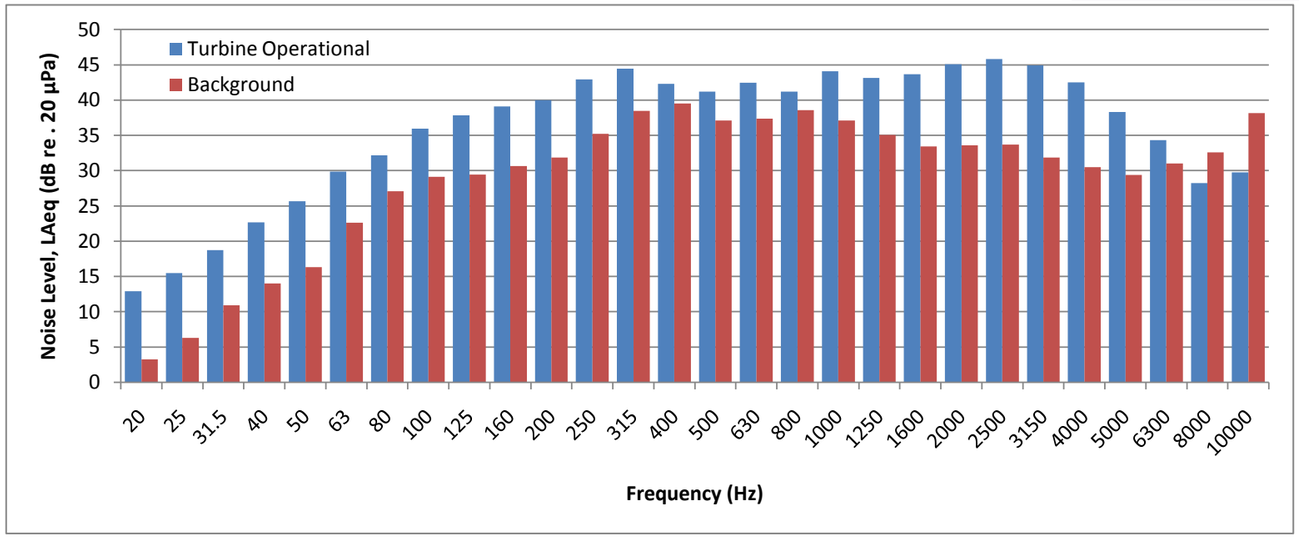


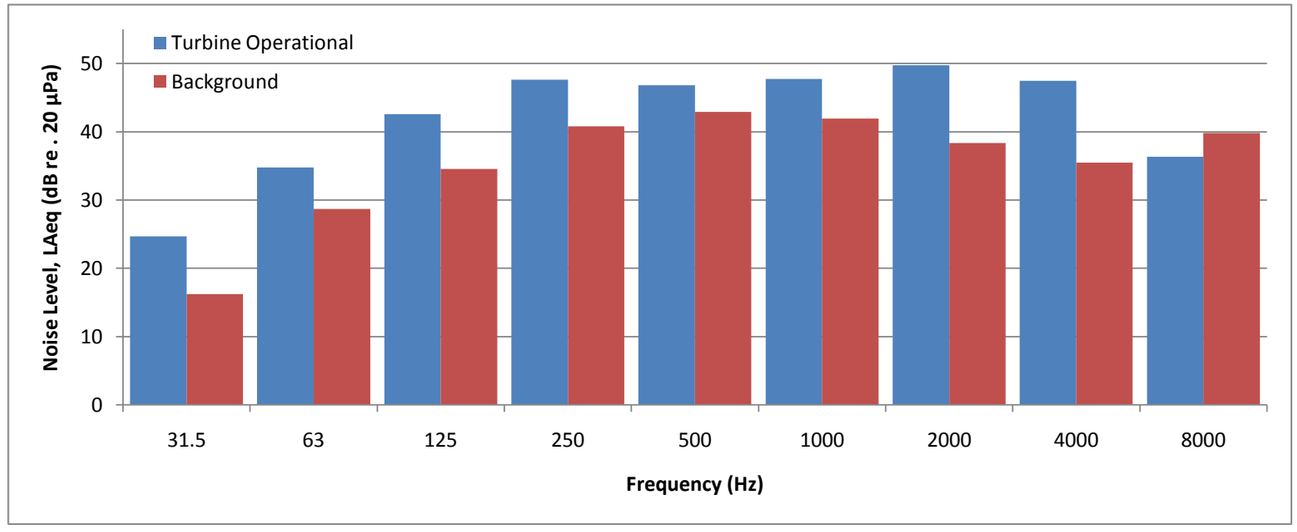
HM:2300/R1

Endurance E-3120 Wind Turbine
Wind Speed - 9 m/s

	Turbine Operational		Background	
Frequency (Hz)	1/3 Octave Band (dB(A))	Octave Band (dB (A))	1/3 Octave Band (dB(A))	Octave Band (dB (A))
20	12.9		3.3	
25	15.5	24.7	6.3	16.2
31.5	18.7		10.9	
40	22.7		14.0	
50	25.7	34.8	16.3	28.7
63	29.8		22.6	
80	32.2		27.1	
100	35.9	42.6	29.1	34.6
125	37.8		29.5	
160	39.1		30.6	
200	40.0	47.6	31.9	40.8
250	42.9		35.2	
315	44.5		38.5	
400	42.3	46.8	39.5	42.9
500	41.2		37.1	
630	42.5		37.4	
800	41.2	47.7	38.6	41.9
1000	44.1		37.1	
1250	43.2		35.1	
1600	43.7	49.7	33.4	38.4
2000	45.1		33.6	
2500	45.8		33.7	
3150	44.9	47.5	31.9	35.5
4000	42.5		30.5	
5000	38.3		29.4	
6300	34.3	36.4	31.0	39.8
8000	28.2		32.6	
10000	29.8		38.1	

Overall	55.3	48.5

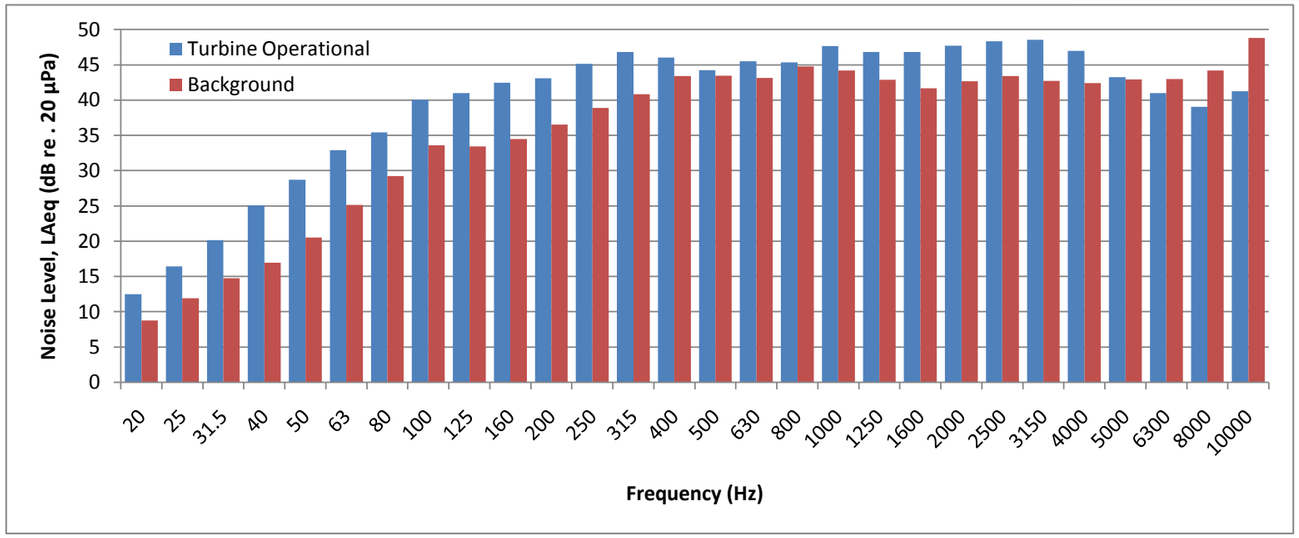


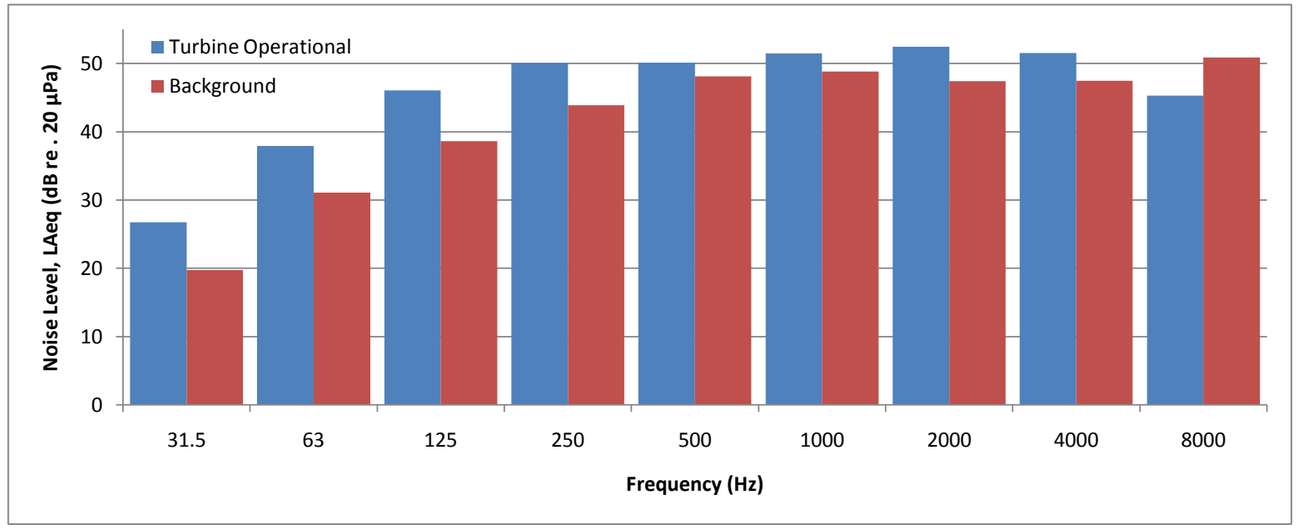


HM:2300/R1

Endurance E-3120 Wind Turbine
Wind Speed - 10 m/s

	Turbine Operational		Background	
Frequency (Hz)	1/3 Octave Band (dB(A))	Octave Band (dB (A))	1/3 Octave Band (dB(A))	Octave Band (dB (A))
20	12.5		8.8	
25	16.4	26.7	11.9	19.8
31.5	20.1		14.7	
40	25.1		16.9	
50	28.7	37.9	20.5	31.1
63	32.9		25.2	
80	35.4		29.3	
100	40.0	46.0	33.6	38.6
125	41.0		33.4	
160	42.4		34.5	
200	43.1	50.1	36.5	43.9
250	45.2		38.9	
315	46.8		40.9	
400	46.0	50.1	43.4	48.1
500	44.2		43.5	
630	45.5		43.2	
800	45.4	51.5	44.8	48.8
1000	47.7		44.2	
1250	46.8		42.9	
1600	46.8	52.4	41.7	47.4
2000	47.7		42.7	
2500	48.4		43.4	
3150	48.5	51.5	42.7	47.5
4000	47.0		42.4	
5000	43.2		42.9	
6300	41.0	45.3	43.0	50.9
8000	39.1		44.2	
10000	41.2		48.8	
Overall	58.7		56.1	



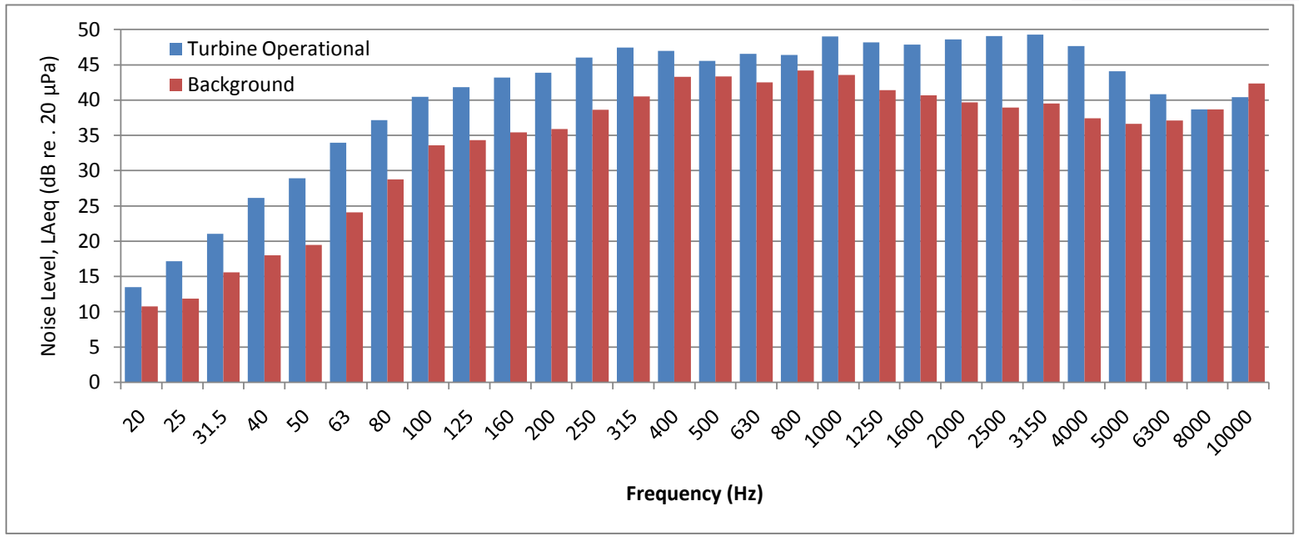


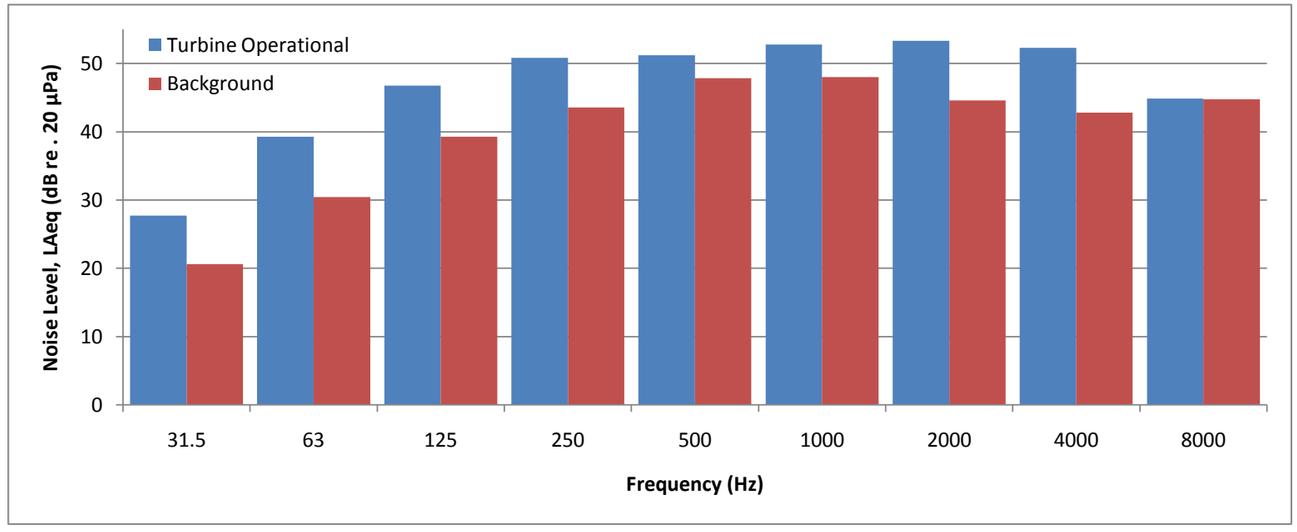
HM:2300/R1

Endurance E-3120 Wind Turbine
Wind Speed - 11 m/s

	Turbine Operational		Background	
Frequency (Hz)	1/3 Octave Band (dB(A))	Octave Band (dB (A))	1/3 Octave Band (dB(A))	Octave Band (dB (A))
20	13.5		10.7	
25	17.1	27.7	11.9	20.6
31.5	21.0		15.6	
40	26.1		18.0	
50	28.9	39.3	19.5	30.4
63	33.9		24.1	
80	37.2		28.8	
100	40.5	46.8	33.6	39.3
125	41.8		34.3	
160	43.2		35.4	
200	43.9	50.8	35.9	43.5
250	46.0		38.7	
315	47.5		40.5	
400	47.0	51.2	43.3	47.8
500	45.6		43.3	
630	46.5		42.5	
800	46.4	52.8	44.2	48.0
1000	49.0		43.5	
1250	48.2		41.4	
1600	47.9	53.3	40.7	44.6
2000	48.6		39.7	
2500	49.1		38.9	
3150	49.3	52.3	39.5	42.8
4000	47.7		37.4	
5000	44.1		36.6	
6300	40.8	44.8	37.1	44.7
8000	38.7		38.7	
10000	40.4		42.4	

Overall	59.6	53.7



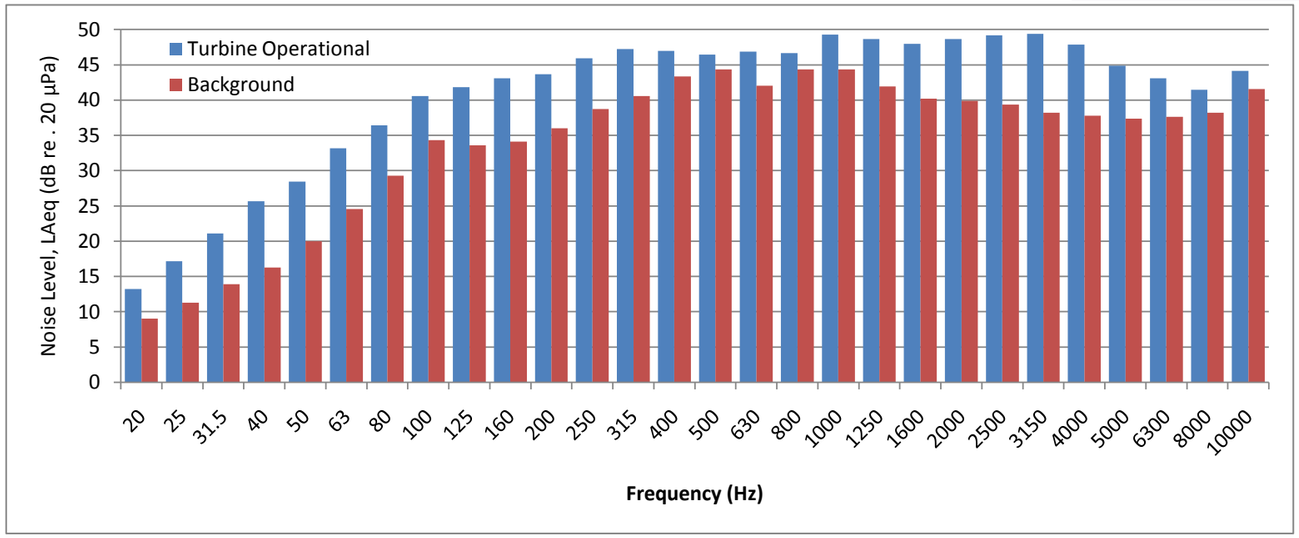


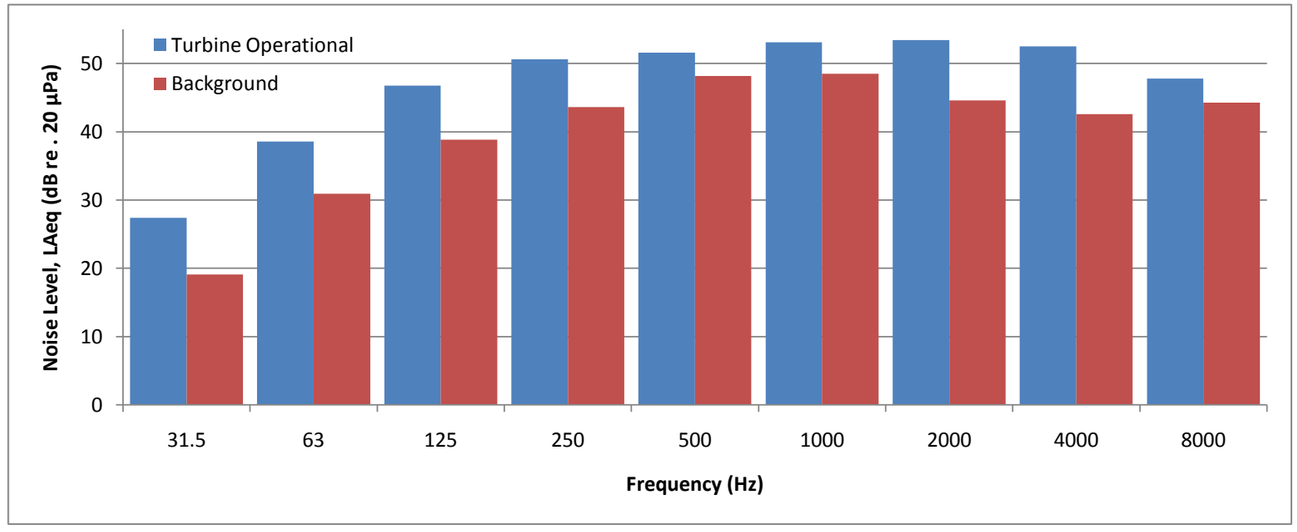
HM:2300/R1

Endurance E-3120 Wind Turbine
Wind Speed - 12 m/s

	Turbine Operational		Background	
Frequency (Hz)	1/3 Octave Band (dB(A))	Octave Band (dB (A))	1/3 Octave Band (dB(A))	Octave Band (dB (A))
20	13.2		9.0	
25	17.2	27.4	11.3	19.1
31.5	21.1		13.9	
40	25.7		16.3	
50	28.4	38.5	20.0	30.9
63	33.2		24.5	
80	36.4		29.3	
100	40.6	46.7	34.4	38.8
125	41.9		33.6	
160	43.1		34.1	
200	43.7	50.6	36.0	43.6
250	45.9		38.8	
315	47.3		40.6	
400	47.0	51.6	43.4	48.1
500	46.5		44.4	
630	46.9		42.0	
800	46.7	53.1	44.4	48.5
1000	49.3		44.4	
1250	48.7		42.0	
1600	48.0	53.4	40.2	44.6
2000	48.7		39.9	
2500	49.2		39.4	
3150	49.4	52.5	38.2	42.6
4000	47.9		37.8	
5000	44.9		37.4	
6300	43.1	47.8	37.6	44.3
8000	41.5		38.2	
10000	44.1		41.5	

Overall	59.9	53.8





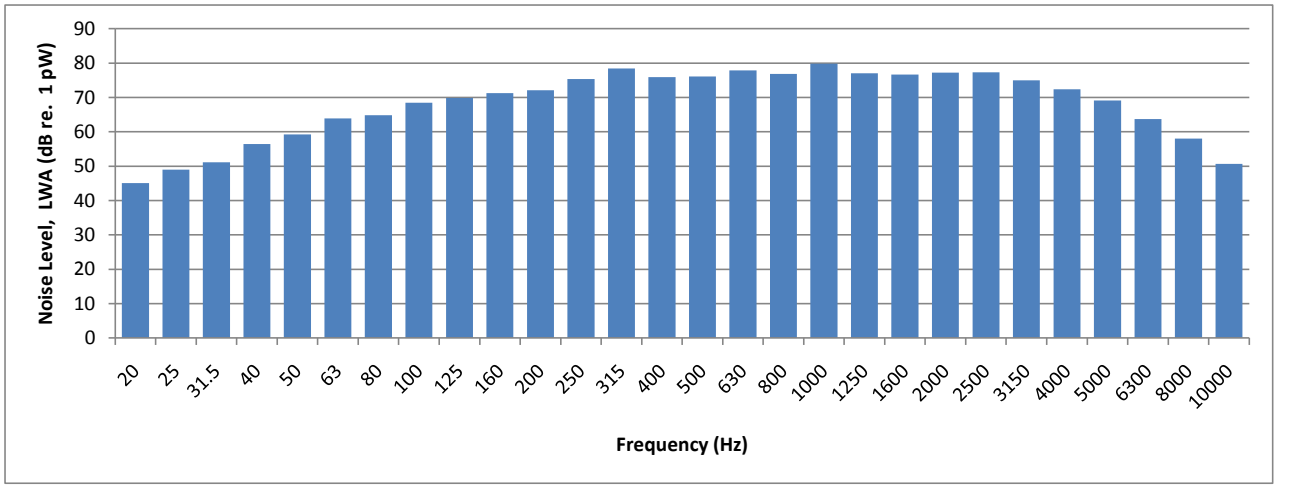
Appendix G
Background Corrected One Third Octave Sound Power Levels

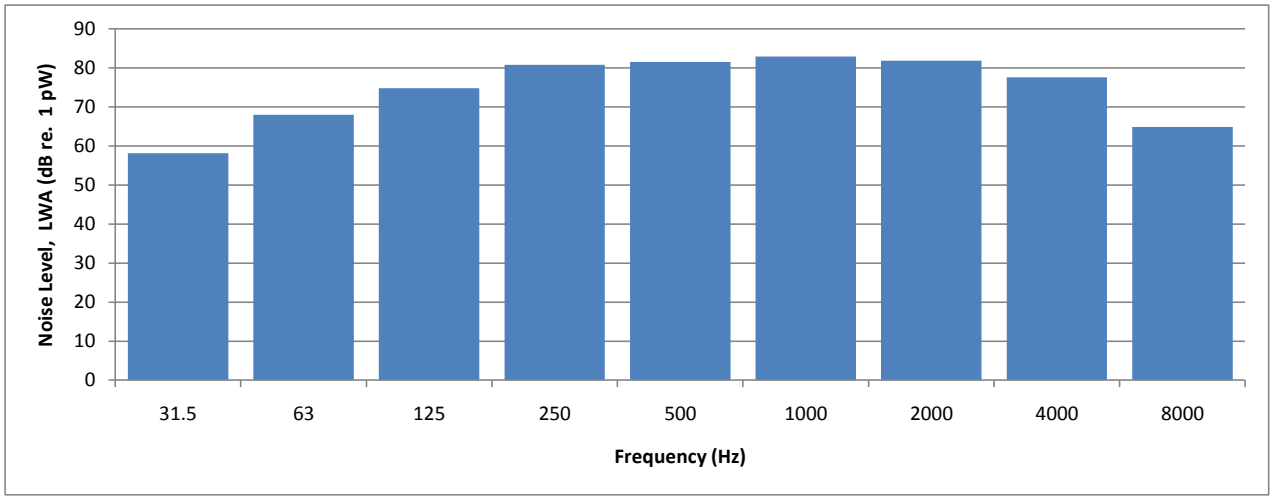
HM:2300/R1

Endurance E-3120 Wind Turbine
Wind Speed - 6 m/s

Frequency (Hz)	1/3 Octave Band (dB LWA)	Octave Band (dB LWA)
20	45.1	
25	49.0	58.1
31.5	51.1	
40	56.4	
50	59.2	68.0
63	63.9	
80	64.9	
100	68.4	74.8
125	69.9	
160	71.3	
200	72.1	80.8
250	75.3	
315	78.4	
400	75.9	81.5
500	76.1	
630	77.8	
800	76.8	82.9
1000	79.8	
1250	77.1	
1600	76.7	81.9
2000	77.2	
2500	77.3	
3150	75.0	77.6
4000	72.4	
5000	69.1	
6300	63.7	64.9
8000	58.0	
10000	50.6	

Overall	88.5





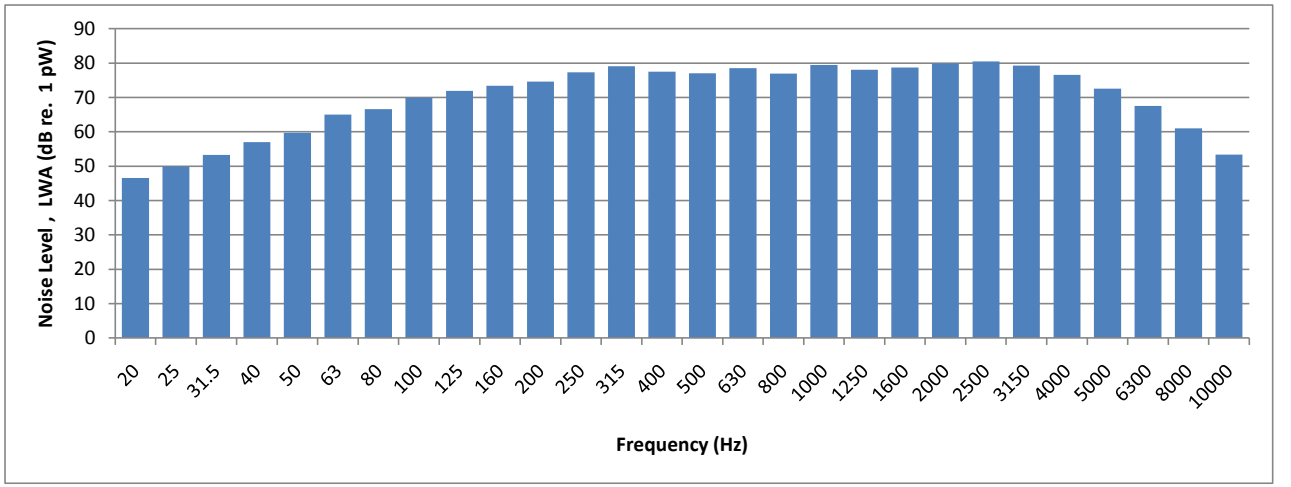
HM:2300/R1

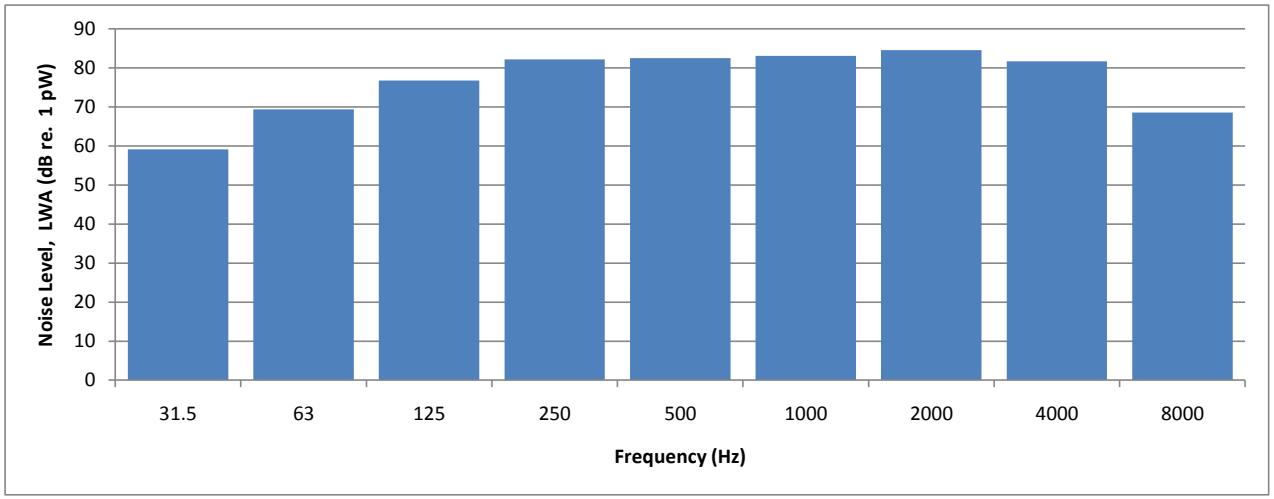
Endurance E-3120 Wind Turbine
Wind Speed - 7 m/s*

Frequency (Hz)	1/3 Octave Band (dB LWA)	Octave Band (dB LWA)
20	46.5	
25	49.9	59.1
31.5	53.2	
40	57.0	
50	59.7	69.4
63	65.0	
80	66.6	
100	69.9	76.7
125	71.9	
160	73.4	
200	74.6	82.1
250	77.3	
315	79.1	
400	77.5	82.5
500	77.0	
630	78.6	
800	76.9	83.0
1000	79.4	
1250	78.1	
1600	78.7	84.5
2000	80.0	
2500	80.5	
3150	79.3	81.7
4000	76.6	
5000	72.5	
6300	67.6	68.6
8000	61.0	
10000	53.4	

Overall	90.2

*Background taken from 6m/s



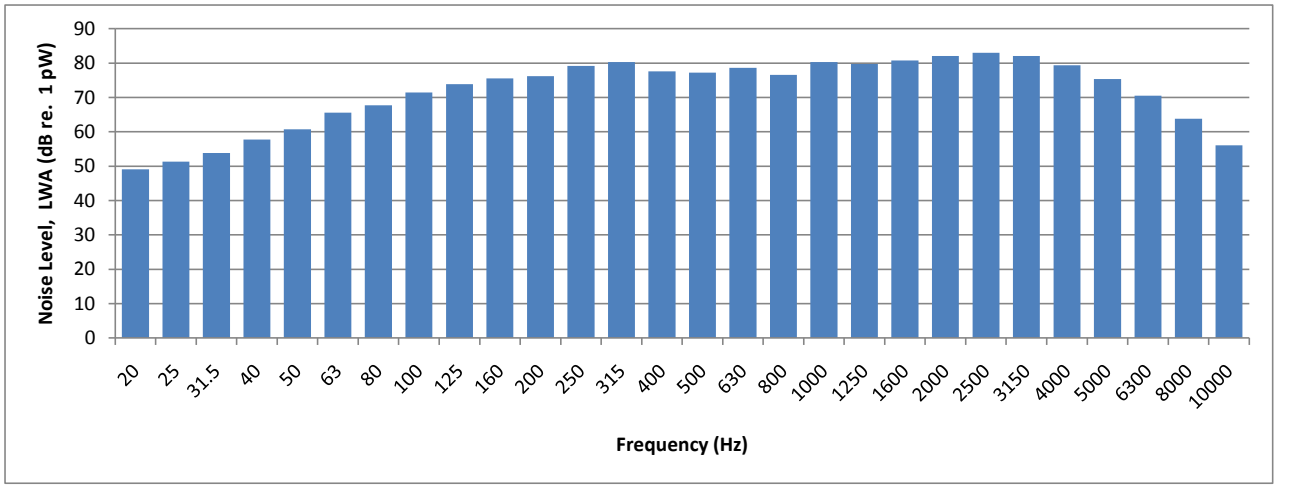


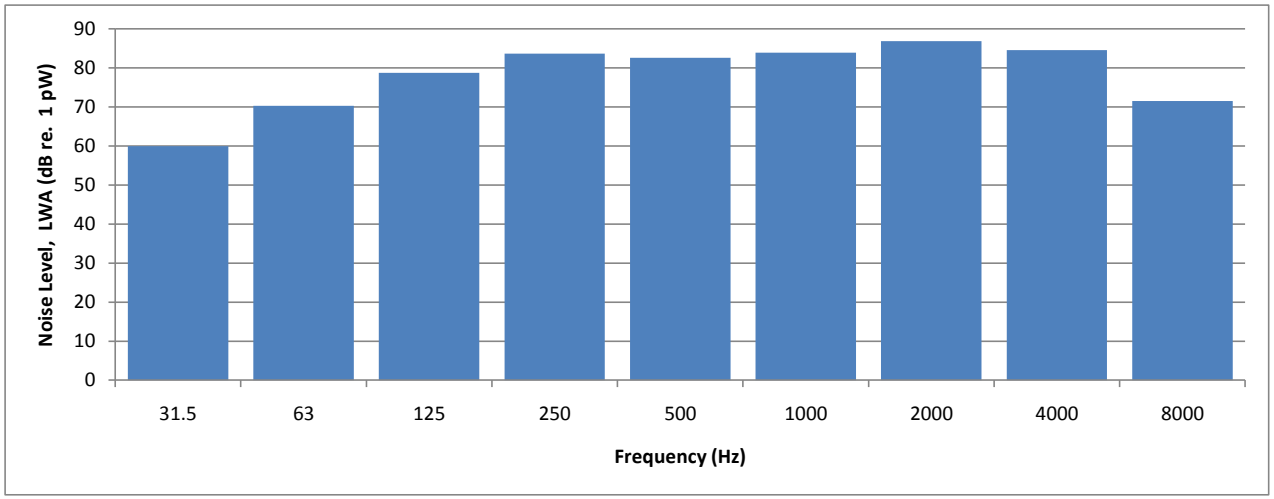
HM:2300/R1

Endurance E-3120 Wind Turbine
Wind Speed - 8 m/s

Frequency (Hz)	1/3 Octave Band (dB LWA)	Octave Band (dB LWA)
20	49.1	
25	51.3	59.9
31.5	53.9	
40	57.8	
50	60.7	70.3
63	65.6	
80	67.7	
100	71.4	78.7
125	73.9	
160	75.6	
200	76.2	83.7
250	79.2	
315	80.3	
400	77.6	82.6
500	77.2	
630	78.6	
800	75.9*	83.9
1000	80.3	
1250	79.7	
1600	80.8	86.8
2000	82.1	
2500	83.0	
3150	82.1	84.5
4000	79.4	
5000	75.3	
6300	70.5	71.5
8000	63.9	
10000	56.1	

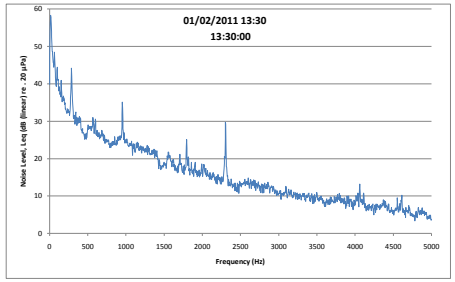
Overall	91.8

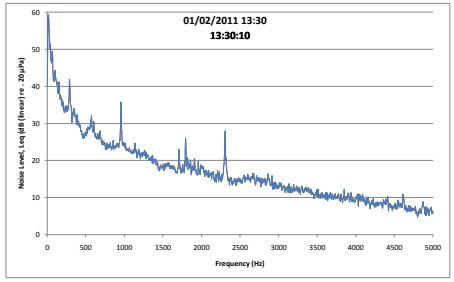


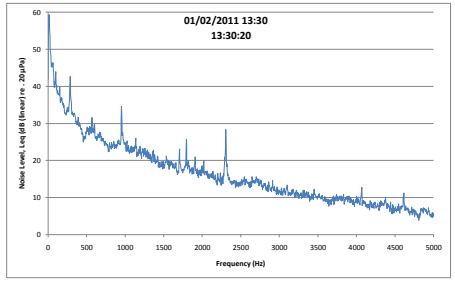


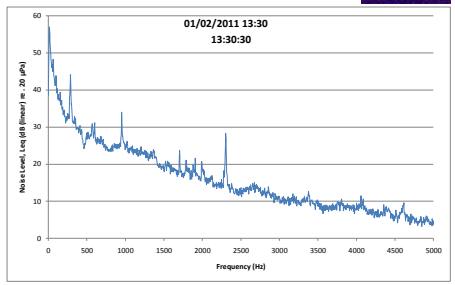
Appendix H
Narrowband Analysis

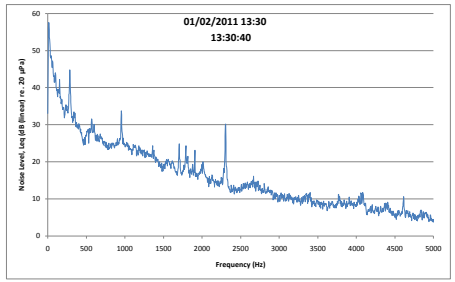
Endurance E-3120 - Narrowband Spectra
6m/s Wind Speed

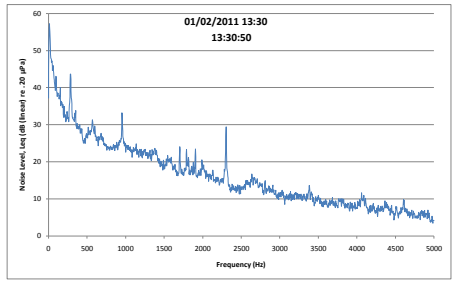


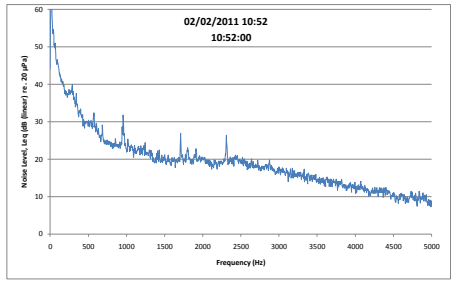


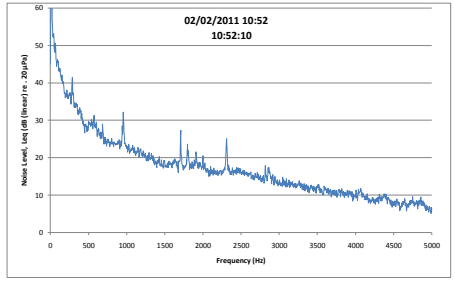


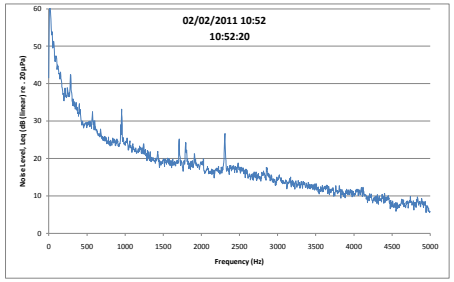


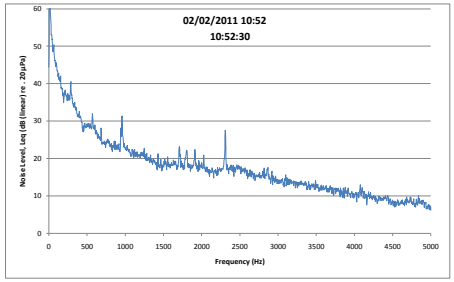


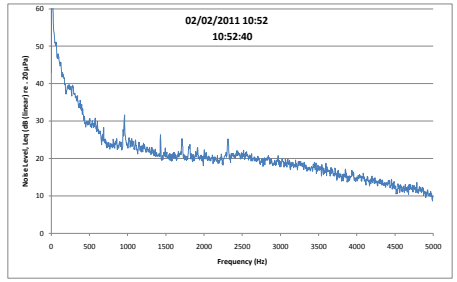


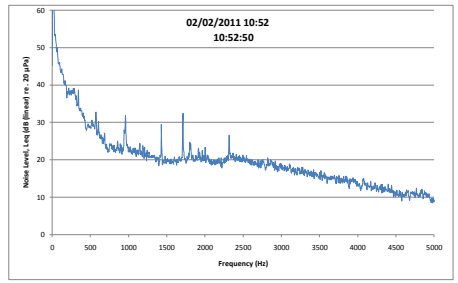


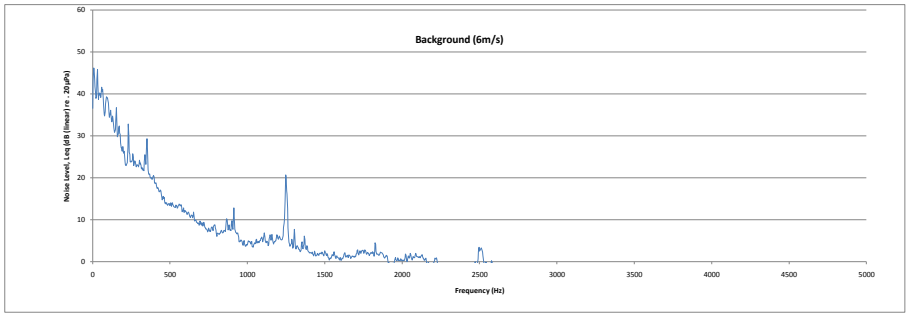








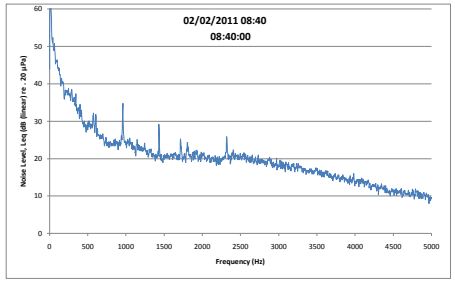


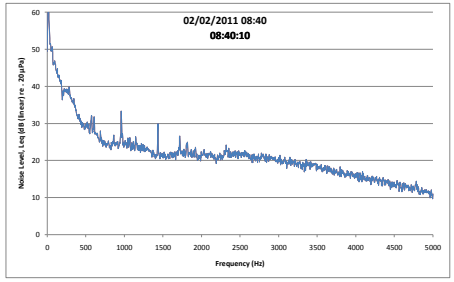


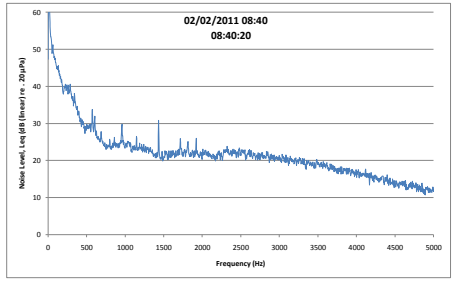
Results of tonal assessment

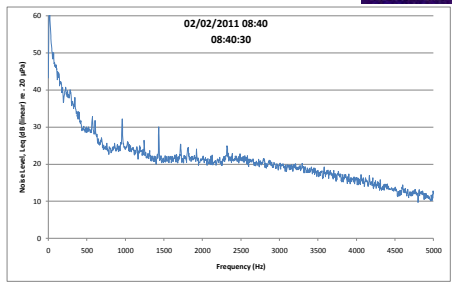
Frequency (Hz)	Tonal Audibility (dB)
287.2	-0.99
955.2	-2.08
2307.8	-0.01

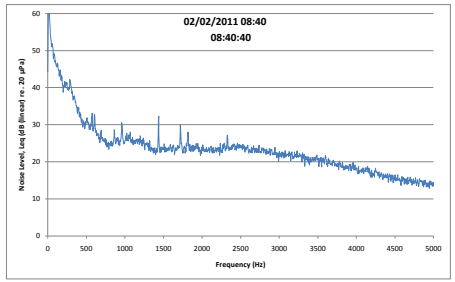
Endurance E-3120 - Narrowband Spectra
7m/s Wind Speed

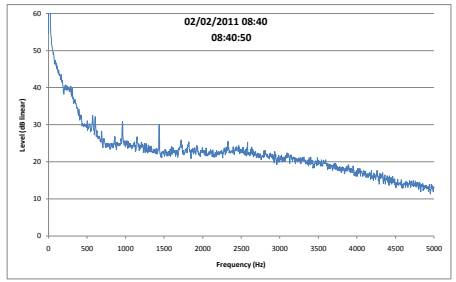


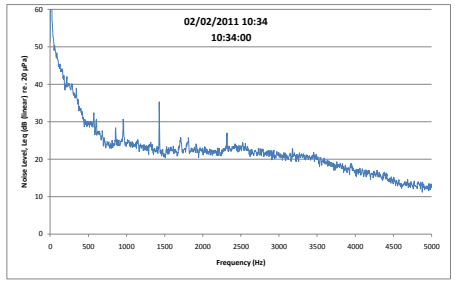


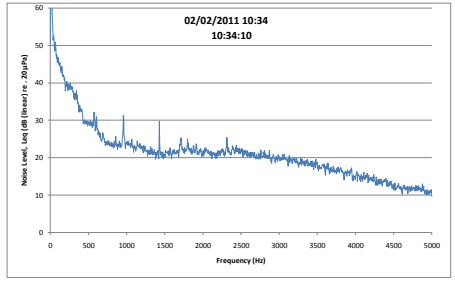


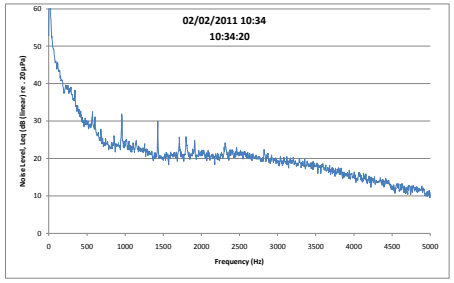


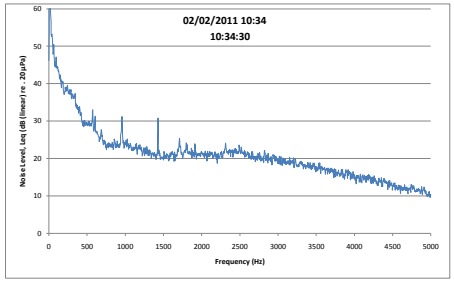


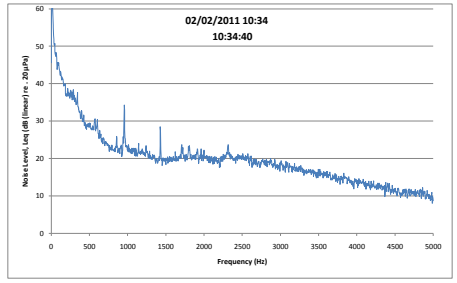


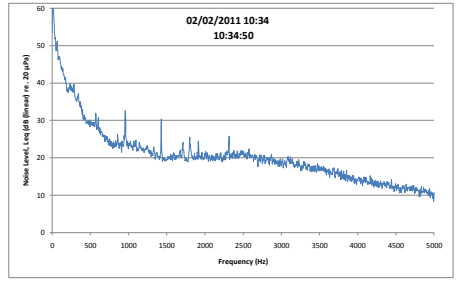


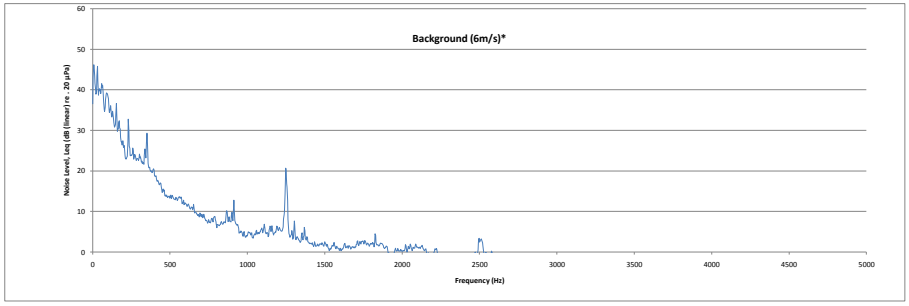










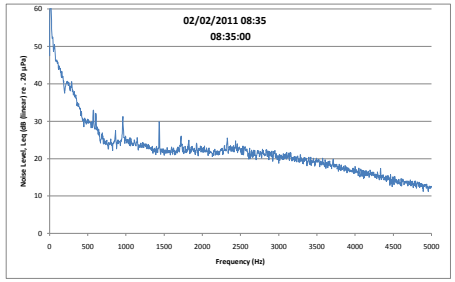


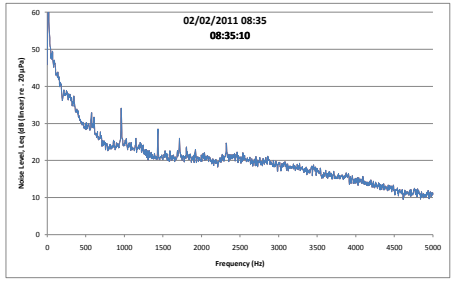
*No background noise data for 7m/s

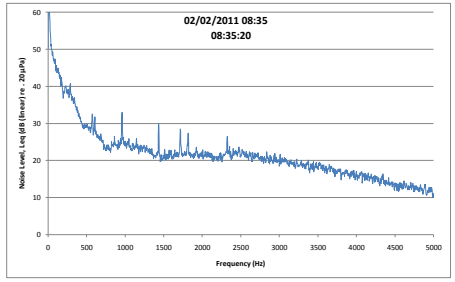
Results of tonal assessment

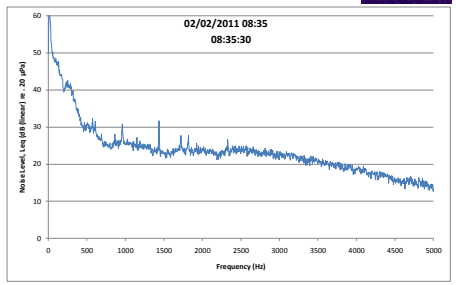
Frequency (Hz)	Tonal Audibility (dB)
No tones identified	

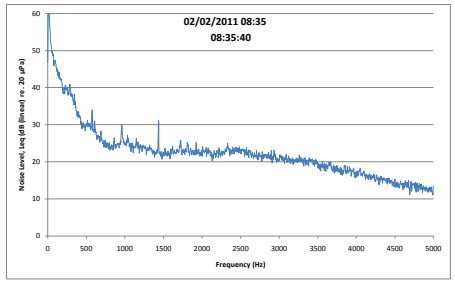
Endurance E-3120 - Narrowband Spectra
8m/s Wind Speed

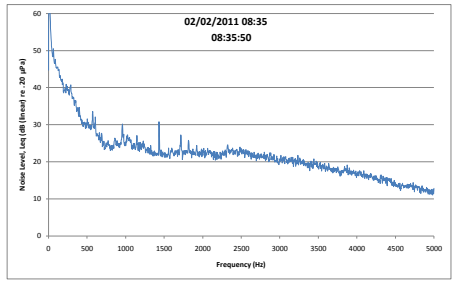


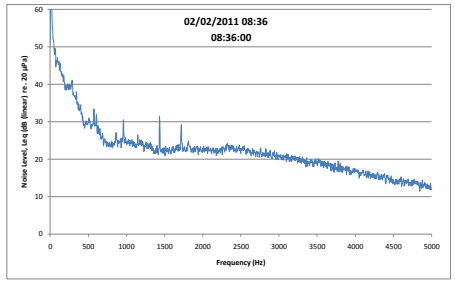


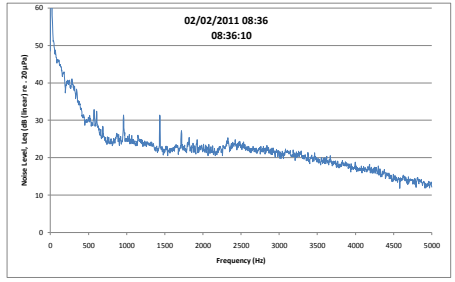


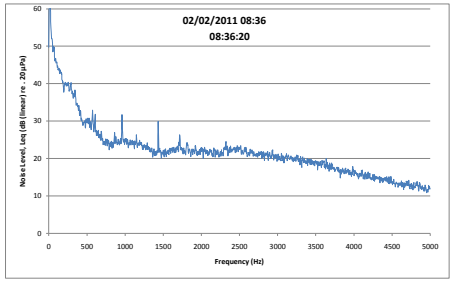


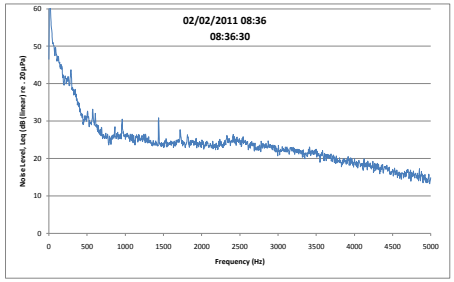


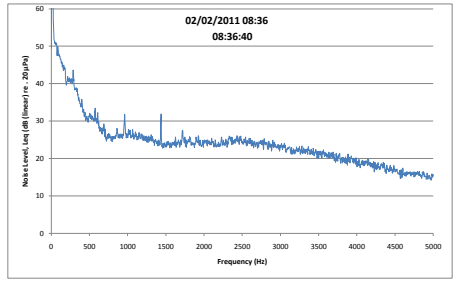


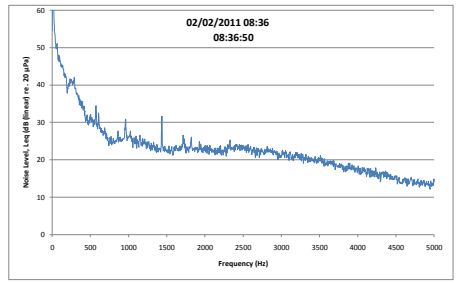


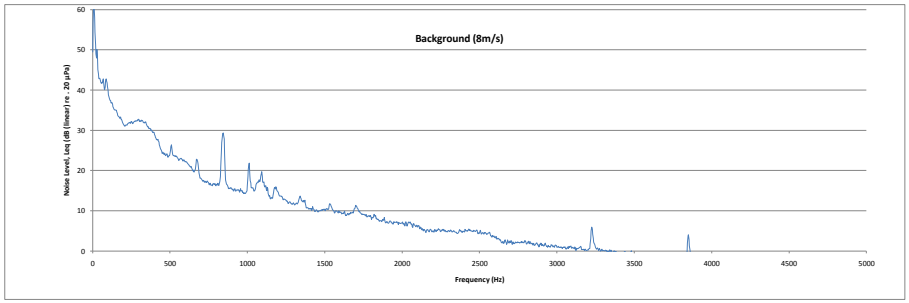








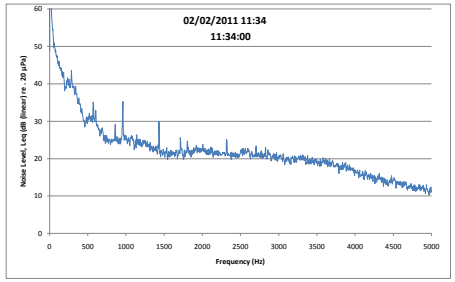


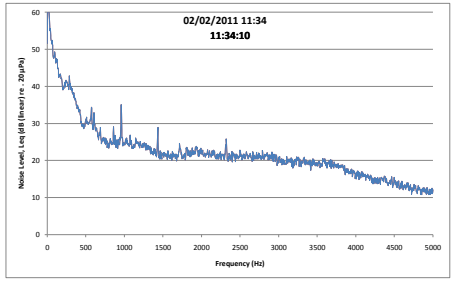


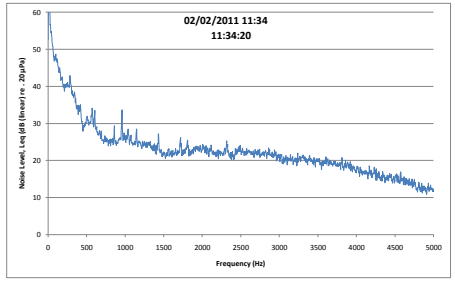
Results of tonal assessment

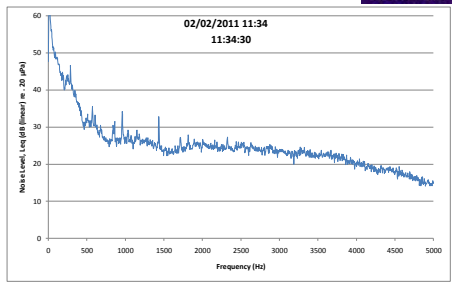
Frequency (Hz)	Tonal Audibility (dB)
No tones identified	

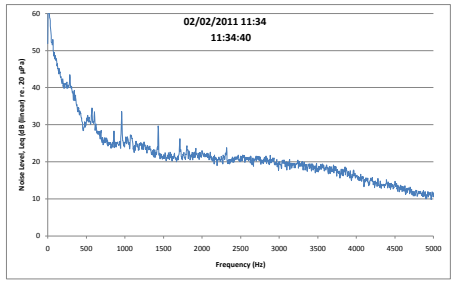
Endurance E-3120 - Narrowband Spectra
9m/s Wind Speed

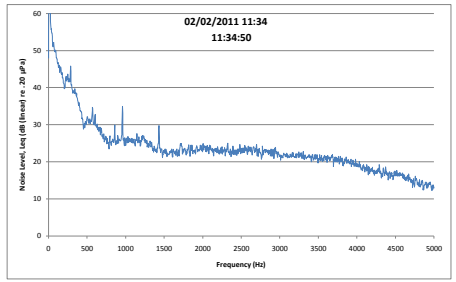


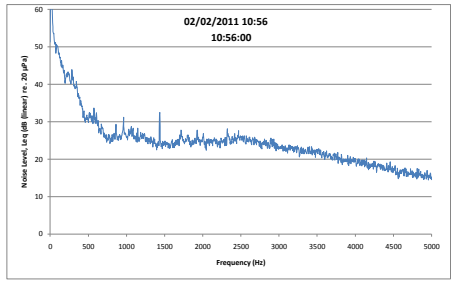


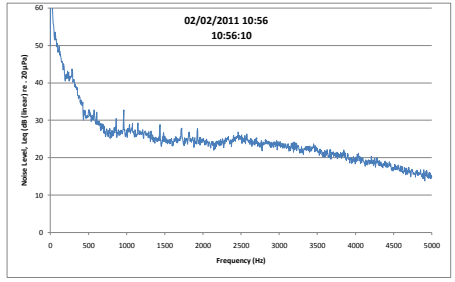


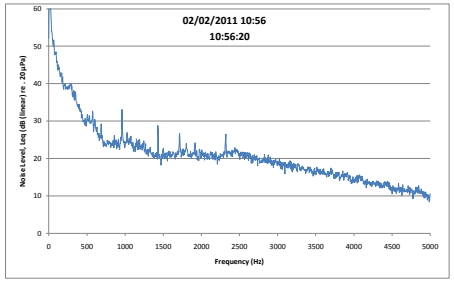


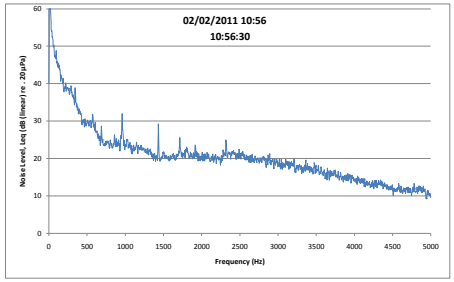


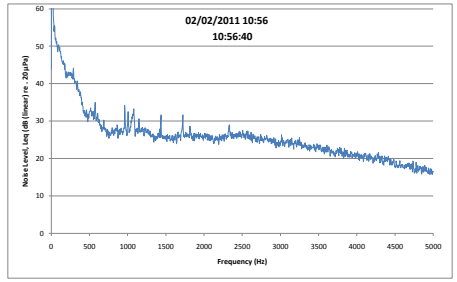


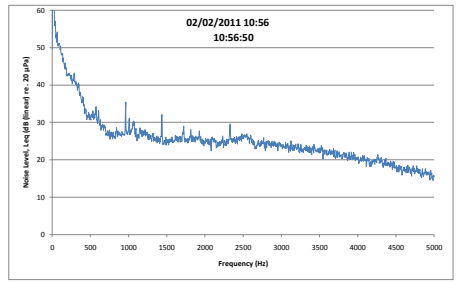


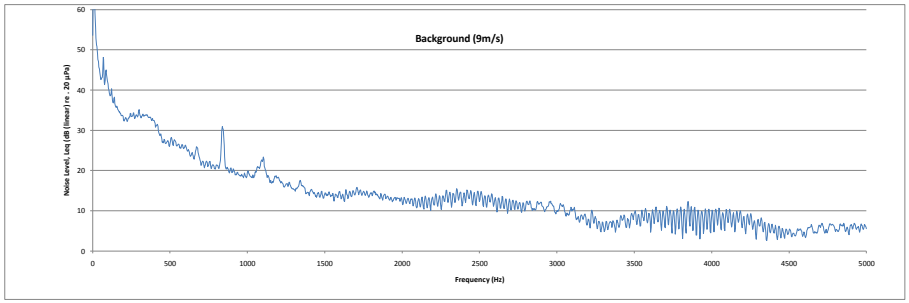








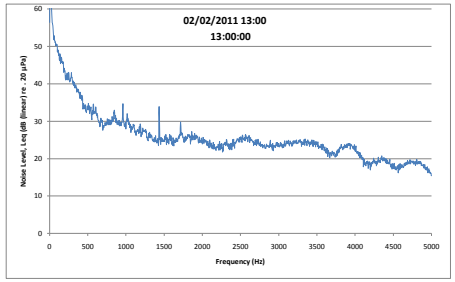


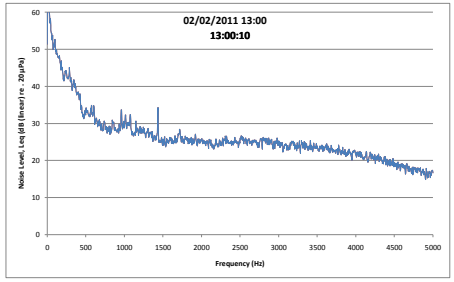


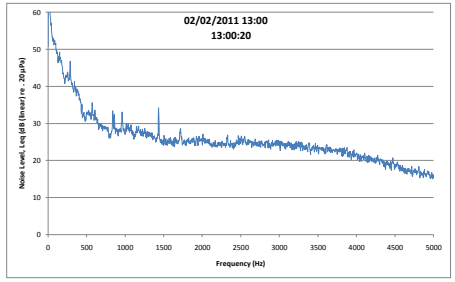
Results of tonal assessment

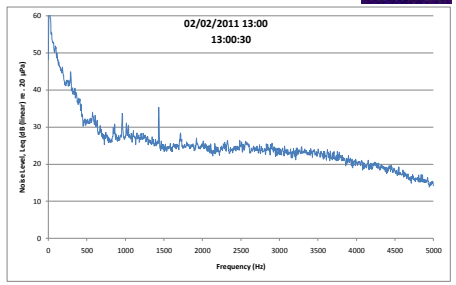
Frequency (Hz)	Tonal Audibility (dB)
No tones identified	

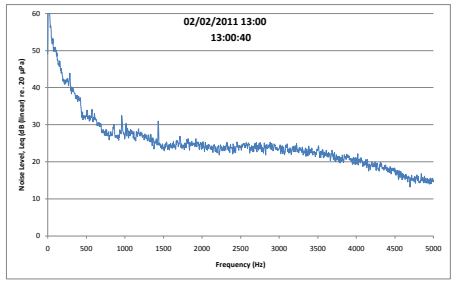
Endurance E-3120 - Narrowband Spectra
10m/s Wind Speed

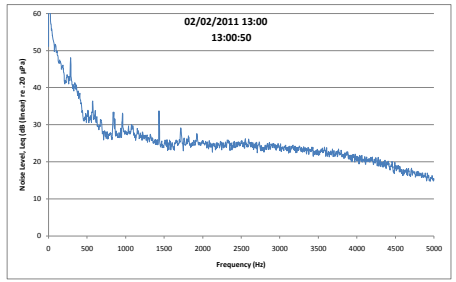


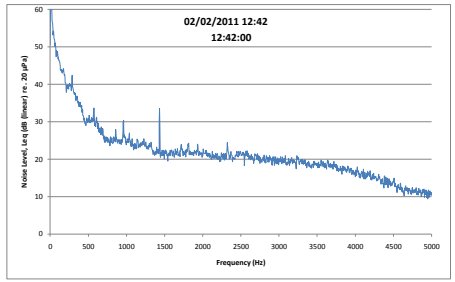


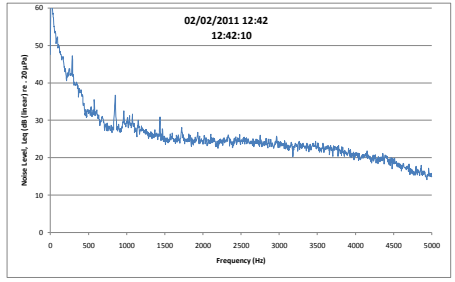


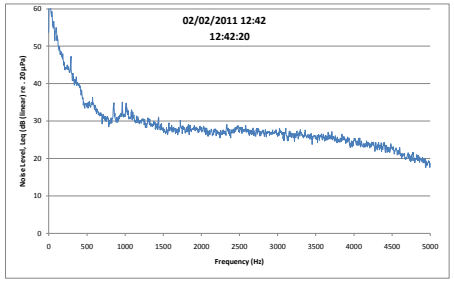


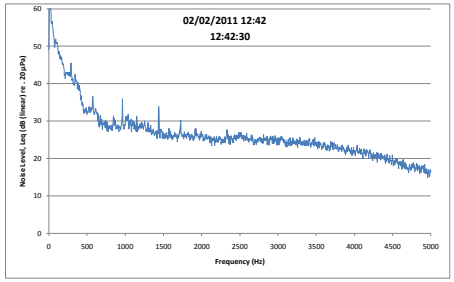


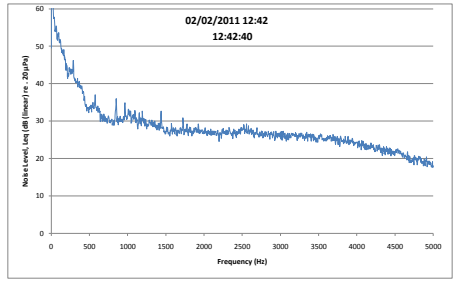


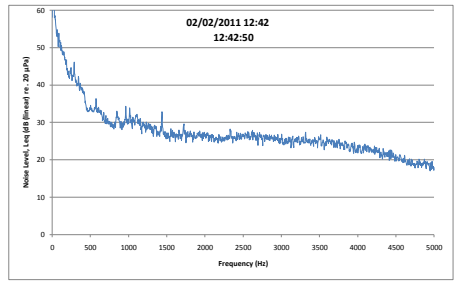


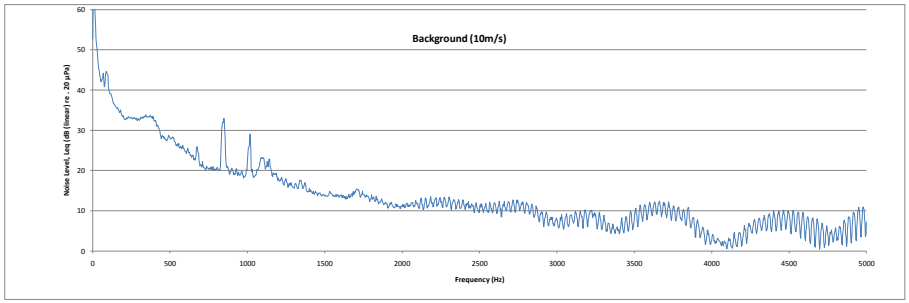










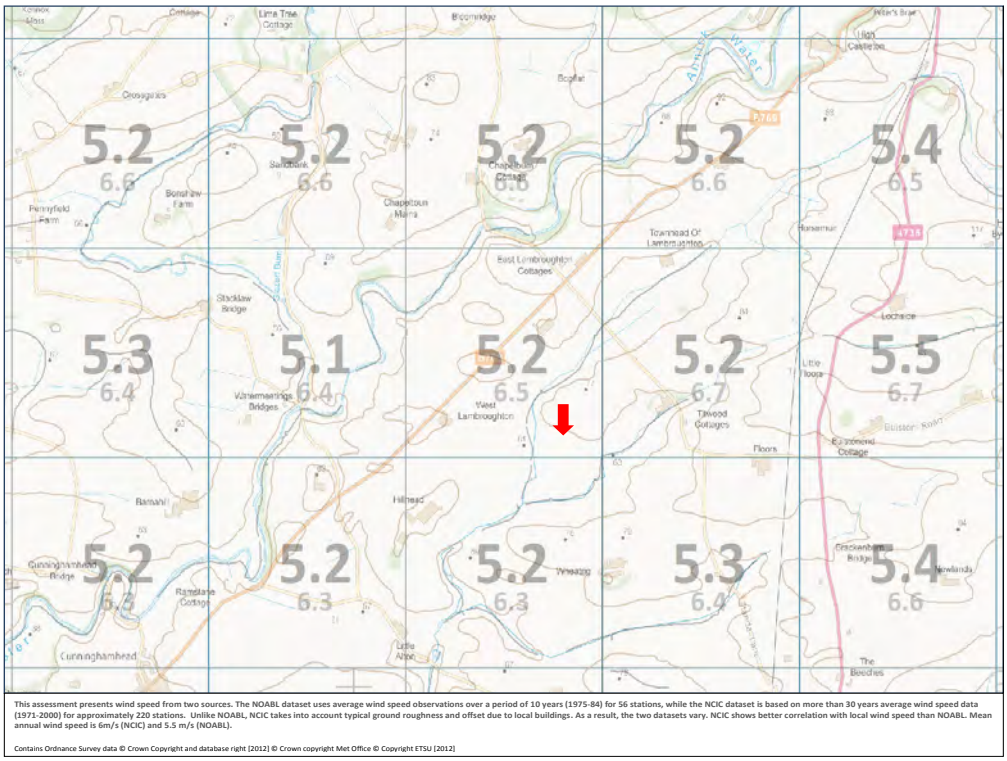


Results of tonal assessment

Frequency (Hz)	Tonal Audibility (dB)
No tones identified	

Appendix 3: CONSTRAINTS MAPPING / FIGURES / OTHER INFO.

- WIND RESOURCE
- GRID CONNECTION DETAILS
- ACCESS ROUTE

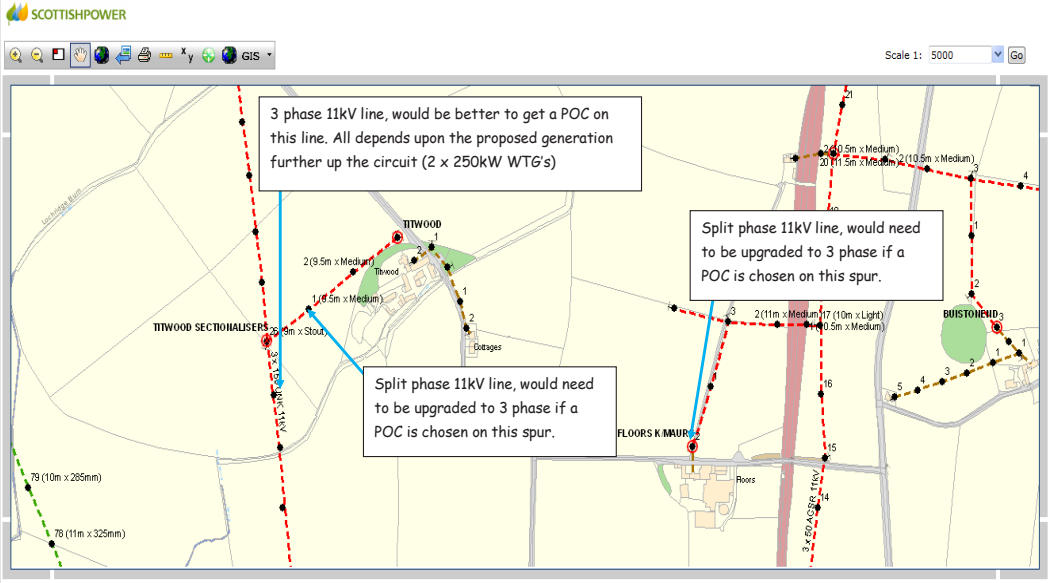


The National Climate Information Centre (NCIC) estimates a mean wind speed of 5.2m/s for the grid square within which we propose to site the turbine. This data set is produced by the Met Office and has more observation sites over a longer period of time (220 stations over 30 years) than the older NOABL wind speed data (56 locations). The NCIC data also takes into consideration an approximation of ground roughness. The above map present both NCIC (large number) and NOABL (smaller number) wind speeds.

The prevailing wind is from the South West and and there is little vegetation to create turbulence.

Grid connection:

The Distribution Network Operator (DNO) for Titwood Farm is Scottish Power.

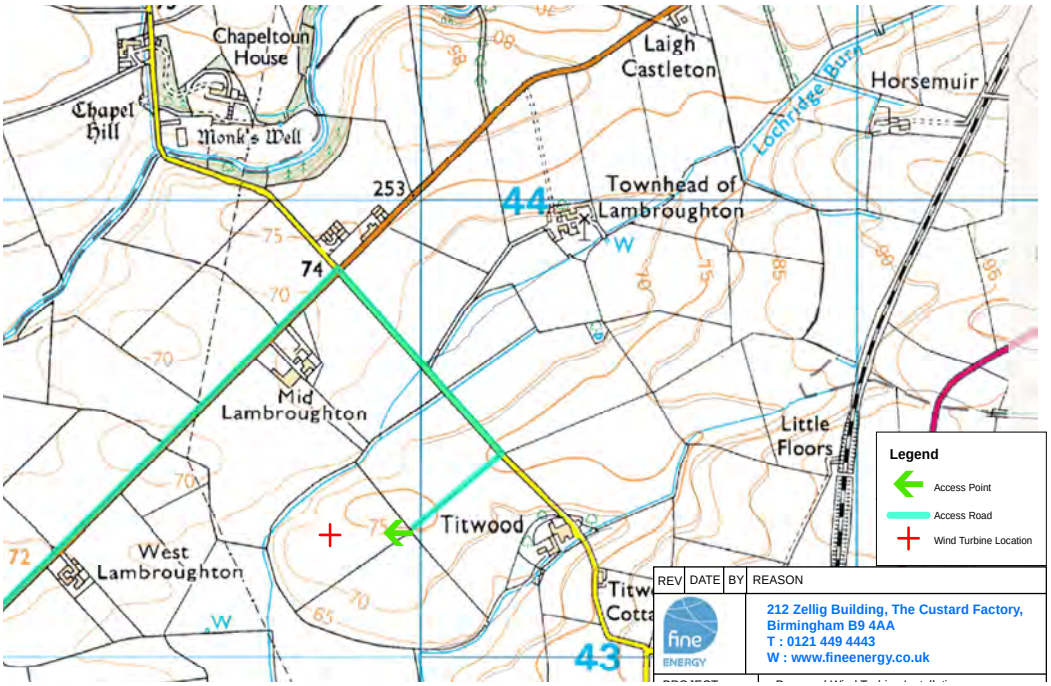


The above map shows the existing 11Kv grid network in the area, in addition to the desired point of connection (POC). There is three phase supply within the land boundary and single phase feeding the farmhouse. There is a 2 x 250kW wind turbine generation proposal at the neighbouring farm which will have an effect on the capacity available on the circuit we intend to connect to.

Going forward we will obtain a connection offer from SP for the connection of the turbine at the POC. From this point cabling would be taken underground (where practicable) to the turbine location.

Access:

Access would be via the B769 road then utilising the road leading to Titwood farm as indicated on the below map. The transport vehicles for the installation and decommissioning of the wind system would be standard 40-foot articulated flat bed trailers and as such are of a size and capacity not categorised as 'abnormal loads' by the Highways Agency. In addition to this, no road network upgrades or maintenance would be anticipated along the proposed delivery route.



Planning Application for the Erection and Operation of a Single Small-Scale Wind Turbine

Supporting Statement: Titwood Farm

Site: Titwood Farm, Kilmaurs, North Ayrshire, KA3 2PN.

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Radio Communications 25

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Appendix 1: LVIA / site information and turbine drawings / ZTVs / photomontages & wireframes

Appendix 2: Noise Report / HAys Mackenzie noise testing document

Appendix 3: Constraints mapping / figures and other information

Appendix 4: Wildlife and Habitat Report

Introduction

This statement has been submitted in support of an application to erect and operate a single Endurance E-3120 wind turbine on a 25m monopole tubular tower at Titwood Farm, Kilmaurs, North Ayrshire, KA3 2PN. This document sets out the relevant planning policies in support of the proposal as well as addressing all of the potential design and access, technical and environmental implications relevant to a development of this size and scale.

Site Description

Site Location

The turbine site is 0.031ha and lies on a land ownership boundary which comprises of approximately 24 hectares of agricultural land (used for grazing), located approximately 3km South West of Stewarton as shown by the plan in Appendix 1. The proposed wind turbine would be sited in open fields as grid coordinates E239791 N643266 as shown by the plan in Appendix 2. The predicted wind speed for the site taken from the Met Office National Climate Information Centre (NCIC)data is 5.2m/s at 25m above ground level (AGL).This location has been chosen to provide the greatest separation distance between third party dwellings and field boundaries while attempting to obtain a clean air flow from the predominant South Westerly winds. The immediately surrounding area is predominantly agricultural in nature.

The nearest residential dwellings to the wind turbine being Mid Broughton Farmhouse, located approximately 375m away.

The site does not fall within any designated sites of ecological, scientific, historic or archaeological interest.

Technology

This proposal is for the erection and operation of a “small” wind turbine, as classified by RenewableUK, the UK’s largest renewable energy association. The wind turbine will have a maximum hub height of up to 25m, maximum rotor diameter of up to 20m, with a maximum blade tip height, when the rotor blades are in a vertical position that will not exceed 35m.

The final wind turbine model proposed is the Endurance E-3120 three bladed horizontal axis turbine. It is envisaged that the turbine’s installed capacity will be in the range of 55-75kW. Its maximum dimensions will not be greater than those stated above.

The information below shows a candidate turbine for the proposed development.

Endurance E-3120 55kW Specification:

Turbine	
Configuration	3 blades, horizontal axis, downwind
Rated power @ 11 m/s	55 kW
Applications	Direct Grid-Tie
Rotor speed	42 rpm
Cut-in wind speed	3.5 m/s (7.8 mph)
Cut-out wind speed	25 m/s (56 mph)
Survival wind speed	52 m/s (116 mph)
Design lifetime	30 years
Overall weight	3,990 kg (8,800 lbs)

Rotor	
Rotor diameter	19.2m (63 ft)
Swept area	290m^2 (3120 ft^2)
Blade length	9m (29.53 ft)
Blade material	Fiberglass / Epoxy
Power regulation	Stall control (constant speed)

Brake & Safety Systems	
Main brake system	Rapid fail-safe dual mechanical brakes
Secondary safety	Pitch control system (for over speed regulation) using passive spring loaded mechanism (patent pending)
Automatic shut down triggered by	High wind speed Grid failure Over-speed All other fault conditions

Towers	
Types and heights	Free-standing monopole: 25m (82ft), 30.5 m (100 ft), 36.5 m (120 ft), 42.7 m (140 ft) Free-standing lattice: 30.5 m (100 ft), 36.5 m (120 ft), 42.7 m (140 ft)
Maintenance Access	Safe climbing system Working space inside the nacelle Tower-top work platform

Access & Construction

The proposed location of the wind turbine will require no new access road or parking facility as access will be taken from the public highway over privately owned agricultural land at Titwood. The turbine would be delivered on a standard HGV vehicle with an insignificant temporary increase in traffic movements on the local road network.

The concrete turbine foundations would measure approximately 6.5m x 6.5m x 1.6m and would be installed within a 2/3 day period using a small tracked excavator. The foundation will be backfilled so that only approximately 4m x 3m would be visible above ground. The wind turbine would be erected on site approximately three weeks after the pouring of the foundations, taking a further 1 to 2 days, dependant on weather conditions. A 50 tonne crane would be used to lift the tower sections, nacelle and blades into place.

Once *in situ* the turbine will require servicing on a quarterly basis by an engineer who would access the site in a car or small van and as such there will be no significant impact on the current road use, access or volume of traffic.

All refuse and materials will be cleared on an ongoing basis and all relevant SHE requirements will be adhered to.

The proposed turbine site is not located within a flood risk area as designated by the Environment Agency and it is not anticipated that the development will have any impact on the existing onsite drainage.

The standard life span of a wind turbine of this size is in the region of 25-30 years if regularly serviced and maintained. At the end of any consented operational period the turbine will be decommissioned, removed from the site and the ground reinstated in accordance with details to be agreed with the Local Planning Authority.

Need and Benefits

It is widely accepted that manmade emissions are contributing to climate change. On a global scale the United Nations Framework Convention on Climate Change (UNFCCC or FCCC), is an international environmental treaty aimed at fighting global warming. In February 2005, as part of the UNFCCC, the Kyoto protocol came into force committing 191 states to significant reductions in greenhouse gas emissions. The European Union (EU) recognises the protocol and has set emission reduction targets for its member states.

The UK's contribution to the EU target is to increase the share of renewables in the UK energy mix to 15% by 2020. To attain this target over 30% (about 117 TWh/yr) of electricity will need to be generated from renewables, since the production of electricity from renewable sources.. This is a significant increase from 2008 levels, where approximately 5.5% of electricity was generated from renewable sources, equating to the need for a six-fold increase in UK renewable electricity production from 2008 to 2020. This represents an ambitious target for the UK and as such planning policy at both national and local level supports this commitment.

The need for renewable energy is made even stronger by the fact that North Sea oil and gas production has peaked and the UK has become a net importer of energy. The UK government has recognised the potential that small-scale renewable energy generation has in contributing to indigenous energy supplies as well as combating climate change. To support the uptake of

small-scale distributed generation, in April 2010, the UK government launched the Feed in Tariff support mechanism which guarantees a price for electricity generated from renewable sources.

It is estimated that an Endurance E-3120 wind turbine at the Titwood site will generate over 270,000 kWh/pa which is equivalent to powering 57 homes per year (using average domestic consumption of 4,700kWh/pa). Using RenewableUK's carbon dioxide emissions savings calculator it is estimated the wind turbine would save over 2,500 tonnes of carbon dioxide over the life of the project.

Planning

The planning system has an important role to play in helping to deliver the UK Government's targets and goals for renewable energy generation, and in assisting the UK's commitment to address the causes of climate change. This Chapter identifies the planning policies and guidance at national and local levels which are relevant to the proposed wind turbine.

A screening opinion was requested from North Ayreshire Council planning department on the 26th April 2012 to determine whether the LPA believed the application should be accompanied by an Environmental Impact Assessment, (EIA). A reponse was received on the 7th June 2012 confirming that an EIA would not be required.

National Energy Policy

The White Paper on Energy **Meeting the Energy Challenge** published in May 2007 sets out the UK central government thinking on energy policy, including renewable energy generation. It explains that the motivation behind the measures to encourage developments harnessing renewable energy sources are two-fold: firstly as a means to combat climate change; and secondly to provide secure future sources of electricity generation in the context of predicted increasing energy demand, domestic power stations closing and diminishing world-wide fossil fuel supplies.

The **Energy Act 2008** strengthens the drive to greater and more rapid deployment of renewables in the UK with the aim of increasing the diversity of the UK's electricity mix, improving the reliability of energy supplies and helping to lower the carbon emissions from the electricity sector.

In July 2009 the **Renewable Energy Strategy** (RES) was published. The Strategy sets out the means by which the UK will meet its legally-binding targets under the EU Renewable Energy Directive. The UK's contribution to the EU target is to increase the share of renewables in the energy mix to 15% by 2020, which represents a seven-fold increase in UK renewable energy production from 2008 levels. A key element of the new strategy relates to the EU requirement that there will be reporting steps every two years in which the achievement of the delivery against the trajectory set for the 2020 targets has to be tested and reported to the EU.

The RES sets out the Government's comprehensive action plan for delivering the 'renewables revolution'. The document sets out the balance of fuels and technologies that are most likely to achieve this challenging goal, the strategic role that the UK Government will adopt and the specific actions intended to lead delivery. The Strategy is also intended to tackle climate

change, reducing the UK's emissions of carbon dioxide by over 750 million tonnes between now and 2030. It will also promote the security of the UK's energy supply, reducing overall fossil fuel demand by around 10% and gas imports by 20–30% against what they would have been in 2020 if no energy were produced by renewable means.

To attain the 15% target, more than 30% (about 117 TWh) of electricity will need to be generated from renewables, an increase on the current level of about 5.5% today. The RES expects that the majority (two-thirds) of this electricity will be from wind power, both on and offshore, with biomass and hydro also playing important roles. These quantities equate to 26.3GW of wind, broken down into about 14GW onshore and 12GW offshore.

The UK current (minimum) target is to achieve 14GW of onshore wind. As of April 2012 there is currently 10.5GW worth of onshore capacity that is either built, under construction or consented, leaving a deficit of 3.4GW.

The **SCOTTISH PLANNING POLICY (SPP)** is the statement of the Scottish Governments policy on nationally important land use planning matters.

"182. - The commitment to increase the amount of electricity generated from renewable sources is a vital part of the response to climate change. Renewable energy generation will contribute to more secure and diverse energy supplies and support sustainable economic growth. The current demand is for 50% Scotland's electricity to be generated from renewable sources by 2020 and 11% of heat demand to be met from renewable sources. These targets are not a cap. Hydroelectric and onshore wind power are currently the main sources of renewable energy supplies. This is expected to continue but will increasingly be part of a wider renewables mix as other technologies become commercially viable. Other technologies` contribution both at a domestic scale and through decentralised energy and heat supply systems including district heating and biomass heating plants for businesses, public buildings and community/housing schemes."

We would state that this small scale wind turbine electrical development has a worthwhile and significant role to play in reaching the above targets.

"183. - There is potential for communities and small businesses in urban and rural areas to invest in ownership of renewable energy projects or to develop their own projects for local benefit. Planning authorities should support communities and small businesses in developing such initiatives in an environmentally acceptable way."

Whereas this development is not suggested or proposed by the local community at large, there are opportunities in this type of development to use, at source, the electricity generated to further generate or safeguard revenues (on top of utilising the Feed-In- Tarriff generation). This has an effect of stabilising and ensuring the long term sustainability if the local business and in some instances allowing expansion and re-investment in the business. This knock on effect safeguards and creates jobs for the local community, which can only benefit the area at large, and all in an environmentally friendly way.

"187 - Planning authorities should support the development of wind farms in locations where the technology can operate efficiently and environmental and cumulative impacts can be satisfactorily addressed. Development plans should provide a clear indication of the potential for development of wind farms of all scales, and should set out the criteria that will be considered in deciding applications for all wind farm developments including extensions.

The criteria will vary depending on the scale of development and its relationship to the characteristics of the surrounding area, but are likely to include:

• landscape and visual impact,

• effects on the natural heritage and historic environment,

• contribution of the development to renewable energy generation targets,

• effect on the local and national economy and tourism and recreation interests,

• benefits and disbenefits for communities,

• aviation and telecommunications,

• noise and shadow flicker, and

• cumulative impact.

The design and location of any wind farm development should reflect the scale and character of the landscape. The location of turbines should be considered carefully to ensure that the landscape and visual impact is minimised."

We contend that the proposed scale and height of the turbine would greatly diminish the potential for visual or other impact upon natural, landscape, cultural and historic locations within the local environment. We intend to show this through the attached ZTV that the position of the turbine has been carried out sensitively - thereby reducing the potential impact to it's minimum on the nearby environmental assets identified by the following council (and other) designatory bodies.

We would state this small scale wind turbine development has a worthwhile and significant role to ply in reaching the targets quoted in the excerpts above and below.

REGIONAL / LOCAL POLICIES

AYRSHIRE JOINT STRUCTURE PLAN

Policy ECON 6 Renewable Energy states:

' Proposals for the generation and utilisation of renewable energy should bepromoted and will conform to the plan both in stand alone locations and as integral parts of new and existing developments where it can be demonstrated that there will be no significant adverse impact, including adverse cumulative impact or infrastructure constraints, and where the design of the development is sensitive to landscape character, biodiversity and cultural heritage.'

Policy ECON 7 Wind Farms states:

'A) In the Areas of search proposals for large and small scale wind farm development will be supported subject to specific proposals satisfactorily addressing all other material considerations.

B) Areas designated for their national or international natural heritage value, and green belts, will be afforded significant protection from large scale wind farms.

C) The integrity of national and international designations should not be compromised.

D) Cumulative impact will be assessed in all relevant cases, taking into account existing wind farms, those which have permission and those that are the subject of valid but undetermind applications. The weight to be accorded to the undetermind applications will reflect their position in the application process. Where the limit of acceptable cumulative impact has been reached the area will be afforded significant protection.

E) Outside the Areas of Search : all wind farm proposals will be assessed against the following constraints, any positive or adverse effects on them and how the latter can be overcome or minimised:

1) Historic
2) Areas designated for their regional and local natural heritage value;
3) Tourism and recreational interests;
4) Communities
5) Buffer zones;
6) Aviation and defense interests;
7) Broadcasting installations

F) Proposals affecting Sensitive Landscape Character Areas shall satisfactorily address any impacts on the particular interest that the designation is intended to protect but the designation shall not unreasonably restrict the overall ability of the plan area to contribute to national targets

G) In all cases, applications for windfarms should be assessed in relation to criteria including as appropriate, grid capacity, impacts on the landscape and historic environment, ecology (including birds), communities, aviation, telecommunications, noise and shadow flicker.'

We have examined all of the above constraints in the surrounding area to our proposed turbine and given evidence to show that there would be no adverse effect on them. We have listed and given details of any potential constraint within the surrounding area of the proposed wind turbine within this document.

NORTH AYRSHIRE LOCAL PLAN

POLICY INF 7 RENEWABLE ENERGY

'Proposals for the development of wind turbines, wind farms, biomass, energy from waste and any other renewable energy developments shall accord with the Local Plan subject to the proposal satisfying the following criteria:

(a) the development is appropriate in design and scale to its surroundings;

(b) where it can be demonstrated that there is no significant adverse effect on the intrinsic landscape qualities of the area, in particular on those areas outlined in policy ENV 5 and ENV 8;

(c) the proposal shall not result in unacceptable intrusion, or have a significant adverse effect on the natural or built heritage of the locality;

(d) it can be demonstrated that any significant adverse effect on telecommunications, transmitting, receiving, or radar systems, can be effectively overcome;

(e) the proposal can be satisfactorily connected to the national grid without causing negative environmental impact; and

(f) when considered in association with existing sites, sites formally engaged in the Environmental Assessment process or sites with planning permission, including those in neighbouring authorities, there are no negative impacts due to the cumulative impact of development proposals.

The Council will require that unused apparatus will be removed within 6 months of it becoming redundant and that the site will be restored.'

We feel that we have sited the turbine in an appropriate area, taking into consideration any constraints and visual imapcts as well as demonstraing that the turbine can be connected to the national grid without causing any negative or environmental impact (demonstrated in following document). Any unused apparatus will be removed and the site will be restored to it's original state.

AYRSHIRE SUPPLEMENTARY PLANNING GUIDANCE - WIND FARM DEVELOPMENT

'The purpose of this Supplementary Planning Guidance (SPG) is to support the implementation of wind energy policy as set out in the Ayrshire Joint Structure Plan which was approved by Scottish Ministers on 22 November 2007.'

International and National Designations:

'The integrity of areas covered by national or international natural heritage designations should not be compromised. SPP6 states that "policies should seek to facilitate the meeting of national targets away from these locations in recognition of the strength of protection afforded to them by law." The designations are defined by SPP6 as:

International Designations – Natura 2000 Sites - Special Protection Areas (SPAs) –

Ramsar Sites - Special Areas of Conservation (SACs)

National Designations – the National Scenic Area on Arran – National Nature

Reserves (NNRs) – Sites of Special Scientific Interest (SSSIs)'.

We have identified the proximity of any of the above designations to our development and examined their impact. The LVIA will also support our assertion that land turbines causes only a minimal visual intrusion to local tourist routes (Major roads and minor coastal routes), recreation areas, iconic viewpoints and tourist sites - and can be shown to be acceptable in nature.

Cumulative Impact:

'Cumulative impacts will most frequently involve landscape and visual impacts but may also affect natural heritage designations and aviation interests. Cumulative impact will take into account existing windfarms, those which have permission and those that are the subject of valid but undetermined applications. The web map facility identifies existing windfarm developments and proposals. In addition windfarm impacts will be assessed along with other impacts from other land uses (eg open cast coal) which in combination produce significant adverse cumulative impacts. Where the limit of acceptable cumulative impact has been reached wind farms will be steered away from these locations. The three element of cumulative impact which will be assessed are composed of landscape, natural heritage and aviation interests.'

Further detailed assessment has been carried out on the potential (or cumulative) impact on the landscape and landscape character of the application area, and how it effects the structure plan's policies, in the attached LVIA document (landscape and visual impact assessment appendix A).

LANDSCAPE CAPACITY STUDY FOR WIND FARM DEVELOPMENT IN NORTH AYRSHIRE - PHASE 2 REPORT

'The landscape capacity study has been prepared in response to the requirement set out within Scottish Planning Policy 6 Renewable Energy (SPP6) that local authorities make positive provision for renewable energy developments by guiding development to appropriate locations and providing clarity on the issues that will be taken into account when assessing specific proposals.'

From the above document we have identified the site lies within the 'Aryshire Lowlands' landscape type. As mentioned in the document the rolling landforms, hedgerows and small woodlands provide intermittent screening within this area. We contend that the proposed scale and height of the turbines would greatly diminish the potential for visual or other impact upon natural, landscape, cultural and historic locations within the above landscape area. We intend to show through the attached ZTVs that the positioning of the turbines has been carried out sensitively - thereby reducing the potential impact to it's minimum on the nearby environmental assests identified by the council (and other) designatory bodies.

The 'Ayreshire Lowlands' are descibed as having a 'field pattern which is generally small and strongly enclosed with beech/hawthorn hedges and mature hedgerow trees and giving an often suprising wooded character... In terms of overall sensitivity, it is considered that this typology could generally accomodate turbines up to a tip height of some 40m.'

Planning Summary

The purpose of this Chapter has been to set out the national and local planning policy framework relative to the proposed development.

To help meet the commitment to reduce carbon emissions, there is strong support at all levels of UK energy and planning policy to increase the proportion of energy produced from development of renewable energy resources. Wind power is expected to make the largest contribution to this increase.

The proposal will also help to further diversify, support and develop the established business at Titwood Farm and ensure the units sustainability going forward.

The proposed development of a small wind turbine at Titwood Farm has planning policy support at national and local levels, and complies with the requirements for a development of this type within the relevant planning policies planning permission should be granted.

Excerpted from the:- North Ayrshire Council Supplementary Planning Guidance Landscape Capacity Study for Wind Farm Development in North Ayrshire

- Landscape Character identification

Ayrshire Lowlands: 'This character area occupies much of the Ayrshire Basin which forms the hinterland to the coastal settlements of Irvine and Saltcoats. The 'Ayrshire Lowlands' have a variable landform, which although generally undulating, can be more rolling in some areas and also comprises small areas of flatter remnant moss. The field pattern is generally small and strongly enclosed with beech/hawthorn hedges and mature hedgerow trees giving an often surprisingly wooded character. Most of the land is improved pasture although wetter, rushy pastures are present in some areas. Remnant areas of moss occur on the more elevated areas on the eastern fringes of North Ayrshire. They comprise a core of slightly raised heathland, often colonised by birch, and encircled by rough grazing.

Farms tend to be evenly sited on low hill tops throughout the area and buildings are often distinctively white-rendered and of traditional style. A number of small settlements are located close to water courses. A large MOD munitions storage depot is incongruously located within this rural landscape although is screened from all but close views. The landform, together with an often intact enclosure pattern of hedgerows, field trees and occasional small woodlands, restrict views when travelling along the tight network of small lanes within the area.'

- Statements of Importance of Candidate Special Landscape Areas

Overall Sensitivity

'This is generally a diverse landscape, characteristically 'Ayrshire' in its rolling, small enclosed pastures and traditional, white-rendered farmsteads. It is of medium to small scale depending on the complexity of landform and landcover. The small typology (4) and lower

height band of typology (3) could be accommodated although development should avoid the more complex rolling parts of this landscape and would need to be of limited scale (height and number of turbines) to fit with the scale of the landform, land cover pattern and settlement. Numbers of turbines could be within the range of 3-7 depending on local context with height restricted to no more than 60 metres to blade tip. It should be stressed however that the 60m upper height band would be too tall in much of this area and would only be suited to more open and flatter areas of moss and pasture which occur towards the south-eastern boundary of North Ayrshire.'

We contend that the proposed scale and height of the turbine would greatly diminish the potential for visual or other impact upon natural, landscape, cultural and historic locations within the above landscape area. The height of the turbine being well within the maximum height recommendation for the area. We intend to show through the attached ZTVs that the positioning of the turbine has been carried out sensitively –thereby reducing the potential impact to it's minimum on the nearby environmental assets identified by the following council (and other) designatory bodies.

Local Historical Sites (to be read in conjunction with HAP01-ZTV)

1. EXTRACT FROM HISTORIC SCOTLAND'S RECORD OF LISTED BUILDINGS:

The proposed development site is located approx. 0.85km to the South-West of a Category B Listed Building (HB NO: 848), named "Townhead of Lambroughton". The site has been notified and designated since the year 1980. The reasons for notification are as follows:-

'Plain classical farmhouse; ashlar; centre pilastered doorway; 3 sash windows sash on upper floor; low parapet and moulded cornice - Limewashed byres from supporting wings.'

We note the significant distance provided, between the proposed turbine and historical assest. The scattered trees between the turbine and the listed building would reduce any major visible impact.

2. EXTRACT FROM THE SCOTTISH SITES & MONUMENTS RECORD:-

The proposed development site is located approx. 0.5km to the north-west from a SSMR record (SITE NO: 53562), named 'Dean Castle'

'This is a long-esablished landscape straddling the Kilmarnock Water to the north of Kilmarnock. Though Pont describes it as 'veill planted and almost environed with gardens, orchards and a park', a devastating fire in 1735 and the subsequent forfeiture of the estate left the house in ruins, as recorded by Armstrong. The landscape, too, is likely to have suffered ruination as a result. Roy shows only a small wood with a single enclosed vista to the north of the castle. The landscape lacks any obvious coherence on the OS 1st. Ed. Restoration of the castle in the early 20thC has been followed by the redevelopment of the landscape as a country park.'

The above's limited importance and would state that the turbine is very unlikely to impact materially to a record of this type in its current form.

3. EXTRACT FROM HISTORIC SCOTLAND'S RECORD OF LISTED BUILDINGS:

The proposed development site is located approx. 0.6km to the north-east from a Category C Listed Building (HB NO: 838), named 'West Lambroughton'

'Courtyard type farm. Centre 2 storey house, 1 storey supporting wings, farmyard to rear. '

We note the above's limited importance and would state that the turbine is very unlikely to impact materially to a record of this type in its current form.

4. EXTRACT FROM THE SCOTTISH SITES & MONUMENTS RECORD:-

The proposed development site is located approx. 0.8km to the north-east from a SSMR record (SITE NO: 17717), named 'Lochend

'The current OS 1:10000 map has nothing marked at this location. However the OS 1st edition 6" map indicates this to be the site of an farmstead named Lochend'

As the above states, there is currently nothing on this site. This would therefore confirm the sites limited importance and thus the turbine is very unlikely to impact materially to a record of this type.

5. EXTRACT FROM HISTORIC SCOTLAND'S RECORD OF LISTED BUILDINGS:-

The proposed development site is located approx. 1.6km to the north-west from a Category C Listed Building (HB NO: 41075), named '16, 18 & 20 Standalane House (Standalane Lodge)'. The site has been notified and designated since the year 1971. The reason for notification are as follows:-

Late 18th century/early 19th century. 2-storey, 3-bay T-plan house with projecting later entrance porch. Separate single-storey gabled wings, form U-plan courtyard. Sandstone ashlar to entrance elevation, rubble to rear. Painted margins. Base course, band course, moulded eaves. Later single-storey extension and conservatory to S.

Predominantly replacement 4-pane timber sash and case windows. Raised skews, grey slates. Gable stack to S.

INTERIOR: (seen 2008). Comprehensively altered. Curved staircase with decorative iron balusters and timber banister extant.

PROJECTING WINGS: to left; white painted rubble with black margins. Grey slates, raised skews. Gable stacks. Currently converted to housing (2008).

To right: rubble with triangular pigeon-loft to attic Currently garage (2008).

We note the significant distance provided, between the proposed turbine and a record of the above's limited importance and would state that the turbine is very unlikely to impact materially to a record of this type in its current form.

6. EXTRACT FROM HISTORIC SCOTLAND'S NATIONAL MONUMENTS RECORD OF SCOTLAND:-

The proposed development site is located approx. 1km to the north-west from a RCAHMS record (site no.: NS44SW), named "Floors Alternative A735". The reasons for notification are not available:-

We note the significant distance provided, between the proposed turbine and the record. The trees on the western edge of the record would also partially obscure the visual impact of the turbine.

7. EXTRACT FROM HISTORIC SCOTLAND'S RECORD OF SCHEDULED MONUMENTS:-

The proposed development site is located approx. 2.0km to the South-West of the Scheduled Monument (NATIONAL MONUMENT INDEX NO: 3381), named "Law mount, Motte and Bailey". The reasons for notification are as follows:

'Law Mount is a circular, grass-covered mound of earth and stones situated in a commanding position on the summit of a low ridge. It has a maximum height of 3.5m, its nearly flat top is 12.6m in diameter, and the overall diameter is approximately 18.6m. On its E side are slight, unsurveyable traces of a ditch.

A terrace, 70.0m W of the mound, runs across the end slope of the ridge and is possibly a silted-up ditch, which may have enclosed part of the W side of a bailey.'

We note the significant distance provided, between the proposed turbine and the record and in vue of this, as well as other factors such as farm buildings and trees which would obscure the view, we would state that the turbine is very unlikely to impact materially to a record of this type in its current form.

8. EXTRACT FROM HISTORIC SCOTLAND'S RECORD OF LISTED BUILDINGS:

The proposed development site is located approx. 890m to thesouth-east of a Category C Listed Building (HB NO: 839), named "Chapeltoun Bridge". The site has been notified and designated since the year 1980. The reasons for notification are as follows:-

''Chapeltoun Bridge' spans the parish boundary line between Dreghorn to the south and Stewarton to the north.'

We would note from the above referenced Historical Asset that the turbine would not be visiblel (ref: ZTV - L01), and as such any potential visual impact on the record and it's setting shall be negligible.

9. EXTRACT FROM HISTORIC SCOTLAND'S NATIONAL MONUMENTS RECORD OF SCOTLAND:-

The proposed development site is located approx. 840m to the south-east from a RCAHMS record (site no.: NS34SE), named "Chapeltoun". The reasons for notification are as follows:-

'There was a chapel, dedicated to the Virgin Mary, at Chapeltoun of Lainshaw. It became

ruinous after the Reformation.

Part of the house of Chapelton (NS 395 441) is believed to have been a chapel dedicated to the Virgin Mary. Though parts of the building are of great age, it is not certain that this was the chapel; it may have been the residence of the chaplain, while the chapel stood near Chapel Hill (see NS34SE 4).

Name Book 1856

A chapel is reputed to have at Chapelton, but the site is not known (H Gollan, Chapeltown). A perambulation of the area revealed nothing. The mansion of Chapelton has been entirely removed and a new one built a short distance N.

Visited by OS (DS) 30 July 1956'

We would note from the above referenced Historical Asset that the turbine would only be partially visible if at all (ref: ZTV - L01), due to the screening effect created by the trees and as such there would be very limited if any potential visual impact on the record and it's setting.

10. EXTRACT FROM HISTORIC SCOTLAND'S NATIONAL MONUMENTS RECORD OF SCOTLAND:-

The proposed development site is located approx. 840m to the south-east from a RCAHMS record (site no.: NS34SE), named "Chapeltoun House, Monk's Well". The reasons for notification as follows:-

'In the meadow behind Chapeltown House, near the Annick Water, is a spring known as the 'Monk's Well', which is believed to have been associated with the chapel described on NS34SE 9.

The 'Monk's Well' is a spring emerging through a stone pipe, situated in a stone-faced cutting in the hill slope. Above the spring is a stone slab with a cross in relief.'

We would note from the above referenced Historical Asset that the turbine would only be partially visible if at all (ref: ZTV - L01), due to the screening effect created by the trees and as such there would be very limited if any potential visual impact on the record and it's setting.

11. EXTRACT FROM HISTORIC SCOTLAND'S NATIONAL MONUMENTS RECORD OF SCOTLAND:-

The proposed development site is located approx. 1km to the south-east from a RCAHMS record (site no.: NS34SE), named "Chape Hilll". The reasons for notification are as follows:-

'Chapel Hill is a circular artificial hill near Chapeltoun House. About 1850, Mr J McAlister raised it to its present height by taking the earth etc which had slid from its sides, and putting it on the top. While doing this, a quantity of human bones was found near the base on the S and E sides, and also some stones which from their appearance Mr McAlister though had been exposed to fire. Mr R Miller, a former proprietor, stated that when the present road past Chapel Hill was being made, a quantity of bones was found, giving the idea that there had been a burial ground here.'

We would note the considerable distance between the turbine and the possible burial ground (ref: ZTV - L01), and as such there would be no impact on any historical remains.

12. EXTRACT FROM HISTORIC SCOTLAND'S RECORD OF LISTED BUILDINGS:-

The proposed development site is located approx. 1.2km to the south-east from a Category C Listed Building (HB NO: 51379), named 'Chapeltoun House'. The site has been notified and designated since the year 2009. The reason for notification are as follows:-

'This distinctive manor house with Arts and Crafts details and particularly fine door surround was designed by the well-known architect Alexander Cullen and is a good example of an early 20th century manor house. The contrasting painted harl and bare stone margins provides an effective decorative device. The decorative interior retains much of its original form and the panelled hall is notable.

The house was designed for Hugh Neilson, the owner of Summerlee Iron Company in Coatbridge and it replaced a previous 19th century house which lay to its South West. The old house was demolished. It is possible that there was an earlier chapel near this site although no remains of this exist.

The Summerlee Iron Works began in 1836 by James Neilston and its production peaked in the 1880s. Thereafter, it declined and closed in 1926. The site is now Summerlee Museum of Industrial Life. '

We would note from the above referenced Historical Asset that the turbine would only be partially visible if at all (ref: ZTV - L01), due to the screening effect created by the trees and as such there would be very limited if any potential visual impact on the record and it's setting.

13. EXTRACT FROM HISTORIC SCOTLAND'S NATIONAL MONUMENTS RECORD OF SCOTLAND:-

The proposed development site is located approx. 1km to the south-east from a RCAHMS record (site no.: NS34SE.41.1), named "Chapel House Hotel Lodge".

We would highlight the significant amount of trees around the referenced Historical Asset and therefore the turbine would be barely visible, if at all, and therefore there would be limited if any potential impact on the record and it's setting.

14. EXTRACT FROM HISTORIC SCOTLAND'S NATIONAL MONUMENTS RECORD OF SCOTLAND:-

The proposed development site is located approx. 960m to the south-east from a RCAHMS record (site no.: NS34SE.41,2), named "Chapeltoun House Hotel, Garden ".

We would highlight the significant amount of trees around the referenced Historical Asset and therefore the turbine would be barely visible, if at all, and therefore there would be limited if any potential impact on the record and it's setting.

15. EXTRACT FROM HISTORIC SCOTLAND'S NATIONAL MONUMENTS RECORD OF

SCOTLAND:-

The proposed development site is located approx. 1km to the south-east from a RCAHMS record (site no.: NS34SE.41,0), named “Chapeltoun House Hotel”.

We would highlight the significant amount of trees around the referenced Historical Asset and therefore the turbine would be barely visible, if at all, and therefore there would be limited if any potential impact on the record and it’s setting.

Local Landscape Classifications and Natural Asset Designations (see dwg LAP01-ZTV)

1.EXTRACT FROM HISTORIC SCOTLAND’S NATIONAL INVENTORY OF GARDENS AND DESIGNED LANDSCAPES:-

The proposed development site is located approx. 3.5km to west from a historic garden, house and designed landscape, known as “Rowallan”. The site is approx. 81ha in area and 4084.7m in perimeter. The site has ‘little’ scenic importance and the reasons for notification are as follows:-

‘Rowallan lies 2.5 miles (4km) north of the town of Kilmarnock in Ayrshire amid rolling agricultural landscape some 9 miles (15km) from the coast. The site is bounded to the south by the B751 and is surrounded on its other boundaries by policy woodlands. From Rowallan House fine views can be obtained to the west across to the islands of Ailsa Craig and Arran. The policy woodlands screen the estate from view from the surrounding roads.

Rowallan Castle dates back at least to 1562 and a Muir stronghold preceded this building, constructed in the meander of the Carmel Water at its confluence with the Balgray Mill Burn and the Gardrum Mill Burn. Rowallan House was built on the site of the old mains to the north of the castle and sheltered by the policy woodlands. General Roy’s map of 1750 and the 1st edition OS map of c.1860 show the structure of the designed landscape as similar to today, apart from the long avenue which ran from the mains in a south-west direction and which had disappeared prior to the 2nd edition map of the early 1900s. The designed landscape today extends to 205 acres (83ha), and includes some 24 acres of parkland and 60 acres of woodland: there is a kitchen garden next to the old castle.’

We would note our drawing no. NAT.LAN01, where we have indicated the extents of the above historic garden and that the turbines would only be visible from a very small area of the site if at all (see ZTV-L01), due to the land form and screening from the trees.. There would therefore be no visual impact on this asset or its setting.

2.EXTRACT FROM HISTORIC SCOTLAND’S NATIONAL INVENTORY OF GARDENS AND DESIGNED LANDSCAPES:-

The proposed development site is located approx. 4km to the north-east from a historic garden and designed landscape, known as “Annick Lodge”. The site is approx. 32ha in area. The scenic rating is “ high” on this record and the reasons for notification are as follows:-

'Annick is situated off the A736 north-east of Irvine in North Ayrshire and is surrounded by gently undulating farmland. There are views into the parkland from the north and south front of the house. Housing development near Irvine can be seen from the drive but is just out of sight from the main house. The dense boundary planting of the Annick estate makes it difficult to see into the designed landscape from outside. The extent of the designed landscape remains exactly as the 1885 estate survey, which is based on the earlier 1st edition OS 1:2500 (25'), 1854.

We would note our drawing no. NAT.LAN01, where we have indicated the extents of the above historic garden in relation to our proposed development site. We would note that the turbines will only be partially in view for the majority of this site, if at all, due to the screening influences of the trees surrounding the site. Considering the 4km distances involved this would, in practical terms negate any potential visual impact.

4.EXTRACT FROM NORTH AYRSHIRE CORE PATHS MAPS:-

The proposed development site is located approx. 3.6km to the North of a National Cycle Network (NCN) route, known as National Route 73 or shown sa IK18 on the North Ayrshire Core Paths Maps. The route extends from Overtoun Road to the East Ayshire Border.

We would note our drawing no. LAP01, where we have indicated the extents of the above cycle route in relation to our proposed development site. We would note that the turbine would not be visible from the vast majority of the cycle route, if at all.

Supporting Environmental Information

Ecology / Ornithology

One of the greatest threats to all living species is climate change resulting from carbon emissions. As mentioned earlier in this statement the proposal would offset more than 2,500 tonnes of carbon dioxide into the atmosphere over its expected operational life, and weight should be given to this positive contribution in line with planning policy.

Any potential impact of this proposal should not be considered in the context of industrial scale installations, but in line with specific guidance for small-scale wind turbines.

The wind turbine site does not lie in or immediately next to any specific natural heritage designations such as Special Protection Area's (SPA's), Special Areas of Conservation (SAC's) Ramsar's or Sites of Special Scientific Interest (SSSI's). The site does not support breeding bird populations of significance, and no bird species recognised as sensitive to collision risk are known to breed in the vicinity of the proposed turbine. The applicant is not aware of any other protected species in the surrounding area that will be adversely affected by the proposal.

Further environmental aspects assessed can be summarised in the following table:

Environmental Aspect	Source	Assessment	Impact posed by proposed development
Geology	British Geological Survey	Superficial deposits of Devensian Till are recorded on site. Immediately underlying this the Limestone Coal Formation is recorded.	Low
Hydrogeology	Scottish Environment Agency	The site is located within a Drinking Water protection zone (Kilmarnock bedrock and localized sand and gravel aquifers). The bedrock is classified as having intergranular fracture flow, with moderate productivity.	Low
Hydrology	Scottish Environment Agency	Lochridge Burn runs along the north and south boundaries of the site. This runs into the Garrier Burn.	Low

Environmental Aspect	Source	Assessment	Impact posed by proposed development
Flood risk	Scottish Environment Agency	The site is not located within an indicative flood plain.	N/A

Visual Impact

At 35m to blade tip the Endurance E-3120 is at the 'very small' end of the 'small' category of turbines. The proposed Titwood wind turbine will be located in rural setting approximately 3km South West of Stewarton. The gently undulating landscape of the area is further interspersed with minor public highways, overhead power lines and pylons and other small wind turbines. This backdrop will reduce the prominence of the turbine against the local landscape and screen wider views.

Whilst there has been other small wind turbines granted planning consent within the surrounding area it is considered that the separation distances with other similar developments are sufficient to ensure that this particular turbine would, in the main, be seen in isolation.

To assist in assessing the potential visual impact of the Titwood wind turbine a Zone of Theoretical Visibility map (ZTV) has been prepared. It uses a 3 dimensional terrain model to calculate where the wind turbine would theoretically be visible. The model is very much a worst-case scenario as it takes no account of vegetation or manmade structures which in a real scenario would provide a high level of extra screening. A 15km assessment radius was chosen for the ZTV as the turbine is unlikely to be clearly visible at distances greater than this. The ZTV map can be found in Appendix 3 along with predicted photomontages that illustrate how the turbine would appear.

The proposed site does not lie within an Area of Outstanding Natural Beauty or an Area of Great Landscape Value. The ZTV at shows that there would be some limited visual impact without taking into account any vegetation or manmade structures. The photomontages at Appendix 3 illustrate that when buildings and vegetation are taken into account the turbine will be almost completely screened from view from most viewpoints.

It is concluded that the proposal is of a temporary nature and does not negatively impact on the wider character area to such a degree as to warrant refusal given the weight of the overarching supportive planning policies.

Noise

The Endurance E-3120 is one of the quietest machines available on the market and whilst it would emit a small amount of aerodynamic noise, this must be taken in context. The indicative maximum noise level of a wind farm at 350m (1150ft) is comparable to the sound of leaves rustling in a general breeze (in the region of 35-45 dB).

Source/Activity	Indicative noise level dB (A)
Threshold of hearing	0
Rural night-time background	20-40
Quiet bedroom	35
Wind farm at 350m	35-45
Car at 40mph at 100m	55
Busy general office	60
Truck at 30mph at 100m	65
Pneumatic drill at 7m	95
Jet aircraft at 250m	105
Threshold of pain	140

Noise impacts should be considered within the planning process before a decision is taken on whether or not to grant consent. **The Assessment and Rating of Noise from Windfarms (ETSU-R-97)** should be used as the basis for Local Planning Authorities to determine noise impacts from wind energy developments. ETUS-R-97 states that '*for single turbines or wind farms with very large separation distances between the turbines and the nearest properties, a simplified noise condition may be suitable. If the noise is limited to an LA90, 10 min of 35 dB(A) up to wind speeds of 10 m/s at 10 m height, then this condition alone would offer sufficient protection of amenity, and background noise surveys would be unnecessary.'*

Using the manufactures certified sound power output information published for the Endurance E-3120 turbine a noise assessment model has been carried out using ISO compliant GL Garrad Hassan WindFarmer V4.2 software. A complex noise report is attached at Appendix 4 and shows that the nearest properties which are not directly involved with this proposal are over 320m distant from the turbine and will not be subject to noise disturbance in accordance with the ETSU-R-97 guidelines.

In view of this study it is not considered necessary to do further work monitoring noise prior to determination of this application and that the Local Planning Authority may require a suitable simplified noise condition for any subsequent planning approval.

Shadow Flicker

Under certain combinations of geographical position and time of day, the sun may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off; the effect is known as 'shadow flicker'. It only occurs inside buildings where the flicker appears through a narrow window opening. The seasonal duration of this effect can be calculated from the geometry of the machine and the latitude of the site. A single window in a single building is likely to be affected for a few minutes at certain times of the day during short periods of the year. The likelihood of this occurring and the duration of such an effect depends upon:

- The direction of the residence relative to the turbine(s);
- The distance from the turbine(s);
- The turbine hub-height and rotor diameter;
- The time of year;
- The proportion of day-light hours in which the turbines operate;
- The frequency of bright sunshine and cloudless skies (particularly at low elevations above the horizon); and,
- The prevailing wind direction.

Only properties within 130 degrees either side of north, relative to the turbines can be affected at these latitudes in the UK – turbines do not cast long shadows on their southern side.

The further the observer is from the turbine the less pronounced the effect will be. There are several reasons for this:

- There are fewer times when the sun is low enough to cast a long shadow;
- When the sun is low it is more likely to be obscured by either cloud on the horizon or intervening buildings and vegetation; and
- The centre of the rotor's shadow passes more quickly over the land reducing the duration of the effect.

At distance, the blades do not cover the sun but only partly mask it, substantially weakening the shadow. This effect occurs first with the shadow from the blade tip, the tips being thinner in section than the rest of the blade. The shadows from the tips extend the furthest and so only a very weak effect is observed at distance from the turbines.

Shadow flicker can be mitigated by siting wind turbines at sufficient distance from residences likely to be affected. Flicker effects have been proven to occur only within ten rotor diameters of a turbine. The maximum rotor diameter for the Titwood wind turbine in this application is 20m, therefore the potential shadow flicker effect could occur up to 200m from the wind turbine. The closest dwelling in this instance is approximately 375m, therefore shadow flicker would not occur at any of the dwellings surrounding this development.

Aviation

It is widely accepted within the aviation industry that wind turbines can have an effect on air traffic control radar as the return received by a radar from a wind turbine can look like a moving object to the air traffic controller. However for this to occur the radar requires a line of sight to the wind turbine. The Civil Aviation Authority (CAA), MOD and the National Air Traffic Service have been consulted regarding this proposal and we have not received any objections to date.

Radio Communications

Wind turbines can cause interference with fixed radio communications links utilised by the telecommunications industry and to control utility infrastructure. Ofcom and the Joint Radio Committee (JRC) have both been consulted regarding this proposal and have confirmed that they have no links that are likely to be affected by a wind turbine in this location and as such have no objections.

Appendices

Appendix 1: LVIA

- LANDSCAPE AND VISUAL IMPACT ASSESSMENT STUDY DOCUMENT
- BLOCK / SITE PLAN
- LOCATION PLAN 1
- LOCATION PLAN 2
- TURBINE ELEVATION DRAWING
- TURBINE ELEVATION COMPARISON DRAWING
- 15km ZONE OF THEORETICAL VIEW PLAN
- CUMULATIVE ZTV
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CUMULATIVE LANDSCAPE AND VISUAL IMPACT ASSESSMENT

1.0 Introduction

1.1 A Landscape and Visual Impact Assessment (LVIA), including an outline cumulative LVIA, has been undertaken for this project in line with the screening and consultation process with North Ayrshire Council. This section reports on the potential landscape and visual effects of the proposed Titwood Farm application, which will comprise of a single wind turbine, up to 35m to blade tip, type E-3120 Endurance and associated infrastructure at Titwood Farm, Kilmaurs, North Ayrshire, KA3 2PN.

1.2 The aims of the assessment process are to promote the best 'environmental fit' for the development through consideration of the existing landscape resource, the potential landscape and visual effects, design alternatives and any mitigation that might be possible. The assessment process refers to landscape value and, in particular, landscape designations and related planning policy, as well as landscape character and capacity for wind turbine development at this site.

1.3 This Landscape and Visual Impact Assessment with Cumulative Impact Assessment has been carried out for Fine Energy in relation to a planning application for a single wind turbine at Titwood Farm, to the north west of Kilmarnock, north east or Irvine and south of Stewarton.

1.4 The approach to this appraisal has been to consider the impacts on the physical structure and aesthetic character of the landscape and, the impacts on the visual amenity of those experiencing views of the site.

Landscape and Visual Impact

1.5 Landscape impacts and visual impacts are separate but related. Broadly *landscape impacts* are changes in the fabric, character and quality of the landscape as a result of development. Hence landscape impact assessment is concerned with:

- direct impacts upon specific landscape elements;
- more subtle effects upon the overall pattern of elements that gives rise to landscape character and local distinctiveness; and,
- impacts upon acknowledged special interests or values such as designated landscapes, conservation sites and cultural associations.

Visual Impacts are a subset of landscape impacts – they relate solely to changes in the appearance of the landscape and the effects of those changes on people. Hence visual impact assessment is concerned with:

- the direct impacts of a development upon the views of the landscape through intrusion or obstruction;
- the reaction of viewers who may be affected; and,
- the overall impact on visual amenity, which can range from degradation through to enhancement.

1.6 As acknowledged by PAN 45 wind turbines cannot be sited within a landscape without some degree of effect on the character of the landscape and on views *" there are no landscapes into which a windfarm will not introduce a new and distinctive feature."*

1.7 Turbines are prominent, large scale, man-made features and there are few precedents in terms of scale, height and appearance for modern turbines in a rural landscape. Topography aside, they are much taller than any natural features such as trees, most buildings and other structures. Of similar built structures in rural landscapes, electricity pylons are usually smaller. Furthermore, most landscape features are static whereas wind turbines rotate.

Cumulative Impact

1.8 Cumulative impact can be where one or more is visible from a particular location or where travellers encounter two or more in quick succession are of key concern (sequential impact). Although there may be specific visual impacts, it may be that development can be accommodated as a feature without altering significantly the intrinsic character of the landscape in question. The characteristics of wind turbines that lead to cumulative impacts include:

- the scale and striking visual appearance of wind turbines; and,
- the great extent of their visibility and the potential for inter-visibility between the developments and from receptors.

Landscape Sensitivity

1.9 Definitions of capacity that apply generally refer to the ability to accept a development without a 'significant' or 'unacceptable' level of change to the landscape. Implication of the criteria has to be identified and thresholds determined to give meaning to the words 'significant' and 'unacceptable'.

1.10 The sensitivity of the landscape is a measure of its inherent ability to accept change without significant or unacceptable effects on its character. This can be considered in two ways:

- an inherent part of the landscape characteristics, regardless of possible types or scales of change; or,
- in relation to a specific proposed type and scale of change.

1.11 In determining capacity, not only the sensitivity of the landscape to the particular type of development is considered but also the *landscape value* of the area concerned. Value may be determined in a number of ways, including by landscape designations (national, regional or local), cultural and historical associations and in terms of how it is valued by those who live in it or use it in some way.

1.12 The principles involved in determining impact significance are the same whether on single or multiple developments. This involves assessing:

- the sensitivity of the receptor to the type of change proposed; and,
- the magnitude of change that would result from the proposals.

Policy and legislation

1.13 In the preceding chapter a description of the planning policy context for the area is provided.

1.14 General Landscape and Natural Heritage issues are broadly specified within Scottish Planning Policies (February 2010) and states that *'planning authorities should take a broader approach to landscape and natural heritage'* while the landscape in *'both the countryside and urban areas is constantly changing and the aim is to facilitate change'* while different landscapes will have *'a different capacity to accommodate new development.'*

1.15 As presented on the Rural Area Map which forms part of the North Ayrshire Local Development Plan (LDP) April 2011, the site sits within an area classed as 'countryside'. The site, and indeed the land holding within the land ownership boundary does not have any other planning designations associated with it. The council encourages *"appropriate development in the 'countryside' and seeks to enhance the viability of rural industry and services while minimising environmental impact".* Under The Natural Environment section of the North Ayrshire LDP, policy ENV1 Development in the Countryside (excluding housing) states that proposals for new development within the countryside will not accord with the LDP unless *"the development is necessary non-residential development associated with agriculture... or other established rural businesses... development is small scale... that has a specific locational need to be located on site."*

1.16 The development, through rigorous assessment will show that *"proposals which would lead to the permanent loss of prime quality farmland on mainland North Ayrshire...shall not accord with the LDP unless it can be demonstrated that the development is for an appropriate scale of renewable energy generation...where restoration proposals will return the land to its former status,"* as stated under Policy ENV4 Farmland. The proposal, while accepted is of a long term nature, is not permanent.

1.17 Due to economic conditions rural land owners are seeking ways in which to diversify and in this respect *"there is a presumption in favour of sensitive farm diversification and shall accord with the LDP provided the development shall not have a significant adverse effect on the character, amenity and biodiversity of the locality"* and *"takes into cognisance of the councils Rural Design Guidance"* as written in policy ENV5 Farm Diversification within the LDP. With proactive design and landscape measures it will be shown that the local area will be able to support the proposed single turbine development. Policy ENV6 Economic Development or Diversification in Rural Areas further promotes favourably proposals within rural areas and in order to accord with the LDP should *"demonstrate a site specific locational need and where the development can demonstrate economic benefit which would outweigh any adverse environmental impacts"* and *"the proposal can be suitably located in rural areas."* It is proposed that a single turbine development at Titwood would comply with the LDP conditions and indeed, through proactive proposed landscaping would enhance and benefit the local biodiversity in which the turbine is located.

1.18 Policy PI9 Renewable Energy within the LDP is favourable for development proposals of this nature as long as it complies and satisfies criteria, such as *"is appropriate in design and scale to its surroundings, it can be demonstrated that there is no unacceptable adverse impact on the intrinsic landscape qualities of the area, the proposal shall not result in unacceptable intrusion, or have an unacceptable adverse effect on the natural, built, cultural or historic heritage of the locality; and in the case of individual wind turbine and wind farm development, that the proposal satisfies the contents of the Ayrshire Supplementary Guidance: Wind Farm*

Development (October 2009)," to paraphrase some of the terms that the proposed development has to conform. It is deemed that through assessment it will be shown that the single turbine proposed at Titwood will satisfy the policy requirements.

Assessment of Impact on Visual Amenity

1.19 The degree of visual impact varies with the position from which the site is viewed. In assessing the visual impact of the proposed development on the landscape, full consideration has been given to all viewpoints; their location and the distance from the site; the quality of each view; and, the impact that the development has on its setting. The visual assessment is based upon the photomontage viewpoints illustrated in the Appendices and summarised below.

1.20 An outline viewpoint assessment has been conducted from particular viewpoints and visual receptors within the study area. The viewpoints were chosen based on the following criteria:

- Viewpoints should be representative of the likely impacts;
- Viewpoints should show a range of different types of views;
- Viewpoints should be representative of a range of different receptor groups;
- If recognised to fall within the ZTV and to have visibility towards the site, viewpoints from areas and / or built forms which have cultural and / or landscape significance;
- Viewpoints should be representative of a range of distances;
- Viewpoints should be representative of the varying image of the wind project in the landscape.

Table 1.1 Viewpoint Photomontage Locations

No.	Viewpoint	Receptors	Direction & Distance of view towards the Site
1	Taken from the unclassified road between the A735 and B769.	Road Users – **Transitory** Residents – **Primary Visual**	North West 0.82 km
2	High Langmuir, south of the site	Residential Dwelling – **Primary Visual** Road User – **Transitory**	North 1.36 km
3	Unclassified Road Junction	Road User - **Transitory**	North East 0.78 km
4	Titwood Farm	Residential Dwelling – **Primary Visual**	South West 0.5 km
5	Road junction of the B769 near Mid Lambroughton	Road User – **Transitory** Residential – **Primary Visual**	South 0.6 km
6	Taken on the B769 opposite entrance to Townhead of Lambroughton	Road User – **Transitory** Residential – **Primary Visual**	South West 2.06 km

	(Category B Listed)		
7	A735	Road User – **Transitory** Residential – **Secondary Visual**	South West 2.57 km
8	West Lambroughton	Residential – **Primary Visual**	East 0.6 km

Sensitivity, Magnitude and Significance

1.21 These three concepts are fundamental to an impact assessment. Sensitivity for landscape receptors may be shown by the distinctiveness of landscape character, inability to accommodate specific change without loss of landscape integrity and presence or absence of landscape designations. For visual receptors, different sensitivity factors apply, such as the character and quality of the existing views, the types of viewer affected and the general popularity or visual amenity of the area. Magnitude of change varies and relates back to sensitivity. Hence for landscape receptors, the degree of change to, or loss of distinctive landscape characteristics or features are considered. For visual receptors, the extent of visibility, numbers and types of affected viewers, degree of visual intrusion and distance of view are all relevant.

1.22 As with landscape impacts, the impact on visual amenity is a function of the *magnitude* of change and *sensitivity. Sensitivity* refers to viewer sensitivity and depends on the following:

- The length of viewing time e.g. a local resident with prolonged viewing opportunity will be more sensitive than a passer – by;
- Context of view, e.g. a viewer with an existing view of industrial structures will be less sensitive than a viewer with rural views, and
- Distance from the source.

1.23 The *magnitude* on the impact depends on the following:

- Obstruction or extent to which existing views are blocked;
- Intrusion or the extent to which existing views are impinged upon;
- Qualitative change to the landscape; and
- Number of people / viewers who are affected.

1.24 Impacts are described according to their severity and are termed as either *high, medium* or *low.* A high impact on visual amenity would generally arise where an impact of high magnitude affects viewers of predicted high sensitivity.

1.25 There are a number of different types of visual receptors which are summarised as:

- **Primary Transitory –** those who travel along a main route or footpath / bridleway and have prolonged and clear or filtered views towards the site and / or are in close proximity;
- **Secondary Transitory –** those using a less used route and who have filtered or limited views towards the site and / or may be in close proximity;
- **Tertiary –** those travelling along a route that is a further distance from the site but have filtered views towards the site which is seen in the wider context or those in closer proximity who have no view but experience impact on experiential characteristics;

- **Primary Visual –** have clear or filtered views and / or of close proximity and / or will have an impact on experiential characteristics; and
- **Secondary Visual –** have filtered or no views towards the site but may have an impact on experiential characteristics.

1.26 The following general criteria in tables 1.2 and 1.3 have been used in the assessment of significance and magnitude of any direct or indirect impact on landscape components.

Table 1.2 Sensitivity of Existing Landscape Components

Sensitivity	Landscape Component	Definition
HIGH	Scale	Enclosed or small scale diverse landscape.
	Quality	Where the landscape is largely intact, coherent and balanced.
	Value	Valued landscape character with important components of a particular character that are susceptible to small changes, or is in good condition, valued and / or distinguishing features, and / or considered attractive and valued nationally and locally.
	Cultural Heritage	Landscape contains category 'A' listed buildings, scheduled ancient monuments, historic gardens and designed landscapes.
	Level of Intrusion	Landscape contains no or very few intrusive or discordant features.
MEDIUM	Scale	Fairly enclosed with an element of landscape structure, although in parts, may be in decline.
	Quality	Where the landscape is no longer intact and coherent and / or may have evidence of alteration, degradation or erosion.
	Value	Landscape of moderately valued characteristics, reasonably tolerant of change, area in good condition with some distinguishing or valued features and / or of local importance.
	Cultural Heritage	Landscape contains 'B' or 'C' category listed buildings and / or sites listed on the Scottish sites and Monuments Records and National Monuments Record of Scotland or regional / local importance.
	Level of Intrusion	Landscape contains a number of confusing, discordant or intrusive features.
LOW	Scale	Open and expansive with little landscape hierarchy and structure
	Quality	Where landscape is of low quality and may be degraded.
	Value	Landscape is relatively unimportant and not valued locally. The nature to potential change is tolerant. Weak landscape structure and few valued or distinguishing features, large scale intervention, i.e tree felling, mineral extraction
	Cultural Heritage	Landscape contains archaeological sites of lesser importance and / or non-inventory gardens and designed landscapes.
	Level of Intrusion	Landscape contains many confusing, intrusive or discordant elements

Table 1.3 Magnitude of Impact

Magnitude	Definition
HIGH	When the development may result in a major change which is easily discernible to key features / elements of the baseline conditions such that there is a noticeable change to the landscape.
MEDIUM	Where the development may result in a moderate but still discernible change, loss or alteration to one or more of the key features / elements of base conditions such that the underlying landscape is partially changed.
LOW	Where the development may result in a minor loss / alteration to some of the key features / elements of the basic condition. The landscape components would remain largely intact and similar to pre-development circumstances.
NEGLIGIBLE	Where the development may result in a very slight loss / alteration to the baseline conditions.

1.27 The level of an effect is determined by a combination of sensitivity and magnitude of change which is demonstrated in the table 1.4 below.

1.28 PAN 45 recognises that *'the visual effect of turbines will be dependent on the distance which they may be viewed.'* Table 1.5 provides a general guide to the effect which distance has a perception of the development in the open landscape.

Table 1.4 Magnitude and Sensitivity Matrix for assessing overall effects

		Sensitivity		
		High	***Medium***	***Low***
Magnitude	**High**	High	Medium	Low
	Medium	Medium	Low	Negligible
	Low/ Negligible	Low	Negligible	Negligible

Table 1.5 General perception of a wind turbine in an open landscape

Distance	Perception
Up to 2km	Likely to be a prominent feature
2 – 5km	Relatively prominent feature
5 – 15km	Only prominent in clear visibility – seen as part of the wider landscape
15 – 39km	Only seen in very clear visibility – a minor element in the landscape

Defining the Study Area

1.29 The area of study corresponds broadly to the wider Zone of Theoretical Visibility (ZTV) of the proposed development has been defined at 15km radius from the site centre. Landscape and visual amenity outside this zone will remain largely unaffected by the proposals and when viewed in the wider context of the landscape will be seen as negligible as presented in the Zonal Visual Impact Assessment Plan, Drawing No. L01.

1.30 The study area was further defined for each part of the assessment process as follows:

- **Landscape and Visual Impact Assessment (LVIA)** – the study area was restricted to the application site, access routes, and the potential Zone of Theoretical Visibility (ZTV) from where there may be a view of the development at up to 15km distance from the site centre.
- **Cumulative Landscape and Visual Impact Assessment (CLVIA)** – following advice from North Ayrshire Council, the Wheatrig consented 2 no. turbine development is to be assessed cumulatively with the proposed development. The assessment has been accompanied by analysis of a computer model of the proposed wind turbine and existing landform (DTM) to produce ZTV graphics and photomontages of the proposed development. These graphics provide an indication of the proposed wind turbine as it would appear in the landscape once constructed.

1.31 The scope of the assessment has been established on the basis of consultation process and professional judgement and is summarised below.

Table 1.6 Scope of the Landscape and Visual Assessment

Landscape Issues	**Description**
Landscape Character	The effects of the proposed development on the landscape character and quality of the site area, as defined by the Ayrshire Landscape Character Assessment and site survey.
Landscape Elements	Direct physical effects on landscape elements.
Visual Issues	**Description**
Local Community	Views from the local rural community, particularly from sensitive receptors near the site and from local settlements, which lie within the ZTV. Views from roads and popular walker destinations and higher ground will also be taken into consideration.
Landscape Designations	Views from the 'countryside' area as illustrated in the Rural Map of the LDP or of notable importance as well as views from other areas of landscape character as provided by people.
Major transport routes & Recreational Paths	Sequential views from important roads and popular recreational routes, including cycle and footpaths where appropriate.
Cumulative Assessment	The cumulative assessment includes viewpoint assessment within the study area where simultaneous and / or successive views of more than one wind turbine may be achieved, and sequential cumulative assessment where more than one turbine may be viewed along transport routes (simultaneous or successive)

2.0 Existing Environment

2.1 This part of the LVIA refers to the existing landscape character, quality or condition and value of the landscape and landscape elements on the site and within the surrounding area, as well as general trends in the landscape change across the study area. A brief description of the existing land use of the area including reference to settlements, routes, vegetation cover, as well as landscape planning designations and local landmarks follow.

Site Location

2.2 The subject lands are located immediately west of Titwood Farm, with the B769 to the west, the A735 and rail line to the east and an unclassified road linking the two main roads named to the north east. The land holding, although within North Ayrshire sits in close proximity to the Ayshire border. The larger settlements of Kilmarnock, Stewarton and Irvine lie approximately 5.57 km, 3.35 km and 9.15 km, to the south east north east and south west respectively. Development of the proposed site presents the opportunity to release a wind turbine of a height of up to 35 metres to blade tip, type E-3120 Endurance, which will provide energy using a method that is renewable and does not involve atmospheric carbon pollution. This accords with current policy and is considered positive and beneficial.

Land Use and Land Cover

2.3 The site, of approximately 0.031 ha, within a land ownership totalling 24 hectares, lies within a field given over to pasture with strong field delineation by hedgerow and hedgerow trees supplemented by post and wire fencing. This coupled with a strong landscape hierarchy throughout the landscape context to the site, the land holding benefits from a sense of enclosure, even though there is little in the way of large woodland blocks or tree copses in proximity to the site.

2.4 The land holding broadly falls from the north east to the south west, with the land holding sitting at approximately 74 metres Above Ordnance Datum (AOD) along the north eastern field boundary, and gently falling to 67 metres AOD in the south western corner of the site, over a distance of approximately 303 metres.

2.5 In a broad sense and as described within the landscape character type Ayrshire Lowlands (see below) the land pattern is medium to large scale agricultural fields that create a gently undulating lowland landscape. However, when viewing the area locally, the land rises and dips, with localised ridgelines formed and the degree of enclosure offered by the existing roadside vegetation primarily means that from various locations, some in close proximity to the land holding and the site, views are limited.

Roads / Settlements / Dwellings

2.6 There are a number of roads which traverse the 'Ayrshire Lowlands' character area and from which there may be views towards the site and which accommodate a number of receptors. As mentioned above the prevailing topography and landscape vegetation structure does mitigate views to an extent, albeit not entirely. The roads identified are summarised in the table 2.1 below, but do include the many unclassified roads which are also important secondary transitory routes between settlements and individual dwellings and farm steadings which litter the landscape setting. The rail line lies approximately 1.15km to its nearest point to the east of the site. It is acknowledged therefore that potentially there a large number of transitory receptors who would have views towards the proposed development. However the majority of the views afforded would not be of a static nature.

2.7 Tables 2.2 and Table 2.3 recognise that there are a number of primary and secondary visual receptors who not only may have views towards the site but also may have effect on their experiential characteristics. This will be assessed in greater detail in section 4.0.

Table 2.1 Roads / Rail Line within 3.5 km of the Titwood Single Turbine Proposal

Road Name	Distance to the Site from nearest part of the road	Direction in relation to the site
B769	0.4km	North West
A735	1.28km	East
B751	1.9km	South
B778 Dalry Road	3.1km	North
B778 Holm Street	3.3km	North East
Kilwinning Road	1.8km (to nearest point)	North West
Rail Line	1.15km (to nearest point)	East

Table 2.2 Small settlements / Villages within the study area

Settlement Name	Distance to the site	Direction in relation to the site
Kilmarnock	5.57km	South East
Kilmaurs	2.3km	South East
Stewarton	3.35km	North East
Dunlop	6.31km	North
Auchentiber	5.23km	North West
Kilwinning	9.77km	West
Barrmill	8.77km	North West
Fenwick	6.78km	East
Crosshouse	4.9km	South
Drybridge	7.9km	South West
Dreghorn	6.73km	South West
Irvine	9.15km	South West

Table 2.3 Individual Dwellings / Farmsteads within 1.5km of the proposed Titwood Farm site

Individual Dwelling / Farmstead	Distance to the site	Direction in relation to the site
Mid Lambroughton	0.7km	North West
West Lambroughton	1.13km	West
Hillhead	1.4km	South West
Wheatrig	0.8km	South
Floors	0.58km	South East
Townhead of Lambroughton	0.69km	North
High Langmuir	1.38km	South
Laigh Langmuir	1.77km	South
Kilmaur Mains	1.84km	South West

Surrounding Landscape Character

2.8 To assist in the understanding and interpretation of this landholding and its wider setting, the appraisal draws on the findings of the Ayrshire Landscape Character Assessment No.111, published in 1998 by Land Use Consultants for Scottish Natural Heritage (SNH) as part of the nationwide programme of landscape assessments. This document classifies the land and its immediate setting as falling within the **'Ayrshire Lowlands'** character area. The key characteristics of the Ayrshire Lowlands area are:

- Predominantly pastoral, with arable farmland on the lower and better soils;

- Historically peat bogs which have been drained and reclaimed for agriculture, although some peat areas still remain;
- Regular shaped field patterns enclosed by beech / hawthorn hedgerows which are in good condition; and
- Many field boundaries are marked by mature hedgerow trees, with beech trees predominating.

2.9 The landscape has a 'woodland character', although woodland blocks are not a common feature in the landscape. Rather this is achieved by the hedgerow with hedgerow trees that often form avenues along the minor roads, giving a sense of enclosure and a rural feel.

2.10 As well as several major road corridors across this landscape type (A77, A735, A736), there are a number of 'B' class roads and unclassified roads, which link the scattered number of individual dwellings and farmsteads.

2.11 With regards to 'tall structures', with the Landscape Character Assessment it states *"to encourage the development of a regional strategy for renewable energy, including wind power, in order that the most appropriate types of development come forward"* and *"underground cabling solutions should be considered in preference...overall aim of strategies should be to conserve... the areas legacy of hedgerows and hedgerow trees."* There is some limited potential for small scale wind power development associated with local consumption.

Scottish Natural Heritage Designations & Cultural Features

2.12 Within the 5 km study area of the turbine there are no national and international nature designations. However, it is recognised that out with this area, but within the ZTV, lies a number of Sites of Special Scientific Interest (SSSI) and Special Areas of Conservation (SAC) which are presented in table 2.4 below. Policy ENV9 Nature Conservation of the LDP states that for international designations *"proposals will not accord with the LDP unless the appropriate assessment indicates that it will not adversely affect the integrity of the site". "Proposals which would affect national designations shall not accord with the LDP unless the objectives of the designation and overall integrity of the area will not be compromised and that any unacceptable impacts on the qualities for which the area has been designated are outweighed by economic benefits of national importance."*

Table 2.4 Scottish Natural Heritage Designations within the ZTV of the Titwood Single Turbine Proposal

Category	Name	Size / Attributes	Distance to site / Direction from site	Sensitivity Rating
SSSI	Dykeneuk Moss	61.65ha – Raised Bog	5.37 km / North West	Medium
SSSI	Cockinhead Moss	48.4 ha – Raised Bog	6.7 km / North West	Medium
SSSI	Bankhead Moss, Beith	32.5 ha – Raised Bog	8.48 km / North West	Medium
SSSI	Trearne Quarry	43.72 ha – Lower Carboniferous	10.63 km / North West	Medium
SAC	Dykeneuk Moss	61.65 ha –	5.37 km / North	High

		Active Raised Bog & Degarded Raised Bog	West	
SAC	Cockinhead Moss	48.4 ha – Active Raised Bog & Degraded Raised Bog	6.7 km / North West	High
SAC	Bankhead Moss	32.5 ha – Active Raised Bog	8.48 km / North West	High

Cultural Heritage

2.13 Within the study area of 1 km a number of historical features have been acknowledged, as presented in the Historic Asset Plan, Drawing No. HAP01-ZTV. Within the LDP, policy HE2 Listed Buildings states that *"proposals for a development of a listed building or its setting which would have an adverse impact...on its setting...shall not accord with the LDP.* Policy HE4 a) Scheduled Monuments states that *"proposals for development which would adversely affect the site or setting of a Scheduled Ancient Monument shall not accord with the LDP"* and for b) Archaeological Sites *"proposals for development which may have an unacceptable impact on sites of archaeological significance shall not accord with the LDP."* Policy HE5 for Historic Gardens and Designed Landscapes states that *"proposals for development which would adversely affect historic gardens and designed landscapes included in the inventory of gardens and designed landscapes in Scotland shall not accord with the LDP."* It will be shown through the assessment, with regards to historical features in proximity to the site and indeed within the ZTV, the proposal will be seen not to detrimentally detract from the setting and the feature itself.

2.14 A number historically recorded sites fall within the blade ZTV. With regards to assessing those features that would be possibly affected the most the study area has been limited to 1 km of the site. The cultural heritage features are listed in table 2.5 below and are graphically represented in the Historic Assets Plan, Drawing No.HAP01-ZTV.

Table 2.5 Cultural Heritage

TITWOOD FARM – CULTURAL HERITAGE		
SCHEDULED ANCIENT MONUMENTS		
Name	**Category**	**Sensitivity Rating**
Law Mount, Motte and Bailey – 1.69km NE		High
LISTED BUILDINGS – within @ 1km of the site		
Name	**Category**	**Sensitivity Rating**
Townhead of Lambroughton – 0.68km N	B	Medium
Chapeltoun House (Hotel) – 1.25km NW	C(s)	Low
Chapeltoun Bridge – 1.25km NW	C(s)	Low
Standalone House (Lodge) – 1.6km NW	C(s)	Low
West Lambroughton – 0.6km SE	C(s)	Low
NATIONAL MONUMENTS RECORDS OF SCOTLAND – in @ 1 sq.km of site		
Name		**Sensitivity Rating**
Townhead of Lambroughton	Farmstead	Medium
Floors	Farmstead	Medium
Chapeltoun – 840m NW	Chapel	Medium
Chapeltoun Bridge	Bridge	Medium

West Lambroughton	Farmhouse	Medium
Chapeltoun House Hotel	Hotel	Medium
Chapeltoun House Hotel Lodge	Lodge	Medium
Chapeltoun House Hotel Garden	Garden	Medium
Chapeltoun House, Monks Well – 840m NW	Well	Medium
Chapel Hill – 1km NW	Human Remains, Mound	Medium
SCOTTISH SITES & MONUMENT RECORDS – in @ 1 sq.km of site		
Name		**Sensitivity Rating**
Townhead of Lambroughton – 0.85km NE	Farmhouse	Medium
Floors – 1km SE	Farmhouse	Medium
Dean Castle – 0.5km NW	Designed Landscape	Medium - High
Lochend – 0.8km SW	Farmstead	Medium
Buiston / Lochside	Logboat	Medium
Annickwater / Bankend	Farmstead	Medium
Chapeltoun House (Hotel) Garden	Garden	Medium
Chapeltoun House (Hotel) Lodge	Lodge	Medium
Standalane Lodge / Standalane Farm	Steading	Medium
Chapeltoun	Chapel	Medium
Chapeltoun Bridge	Bridge	Medium
West Lambroughton	Farmhouse	Medium
Kilmaurs Main	Enclosure, plantation, rig	Medium
Chapel Hill	Mound, human remains, motte(possible)	Medium
Chapeltoun Monks Well	Well	Medium
Law Mount, High Castleton	Mound: motte and Bailey Castle (possible)	Medium
Buiston / Buston / Mid Buiston / Lochside / Biston / Swan Knowe	Crannog, logboats, oar	Medium
GARDENS AND DESIGNED LANDSCAPES		
Name		**Sensitivity Rating**
Rowallan – 81 ha. – 3km East of site		High
Annick Lodge – 32ha. – 4.29 km South West of the site		High

3.0 Landscape Resources & Mitigation

3.1 The proposed development will result in the loss of area of pastoral land. However, when viewed in the wider context, pasture cover remains an abundant resource across the landscape. Once constructed the pastoral resource can be reinstated and used as before up to the base of the turbine proposal.

3.2 Having defined the effect of the proposed wind turbine on the character of the landscape, considerations of the factors in the design and location can mitigate the potential impacts. The number of visual elements over the twenty year operational phase has been kept to a minimum. Furthermore, the location, size, style and appearance of the proposal has been designed and sited to minimise its impact on the landscape and visual amenity. This can be achieved by adopting the following mitigating measures:

- selecting the smallest design possible for the sub-station;
- locating the sub-station as near as possible to the turbine to reduce the overall footprint;
- use underground caballing as far as practical;
- minimising the track length and width;
- utilising an existing site access; and
- connecting to the existing electricity line passing in close proximity to the site.

3.3 The site benefits from an existing strong landscape structure so all steps would be taken to prevent any degradation of this resource. In terms of mitigation, little is required in additional landscaping. However, the measure that would be provided would be:

- Re-instating any lost landscape resource including hedgerow and hedgerow trees through the construction (not including the entrance). Any existing landscape resource lost at the entrance will be replaced with compensatory planting elsewhere on the land holding.

3.4 With the application of a reinstating strategy, it is considered that a renewable energy development proposal could be successfully assimilated into the existing landscape with as minimal landscape impacts as possible. Any existing landscape resource that is lost at the entrance will be replaced with compensatory planting elsewhere within the land ownership, for example, along existing field boundaries.

4.0 Appraisal of Likely Landscape & Visual Effects

4.1 Landscape Effects are defined by the Landscape Institute as *"changes to landscape elements, characteristics, character, and qualities of the landscape as a result of development".* The potential landscape effects, occurring during the construction and operation period, may therefore include, but are not restricted to, the following:

- Changes to landscape elements: the addition of new elements or the removal of trees, vegetation, and buildings and other characteristic elements of the landscape character type;

- Changes to landscape quality: degradation or erosion of landscape elements and patterns, particularly those that form characteristic elements of landscape character types;

- Changes to landscape character: landscape character may be affected through the incremental effect on characteristic elements, landscape patterns and qualities and the cumulative addition of new features, the magnitude of which is sufficient to alter the overall landscape character type of a particular area; and

- Cumulative landscape effects: where more than one wind turbine may lead to a potential landscape effect. Development may have a direct (physical) effect on the landscape as well as an indirect effect or effect perceived from out with the landscape character area.

4.2 It is acknowledged that views will be obtained of the site to a greater or lesser degree, from viewpoint locations in proximity of the site. It can be argued that due to the existing prevailing topography and landscape structure, views however will be mitigated. To this extent views may be afforded to the blades and nacelle and parts of the column as opposed the development in its entirety including ancillary buildings at the base of the structure.

Visual Receptors

4.3 There are a number of different types of visual receptors which are summarised as below and have been described in greater detail in paragraph 1.25:

- **Primary Transitory**
- **Secondary Transitory**
- **Tertiary**
- **Primary Visual**
- **Secondary Visual**

Visual Impact Assessment

4.4 In general the proposed site at Titwood Farm has a varying zone of theoretical visibility towards the proposed 35m to blade tip. However, the site and surrounding landscape context is well contained by the strong hierarchy of existing landscape framework, primarily of hedgerow, hedgerow trees and small blocks of tree copses and woodland. The ZTV does not take this abundant landscape resource into account, so in reality the theoretical visibility towards the site is greatly reduced.

Visual Impact from the North

4.5 In general terms, land that is lying at a slighter lower elevation following watercourses have no visibility towards the site. This is further mitigated with structural vegetation that follows the associated watercourse. Views from roads, for example, B778 and B769 and land lying at a higher elevation have varying degrees of visibility towards the site. Many of the minor unclassified roads to the north will have limited to negligible views towards the proposed development as these roads predominantly have structural roadside vegetation which will mitigate, if not screen the view in its entirety. In terms of assessing the overall impact on sensitivity and magnitude, the landscape character would have a *medium - high* rating, in that the scale is fairly enclosed with an element of landscape structure, although in parts this landscape becomes more intimate and is diversely small scale. It is also acknowledged that to the north lies a Scheduled Ancient Monument (Law Mount) which itself rates a high sensitivity rating and a Listed Building (Townhead of Lambroughton), with both being within the zone of visibility.

4.6 To the north there are a number of roads, which while relating reasonably well to the existing landform. It is recognised that there will be a number of receptors that will attain views, in certain locations, of the proposed development, but the majority of the identified receptors will be travelling at speed and be transitory and therefore the impact from the proposal is seen to be *low.*

4.7 In terms of assessing the magnitude of impact that the proposed development would have on views from the north, it is acknowledged that there will be a change to the base conditions, but the impact magnitude is perceived as being *medium* due to the proximity of the views afforded toward the site. The overall magnitude is reached by the *lower* impact of the transitory receptor against the *higher* magnitude rating given to Scheduled Ancient Monument and Listed Buildings and their settings. However this is counterbalanced by the fact that the views can only be seen in parts from roads to the north and seen at speed. Views from the Scheduled Ancient Monument, while slightly elevated are only approximately 15 metres above the land holding AOD and at a distance of approximately 2 km, with existing hedgerow and hedgerow field boundaries, mitigating the magnitude of impact. Views from Townhead of

Lambroughton and Chapeltoun House will change, due to its proximity and that the view is at a slightly higher elevation, although it is perceived that the view afforded will be seen within a larger landscape context, with Photomontage 6, representing the view that would be obtained from Townhead of Lambroughton.

4.8 The overall level of effect is therefore determined to be *low - medium* visual impact from the north. Perceived impact will be mitigated by existing landform and vegetation structure, coupled with proactive measures, to ensure that any existing vegetation on site or in the proximity of the site is retained or replaced.

Visual Impact from the South

4.9 To the south of the proposed single turbine the visibility is determined by the existing landform and built form primarily. Existing vegetation to the south is predominantly that associated with delineating field boundaries. There are a small number of tree copses affiliated with farmsteads and Annick Water, but no large blocks that may mitigate any views afforded of the proposed development.

4.10 In terms of assessing the overall impact on sensitivity the landscape character to the south of the site would has a *low - medium* rating, in that the scale of the landscape component varies from fairly enclosed with elements of landscape structure to areas that are more open. It is acknowledged that a number of individual dwellings will afford a view towards the proposed development, with the proximity to the development having a determination on the overall assessment of the sensitivity and magnitude.

4.11 A small number of access roads to farmsteads as well as the unclassified road linking Cunninghamhead and Kilmaurs, lie to the south of the site. However, as illustrated in the Zonal Visual Impact Assessment Plan, Figure L01, many parts of the mentioned routes have either no visibility or have visibility in narrow stretches, towards the site. Any stretches of road perceived to have visibility towards the proposed turbine would have further mitigation from the existing mature trees associated with farmsteads, coupled with the mature hedgerow and hedgerow tree landscape characteristic to the south of the site. It is also acknowledged that a pedestrian cycle route is located to the south of the site, as identified on the Landscape Asset Plan, Drawing No. LAP01-ZTV, although it is shown on Drawing No. L01 Zonal Visual Impact Assessment, that this route does not fall within any areas of visibility.

4.12 In terms of magnitude of impact on the identified routes that the proposed single turbine would have on views from the south, it could be perceived as being *negligible*, in that the development will result in a very slight alteration on baseline conditions, but with existing mitigating factors, will perceivably have no impact.

4.13 Photomontage No.2 (taken from High Langmuir, approximately 1.8km to the south), shows the view afforded towards the proposed development, but also cumulatively shows Fine Energy single turbine proposal in relation to two consented turbines at Wheatrig, visible on the horizon line. The view obtained is that of the nacelle and blades as opposed to the structure in its entirety.

4.14 Overall the significance of the proposed development on views from the south will be *negligible*, although it is recognised that within closer proximity, primary visual receptors, such as residents, could be perceived as having higher overall effects.

Visual Impact from the East

4.15 Views from the east are slightly reduced, with views afforded in small enclaves or in closer proximity. This primarily is due to prevailing landform and field boundary landscape structure. Discordant elements such as the A735 and the rail line will also mitigate views to an extent from the east. There is also a 11kv electricity line which is approximately 3km to the east.

4.16 In general, the landscape setting to the east (although not the immediate setting) has a more open and expansive landscape setting with fewer landscape elements and a number of intrusive discordant elements which would rate it as having a *lower* sensitivity rating on its landscape components. It is acknowledged that the Rowallan Garden and Designed Landscape sits approximately 3km east of the site, but this is shown not to be within a visibility zone on the ZTV.

4.17 Immediately east of the site, the unclassified roads have a strong landscape structure of mature hedgerow and hedgerow trees, which means that views are 'tunnelled'. When in leaf, views are extremely limited, only opening up where field gates are located. Photomontages 3 and 4 demonstrate this case in point. The magnitude of impact is deemed as being *medium*, in closer proximity and *lower* when viewing beyond the A735. In determining the overall significance of the proposed development on views from the east, it is seen as being *low - negligible.* Very small limited points along the unclassified roads where there are gaps will have an overall significance assessment of *low – medium*, due to proximity and lack of vegetation at these limited points.

Visual Impact from the West

4.18 The Zonal Visual Impact Assessment, Drawing No. L01 demonstrates that there could be potential views towards the site from the west and north west, up to 6km away. However the ZTV does not take into account any built form or existing vegetation structure. To the west and north west of the site lies extensive vegetation associated with Lugton Water, as well as woodland, shelterbelt and tree copse planting at Kennox Moss and Bloak Moss which will all help mitigate perceived long distance views from the west. More views are afforded towards the site from the immediate west, although these again are mitigated by the landscape resource associated with Annick Water and the roadside vegetation commonly found in this landscape area. The sensitivity of the landscape components have been given a *medium – high* rating, in that the character feels more enclosed and intimate.

4.19 It is acknowledged that there are views from West Lambroughton (Category C Listed building) towards the site due to its proximity coupled with the prevailing topography and landscape structure as presented in Photomontage No 7.

4.20 The visual receptors to the west are numerous in number, both primary and transitory, due to the high number of individual dwellings, farmsteads and tourist accommodation and number of roads that traverse the landscape. However, there are no buildings of merit or landscape designations that will warrant a higher sensitivity rating. With this in mind, the magnitude of impact is perceived as being *medium – low,* due primarily to the lack of large scale woodland or shelterbelt planting which would add a beneficial mitigation. It is deemed that the overall significance of the proposed development is therefore *low – negligible,* other than those properties that are in close proximity where the overall assessment would be higher.

Visual Impact on the Landscape Character Area

4.21 The proposed development will add a single turbine to the undulating landscape which forms part of the 'Ayrshire Lowlands' character type.

4.22 Using the GLVIA criteria for evaluating sensitivity (Table 1.3) the following is deemed to apply to the local area surrounding Titwood Farm.

Table 4.1 Sensitivity of the Local Landscape Character

Landscape Element	**Sensitivity Rating**
Scale: Undulating lowland landscape; Predominantly pastoral with strong field boundaries of hedgerow and hedgerow trees; Small areas of woodland and policy planting associated with estates of grander buildings	High - Medium
Quality: Landscape is largely intact, but does have evidence of alteration in parts.	High - Medium
Features of Cultural Heritage: Area contains Gardens and Designed Landscapes approximately 3km east of the site , Scheduled Ancient Monument (1.69km) and Category B Listed Buildings	High
Level of Intrusion: Contains a number of discordant elements, roads, rail line, electricity lines	Medium
Overall Landscape Sensitivity	**High - Medium**

4.23 The magnitude of effect on the local landscape character is assessed below using Table 1.4 criteria.

Table 4.2 Magnitude of effect on Local Landscape Character

Landscape Property	**Magnitude of Effect**
Change to Landscape Character: As a single turbine development in this undulating lowland the overall character will experience a moderate but discernible change, such that the underlying character, composition and quality will be partially changed.	Medium - High
Change to Landscape Composition: While there may be some locally significant change, the overall effect on the landscape composition is less significant.	Medium
Change to Landscape Quality: The development may result in a small but discernible change to features / elements of the basic conditions when viewed from a medium distance. It is recognised that this significantly heightens when in closer proximity.	Low - Medium
Overall Landscape Magnitude	**Medium**

4.24 As the local landscape character is expected to be affected by the project to a medium - high sensitivity extent and low magnitude, it is considered the significance of the effect on the character of the landscape is **medium.**

Roads

4.25 The transitory network within the study area of the site has a hierarchy of roads, therefore a varying number of receptors. In general, if a view towards the site can be seen from a road, it is given a low to medium sensitivity rating. This varies dependant on the type of road and the distance it is to the site. The A735, B769 and B778 all lie within 3km of the site, but the receptors using it travel at speed and due to the prevailing topography and vegetation structure, only glimpsed views are seen, therefore has a *low* sensitivity rating. When travelling along an unclassified road, the view when afforded tends to be within a longer time frame, due to the slower speed of the receptor, which means the sensitivity impact is of a *medium* rating. However many of the unclassified roads in this character area have a rural feel and benefit strongly from being hedgerow lined with mature hedgerow trees, which in the most part, are in a very good condition which provide a large degree of screening. The magnitude of impact would be *low - negligible*, dependant on the proximity of the viewer and the context in which the view is seen.

4.26 The overall significance of the perceived impact from roads is deemed as being *negligible,* although it is recognised that the overall impact from parts of the A735 to the east, as presented in Photomontage No.8 and B769 to the west and north, as shown in Photomontages 6 and 7 and the unclassified road directly north east of the site is *low – medium*, due to their proximity. However there are open direct views from certain locations that can be seen of the site, as illustrated in Photomontage 5. In broad terms visibility is greater from the north and west, and reduced from the south and east, primarily due to the prevailing topography.

Settlements

4.27 The appraisal of likely effects considers firstly landscape effects and secondly visual effects, in accordance with established best practice. The appraisal is informed by a number of supporting graphics, including a Zone of Theoretical Visibility (ZTV) diagram, Drawing no. L01, Zonal Visual Impact Assessment Plan. The ZTV provides an indication of the areas surrounding the site from which there may be visibility of the highest part of the wind turbine. This has been produced at a scale of 1:150,000 with the defined 15km study area, but takes no account of any built or natural feature which may mitigate views.

Table 4.3 Population centres, Hamlets, Dwellings within the study area ZTV where it is proposed that part or all of the turbine will be visible (not taken into account existing mitigating factors such as vegetation etc)

Population Centres	**Distance**	**Overall significance of perceived impact**
Kilmarnock	5.57km	No Visibility (other than outer NW edge)
Kilmaurs	2.3km	Medium - High
Stewarton	3.35km	Medium
Dunlop	6.31km	No Visibility
Auchentiber	5.23km	Medium
Kilwinning	9.77km	Low - Negligible
Barrmill	8.77km	No Visibility
Fenwick	6.78km	No Visibility

Crosshouse	4.9km	Low - Negligible
Drybridge	7.9km	Low
Dreghorn	6.73km	Low
Irvine	9.15km	Low
Dwellings	**Distance**	**Overall significance of perceived impact**
Mid Lambroughton	0.7km	High
West Lambroughton	1.13km	High
Hillhead	1.4km	Medium - High
Wheatrig	0.8km	Medium
Floors	0.58km	Medium
Townhead of Lambroughton	0.69km	High
High Langmuir	1.38km	Low
Laigh Langmuir	1.77km	Low
Kilmaur Mains	1.84km	Low - Negligible

4.28 The project is located to 2.3 km from the nearest settlement (i.e Kilmaurs) which is predicted to experience some views of the project and be the most affected centre of population. The nearest primary receptor would be those residing at Floors Farm to the east of the site and who will experience views and impact on their experiential characteristics.

4.29 Although eighteen number of receptors(villages and individual dwellings and farmsteads) have been identified within 9.7km of the site and within the ZTV study area, four are deemed as having no visibility, and five are predicted to experience limited to narrow clear views to the project.

4.30 It has to be noted that in practice, the visibility is likely to be significantly reduced due to local screening (i.e trees, building, landform etc.)

Visual Impact on Landscape Designations and Historical Elements

Landscape Designations

4.31 The site does not sit within any landscape designations therefore a *negligible* sensitivity rating can be applied to the landscape context. The magnitude of impact of the proposed single turbine on the landscape designations is seen as *negligible*, as activity can be carried on as pre- construction after the turbine is erected and will have little perceived impact. The overall effect could be perceived as *negligible.*

Historical Designations

4.32 There are no direct impacts on archaeological, cultural heritage or sites with important flora or fauna attributes as none lie within the site area. With regards to those surrounding the development, no significant impacts are predicted and the proposal accords with all relevant policies of the development plan. As presented in table 2.4 Cultural Heritage Features, there are a number of historical sites that lie in proximity to the site. The level of potential impact on the cultural heritage features are summarised in the table below.

Table 4.4 Potential Impact on Cultural Heritage Features

TITWOOD FARM – CULTURAL HERITAGE			
SCHEDULED ANCIENT MONUMENTS			
Name	**Sensitivity**	**Magnitude**	**Overall Assessment**
Law Mount, Motte and Bailey	High	Low	**Low**
LISTED BUILDINGS			
Name	**Sensitivity**	**Magnitude**	**Overall Assessment**
Townhead of Lambroughton	Medium	High	**Medium**
Chapeltoun House (Hotel	Low	Medium	**Negligible**
Chapeltoun Bridge	Low	Medium	**Negligible**
Standalone House (Lodge)	Low	High	**Negligible**
West Lambroughton	Low	High	**Low**
NATIONAL MONUMENTS RECORDS OF SCOTLAND			
Name	**Sensitivity**	**Magnitude**	**Overall Assessment**
Townhead of Lambroughton	Medium	High	**Medium**
Floors	Medium	Medium - High	**Low – Medium**
Chapeltoun	Medium	Medium	**Low**
Chapeltoun Bridge	Medium	Medium	**Low**
West Lambroughton	Medium	High	**Medium**
Chapeltoun House Hotel	Medium	Medium	**Low**
Chapeltoun House Hotel Lodge	Medium	Medium	**Low**
Chapeltoun House Hotel Garden	Medium	Medium	**Low**
Chapeltoun House, Monks Well	Medium	Medium	**Low**
Chapel Hill	Medium	Low - Medium	**Negligible**
SCOTTISH SITES & MONUMENTS RECORDS			
Name	**Sensitivity**	**Magnitude**	**Overall Assessment**
Townhead of Lambroughton	Medium	High	**Medium**
Floors	Medium	Medium - High	**Low - Medium**
Dean Castle	Medium - High	Medium	**Low - Medium**
Lochend	Medium	Medium	**Low**
Buiston / Lochside	Medium	Negligible	**Negligible**
Annickwater / Bankend	Medium	Low - Negligible	**Negligible**
Chapeltoun House (Hotel) Garden	Medium	Medium	**Low**
Chapeltoun House (Hotel) Lodge	Medium	Medium	**Low**
Standalane Lodge / Standalane Farm	Medium	Medium - High	**Low – Medium**
Chapeltoun	Medium	Medium	**Low**
Chapeltoun Bridge	Medium	Medium	**Low**
West Lambroughton	Medium	Medium	**Low**
Kilmaurs Main	Medium	Negligible - Low	**Negligible**
Chapel Hill	Medium	Low - Medium	**Low - Negligible**
Chapeltoun Monks Well	Medium	Medium	**Low**
Law Mount, High Castleton	Medium	Low	**Negligible**
Buiston / Buston / Mid Buiston / Lochside / Biston / Swan Knowe	Medium	Negligible	**Negligible**
GARDENS AND DESIGNED LANDSCAPES			
Name	**Sensitivity**	**Magnitude**	**Overall Assessment**
Rowallan	High	Low - Medium	**Low - Medium**
Annick Lodge	High	Low	**Low**

4.33 The Titwood Farm Renewable Energy Proposal will not have a significant visual impact on or from features of cultural importance. It is recognised that there are sites within 2km of local and national significance, with their individual overall assessment tabled above. In broad terms it is deemed that the Scheduled Ancient Monument (SAM) will overall have low overall assessment on its sensitivity and magnitude of impact, primarily because it is located on the edge of the visibility zone with layers of topography and existing vegetation mitigating views to and from the proposed development. In accordance with Policy HE4 of the LDP it is considered that due to the mitigating factors the proposed development will not adversely affect the site or the setting of the SAM.

4.34 The overall assessment on listed buildings ranges from medium – negligible. It is recognised that Townhead of Lambroughton (Category B Listing) has a higher overall assessment to their sensitivity and magnitude of impact as they are within the higher visibility zone of the proposal. There are likely to be changes to the setting of the building, and acknowledge this may contravene policy HE2 of the LDP. However, it could be argued that the economic benefits and the diversification of rural activities, as in accordance with Policies ENV5 and ENV6 countermeasure this. Other listed buildings within the study area of the site, as shown in the Historical Assets Plan, Drawing No.HAP01-ZTV all have an overall assessment of low – negligible and will be in accordance with Policy HE2 of the LDP.

4.35 Broadly the overall assessments for sites designated under the National Monuments Records of Scotland and Scottish Sites and Monuments are low – negligible. There are a very small number of sites that have a medium overall assessment, primarily due to proximity and being perceived as being within the visibility zone. However, the surrounding landscape has a strong field boundary and roadside vegetation structure, which will go towards screening and mitigating views to and from sites and the proposed single turbine. It is therefore deemed that these recorded sites will accord with Policy HE4 of the LDP, in that the proposal will not have an unacceptable level of impact on their settings.

4.36 It is also acknowledged that the Garden and Designed Landscape (GDL) of Rowallan and Annick Lodge, although having a high sensitivity rating, their overall assessments are valued at low – medium and low respectively. The ZTV shows that there may be views afforded towards the site, but due to the distances involved and the existing structural vegetation layers that are between the GDL's and the proposed development, and in accordance with Policy HE5, it is surmised that the development will not adversely affect these areas.

4.37 In the instances that the proposal would be visible from sites at a distance, it would be a relatively minor impact on the skyline and indeed, would be temporary given the 20 year operational lifetime of the scheme. Consequently the scheme will not detract from the appreciation or understanding of archaeological sites and monuments and other features of historical and cultural interest.

4.38 The proposed development would not significantly alter the character of the landscape. In fact the landscape can successfully absorb this new development without eroding its key characteristics.

5.0 Cumulative Assessment Impact

Evaluation of cumulative landscape and visual effects

5.1 The level and significance of cumulative landscape and visual effects is determined in the same way as the main LVIA. The additional criteria required to evaluate cumulative effects relate to the certainty of effects of currently built projects, the likely effects of approved but not built projects, and the uncertain effects of known proposed projects currently within the planning system.

5.2 In negotiation with North Ayrshire Council we have been advised to only take into account the consented 2 no. turbine development at Wheatrig, which is approximately 0.95 km to the south east. A Cumulative ZTV (Cumulative ZTV Plan, Drawing No. CUM-ZTV01) has been produced indicating where a simultaneous or successive visibility may theoretically occur between the proposed Titwood Farm single turbine development and the two consented turbines at Wheatrig. While the character area has been perceived as having a medium overall sensitivity and magnitude rating, cumulatively it does have the capacity to absorb further development.

5.3 It is shown that the vast majority of areas within the ZTV for the proposed development at Titwood Farm, also cumulatively show views of the consented development at Wheatrig. Generally the edges of the proposed cumulative zones for both developments are areas that have views towards the consented development at Wheatrig only. It should be acknowledged however, that like the ZTV, the cumulative ZTV does not take into account mitigating factors such as built form and the existing prevailing landscape resource, which in some locations will prevent views towards both developments.

5.4 The capacity to absorb cumulative elements is primarily due to the existing prevailing topography and landscape structure. These elements visually reduces any perceived cumulative impact that may occur between not only the proposed development at Titwood Farm with other intrusive features in the landscape, but also the proposed single small height turbine with other turbines that have been consented and of which were advised to include in the cumulative assessment.

Site Tracks and Sub-Station Building

5.5 In addition to the turbine there will be a small visual impact from the site tracks and the sub-station / control building. The small size of the building coupled to the likely location suggests that it is only likely to be visible from a few stretches on the ‘B’ and the unclassified roads within approximately 2 km of the site. On this basis the significance of the effect would be negligible.

Photomontage Viewpoint Analysis

5.6 The photomontage locations are shown in Drawing VP01 Viewpoint Locations and the cumulative photomontages are illustrated in a range of Photomontages, primarily 2, 4 and 5. The assessment has considered the following views:

- Photomontage 2 – Looking north from the unclassified road at High Langmuir;
- Photomontage 4 – Looking west from Titwood Cottage; and

- Photomontage 5 – Looking south from the B769.

These represent a typical range of setting, directions and distances from the project and are believed to give a good overview of the context that the project and other cumulative developments will sit within.

5.7 All of the above examples of Photomontages show the proposed development and the consented development at Wheatrig and the type of view that could be afforded. From the south the proposed development is seen on the horizon line, with the turbines at Wheatrig and appears as a cluster development. There is little in the way of existing mature tree blocks which may mitigate views. Views from the east, as represented by Photomontage 2, show that although both developments can be seen, the cumulative consented development at Wheatrig is mitigated by the existing landscaping which delineated field boundaries and the falling elevation. Over time, this view will be further mitigated as the existing landscape resource matures. The most prominent views are from the west and south, when in closer proximity, as illustrated by Photomontage 5. However, due to the siting of the turbines both the proposed and consented development is seen as a cluster, as opposed to sequential development, which is favourable.

6.0 Conclusions

6.1 In general the characteristics of the site and its immediate setting offer a positive opportunity to provide renewable energy within the 'Ayrshire Lowlands character area. Although the proposal will result in a change in the landscape character and experiential experience of the site and the surrounding context, it is considered that the impacts on the landscape character will be minimised and mitigated in a positive manner and, the limited loss of pasture land, hedgerow and possibly hedgerow trees will have a negligible impact on the wider landscape resource.

6.2 On a local level the proposed development site is visible, particularly from the north and west in close proximity. This is primarily due to the prevailing topography, although in parts there are layers of existing vegetation in the fore and middle ground views. The existing vegetation in the majority is mature hedgerows and hedgerow trees with few large blocks of woodland, tree copses or shelterbelts, which allow views towards the site. However, from the east and south views are more limited. In close proximity, generally views of the site can only be seen through gaps in hedgerows. In this regard, it is perceived that the impact would be *low – medium*, on the receptors using these routes.

6.3 It is acknowledged that there will be a level of inter-visibility between the transitory receptors using the unclassified roads, 'B' and 'A' roads that are within the study area and more importantly, the primary receptors residing in properties that are in close proximity to the development. It is acknowledged that those residing in properties to the north and west within 2 km of the proposed development will have clear uninterrupted views towards the turbine, primarily due to the gently falling land from north to south. Those to the east and south of the site, in closer proximity, will afford some view towards the development. However, due to the prevailing topography coupled with the existing vegetation structure and mitigation proposals that will proactively minimise any perceived visual impact, views of the turbine in its entirety will be limited and the impact lessened in this regard. In assessing the overall significance of impact, in a local context and within 2 km of the site it would be deemed that from the north and west the impact would be *medium* and from the east and south *low*. There may be a

perceived impact on the individual properties and farm steadings located close to the site. As such, careful consideration will be given to the scale, siting and form of the proposed elements within the development, for example, the footprint size, turbine design, colour and access. This coupled with further mitigation measures, such as the reinstatement of hedgerows or planting of hedgerow trees after construction, will be used to ensure local impacts minimised

6.4 It is also acknowledged that longer distance views towards the site from the north west in particular, may be seen. However, the site would be seen in a wide landscape context with layers of middle ground containing existing vegetation structure including large blocks and shelterbelt planting, field boundary delineation and built form including roads, and electricity pylons, that it could be deemed that the impact would be *negligible.* Views from longer distances to the north, east and south are less so.

6.5 There are a number of cultural historical features within 2 km of the site which are detailed in table 2.5. Broadly the proposed development will have little or no impact on these features, although it is recognised that Townhead of Lambroughton and West Lambroughton both have an overall sensitivity and magnitude of impact rating of medium. This is primarily due to initially having a higher sensitivity rating in respect of Townhead of Lambroughton (Category B listed) and the prevailing landform and lack of existing mitigating vegetation structure to provide screening. However, on a listing of thirty five features, with two being assessed as medium, coupled with the councils LDP policies on Economic Development or diversification in rural areas (ENV6), it is argued that overall the benefit of the renewable energy proposal outweighs the small perceived impact.

6.6 It is recognised that there are Scottish Natural Heritage designations within the 15 km ZTV of the site, but it has been assessed that there will be a negligible impact, if any, on these sites due to the distances involved and the level of vegetative layers coupled with the prevailing topography between them and the site.

6.7 From the outline assessment of landscape effects it is considered that the landscape will have the capacity to absorb the proposed development of a single turbine without any significant adverse effects on the existing, intrinsic landscape character, composition and quality of the area. The landscape impact within the character area surrounding the site is considered to be of medium significance in the local context and low to negligible in the wider context.

6.8 Cumulatively the proposed site can be seen with the consented 2 number turbine site at Wheatrig, which is located approximately 0.7 km to the south east. However they are seen as a ‘cluster’ rather than two separate developments, which means that any sequential views afforded are diminished.

6.9 The majority of the cumulative ZTV shows that both the proposed single turbine development at Titwood Farm and the consented 2 turbines at Wheatrig, can be shown in most locations, with only the outer edges of the visibility zones, deeming that only those at Wheatrig can be seen. The majority of the views are within a 2 – 3km radius of the site at Titwood, although there are small pockets within this range that are deemed to have no views. Views afforded are further mitigated by the existing built form and structural vegetation present. Cumulatively the views lessen towards the 5km radius, with the majority of the views being towards the south west and north east. Again, due to mitigating factors coupled with the distances involved it is perceived that the overall impact cumulatively of both the proposed and consented development will be negligible.

6.10 From the above brief assessments of visual effects it has been found that the Titwood Farm single wind turbine proposal may have a moderate or major visual impact on a few nearby views due to the number of residential, i.e. primary receptors that would experience these views. However, as a single turbine development, of maximum height of 35 metres, sitting within pastoral land with a mature hedgerow and hedgerow tree landscape, the development would have an uncomplicated relationship with not only the surrounding landform but also the consented two turbines to the south. From further away viewpoints, the visual impact of the project is significantly reduced due to the distance to the project and the interplay between the existing topography and landscape structure. On balance, then, the visual impact on the study area is considered to be of medium significance in the local context and low – negligible in the wider context.

Methodology

The methodology for the landscape and visual impact assessment (LVIA) and the cumulative landscape and visual assessment (CLVIA) has been undertaken in accordance with the methodology set out below and conforms with The Guidelines for Landscape and Visual Impact Assessment, Second Edition (Landscape Institute and IEMA, 2002).

Additional guidance has been taken from the following publications:

- Supplementary Planning Guidance for Assessing Applications for Wind Farms, April 2011
- Siting and Designing windfarms in the landscape, Scottish Natural Heritage, December 2009;
- Siting and Design of small scale wind turbines of between 15 – 50m in height, Scottish Natural Heritage, March 2012;
- Ayrshire Landscape Character Assessment: No.111, Scottish Natural Heritage publication, prepared by Land Use Consultants 1998;
- Guidance: Cumulative Effects of Wind Farms, Scottish Natural Heritage Advisory Service, Version 2, 13/04/05;
- Guidelines on Landscape and Visual Impact Assessment (GLVIA Second Edition), Landscape Institute and Institute of Environmental Management and Assessment, 2002; and
- Visual Assessment of Windfarms, Best Practice, University of Newcastle and Scottish Natural heritage, Report No. F01AA303A, 2002

The methodology comprised an initial desktop study of Ordnance Survey (OS) maps, Scottish Natural Heritage and planning documents followed by a site survey in **June 2012.** The assessment and evaluation of the landscaping and visual features has been concluded alongside the prevailing planning policy guidance and policies in respect of these issues.

Information on landscape planning policy and the existing historical landscape elements has been collated by reference to the following:

- North Ayrshire Local Development Plan, April 2011
- Scottish Planning Policy, 2008 'Planning and the Historic Environment' (SPP23)
- National Policy, 2009 'Scottish Historic Environmental Policy (SHEP)'
- Historic Scotland 2010 'Managing change in the Historic Environmental Setting.'
- Scottish Government 2005 'Scottish Government's Strategic Environmental Assessment (SEA)
- Royal Commission The Ancient and Historical Monuments of Scotland. http://www.rcahms.gov.uk
- Scottish Natural History, Site Link. http://www.snh.gov.uk/sitelinkl/index.jsp
- http://www.pastmap.org.uk

In addition a schedule of guidance which supplements the Local Plan core policies was also referenced and is tabled below.

North Ayrshire Local Development Plan Core Policies

Historic Environment
HE2 Listed Buildings
HE4 Scheduled Monuments and Archaeological Sites
HE5 Historic Landscapes
Natural Environment
ENV1 New Development in the Countryside (excluding housing)
ENV4 Farmland
ENV5 Farm Diversification
ENV6 Economic Development or Diversification in Rural Areas
ENV9 Nature Conservation
Infrastructure
PI9 Renewable Energy
Design Guidance
Rural Design
Ayrshire Supplementary Guidance on Wind Farm Development April 2011
Supplementary Guidance on Wind Farm Developments Phase 1
Supplementary Guidance on Wind Farm Developments Phase 2
Supplementary Guidance on Wind Farm Developments – Ayrshire Joint Planning Unit

Reference List

- Siting and Designing Windfarms in the Landscape, SNH, Dec 2009

http://www.snh.gov.uk/docs/A317537.pdf

- Landscape Character Assessment: Ayrshire No. 111, SNH publication, prepared by the Land Use Consultants, 1998

http://www.snh.org.uk/pdfs/publications/review/111.pdf

- Guidance: Cumulative effects of Windfarms, SNH Advisory Service, Version 2, 13/04/05

http://www.snh.gov.uk/docs/A305440.pdf

- Guidelines on Landscape and Visual Impact Assessments (2nd edition), Landscape Institute of Environmental Management and Assessment, 2002

http://www.landscapeinstitute.org/glvia3.pdf

- Visual Assessment of Windfarms: Best Practice, University of Newcastle and Scottish Natural Heritage, Report NO. F01AA303A, 2002

http://www.snh.gov.uk/docs/A305437.pdf

- North Lanarkshire Local Development Plan

http://www.north-ayrshire.gov.uk/Documents/CorporateServices/LegalProtective/LocalDevelopmentPlan/LDPPart2.pdf

- Scottish Planning Policy 23, 2008, 'Planning and the Historic Environment'

http://www.scotland.gov.uk/publications/2010/02/03132605.pdf

- National Policy 2009 'Scottish Historic Environment Policy (SHEP)

http://www.historic-scotland.gov.uk/shep

- Scottish Government 2005 'Scottish Governments Strategic Environmental Assessment (SEA)

http://www.scotland.gov.uk>environment>sustainabledevelopment

- Historic Scotland 2010 'Managing Change in the Historic Environmental Setting.'

http://www.historic-scotland.gov.uk/managing-change-consulation-setting.pdf

- Royal Commission on the Ancient and Historical Monuments of Scotland

http://www.rcahms.gov.uk

- PAN 45 Annex 1: Renewable Energy

http://www.scotland.gov.uk/publications/2006/10/03093936.pdf

- Design Guidance – Development in the Countryside. North Ayrshire Council January 2009

http://www.north-ayrshire.gov.uk/Documents/CorporateServices/LegalProtective/LocalDevelopmentPlan/RuralDesignGuidance.pdf

- Ayrshire Supplementary Planning Guidance on Wind Farm Development

http://www.north-ayrshire.gov.uk/Documents/CorporateServices/LegalProtective/LocalDevelopmentPlan/AyrshireSGonWindFarmDev.pdf

- Landscape Capacity Study for Wind Farm Development in North Ayrshire, Phase One, Carol Anderson and Alison Grant Landscape Architects

http://www.north-ayrshire.gov.uk/Documents/CorporateServices/LegalProtective/LocalDevelopmentPlan/WindFarmCapacityPhase1.pdf

- Landscape Capacity Study for Wind Farm Development in North Ayrshire, Phase Two, Carol Anderson and Alison Grant Landscape Architects

http://www.north-ayrshire.gov.uk/Documents/CorporateServices/LegalProtective/LocalDevelopmentPlan/WindFarmCapacityPhase2.pdf

NORTH AYRSHIRE COUNCIL

IAN T. MACKAY : Solicitor to the Council (Corporate Services)

No N/12/00469/PP
(Original Application No. N/000046238-001)

REFUSAL OF PLANNING PERMISSION Type of Application: Local Application

TOWN AND COUNTRY PLANNING (SCOTLAND) ACT, 1997,
AS AMENDED BY THE PLANNING ETC (SCOTLAND) ACT 2006.
TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT PROCEDURE) (SCOTLAND)
REGULATIONS 2008

To : Mr M Montgomerie
c/o Fine Energy Fao Nicola Thomson-Jack
5 Kingsknowe Park
Edinburgh
EH14 2JQ

With reference to your application received on 29 August 2012 for planning permission under the above mentioned Acts and Orders for :-

Erection of a wind turbine with a hub height of 24m and a maximum blade tip height of 35m

at Titwood Farm
Kilmaurs
Kilmarnock
Ayrshire
KA3 2PN

North Ayrshire Council in exercise of their powers under the above-mentioned Acts and Orders hereby refuse planning permission on the following grounds :-

1. The proposed development would be contrary to criterion (f) of Policy INF 7 of the adopted North Ayrshire Local Plan (excluding Isle of Arran) by reason of the unacceptable cumulative impact the proposed development would have on the countryside, in combination with the consented Whearig Farm wind turbine development, to the detriment of the setting and character of the area.

Dated this : 17 October 2012

.....
for the North Ayrshire Council

(See accompanying notes)

NORTH AYRSHIRE
COUNCIL

TOWN AND COUNTRY PLANNING (SCOTLAND) ACT 1997
AS AMENDED BY THE PLANNING ETC (SCOTLAND) ACT 2006.
TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT PROCEDURE) (SCOTLAND)
REGULATIONS 2008 – REGULATION 28

IAN T. MACKAY : Solicitor to the Council (Corporate Services)

FORM 2

1. If the applicant is aggrieved by the decision to refuse permission for or approval required by a condition in respect of the proposed development, or to grant permission or approval subject to conditions, the applicant may require the planning authority to review the case under section 43A of the Town and Country Planning (Scotland) Act 1997 within three months from the date of this notice. The notice of review should be addressed to Committee Services, Chief Executive's Department, Cunninghame House, Irvine, North Ayrshire, KA12 8EE.

2. If permission to develop land is refused or granted subject to conditions and the owner of the land claims that the land has become incapable of reasonably beneficial use in its existing state and cannot be rendered capable of reasonably beneficial use by the carrying out of any development which has been or would be permitted, the owner of the land may serve on the planning authority a purchase notice requiring the purchase of the owner of the land's interest in the land in accordance with Part 5 of the Town and Country Planning (Scotland) Act 1997.

REPORT OF HANDLING

NORTH AYRSHIRE COUNCIL

Reference No:	12/00469/PP
Proposal:	Erection of a wind turbine with a hub height of 24m and a maximum blade tip height of 35m
Location:	Titwood Farm, Kilmaurs, Kilmarnock, Ayrshire KA3 2PN
Local Plan Allocation:	Countryside/Rural Community
Policies:	POLICY INF7 Development Control Statement
Consultations:	Yes
Neighbour Notification:	
Advert:	Not Advertised
Previous Applications:	12/00242/EIA for Screening opinion for erection of single wind turbine with height to blade tip less than 33m was Scoping/Screening Agreed on 30.05.2012

Description

This report relates to the above planning application.

It is proposed to erect a wind turbine with the following specifications on a rural site associated with Titwood Farm, near Kilmaurs. The site is situated just under 500m west of Titwood Farm, although the nearest dwelling would be at Mid Broughton, located approximately 375m. The development is anticipated to have an operational period of 25-30 years. The description of the proposal is as follows:

Height to blade tip:	35m max.
Height to hub:	24m max.
Rotor diameter:	20m max, 3 blades.
Turbine power output:	225kW max.
Design:	Conical steel tower; steel hub/nacelle; fibreglass blades.
Colour:	Matt pale grey.
Site infrastructure:	Concrete foundation pad for turbine to be set below ground level and covered in soil/grass, with a 4m x 3m area visible at ground level.
Access to site:	Across agricultural land, leading from the nearest public road (no access track is proposed).

In addition to the residential dwellings mentioned above, there are a number of other isolated farmhouses and rural dwellings within the immediate area, including the hamlet of Chapelton to the north west. The village of Cunninghamhead lies to the south west. The landscape has a fairly open character, with particularly long views from north east to south west, following the general route of the B769 Irvine - Stewarton Road.

The application site is located in an area identified as Countryside within the adopted North Ayrshire Local Plan (Excluding Isle of Arran). As the proposal is for the development of a renewable energy source, it requires to be assessed against Policy INF7.

All proposals require to be considered against the relevant criteria of the Development Control Statement contained in the adopted Local Plan.

Also relevant are the Ayrshire Supplementary Planning Guidance (SPG) on Wind Farm Development and the Landscape Capacity Study for Wind Farm Development in North Ayrshire - Phase Two Report.

A range of supporting information has been submitted by the applicant, which includes commentary on planning policy in addition to various other material considerations including: landscape impact, shadow flicker, noise generation and radar systems. Photomontages and commentary associated with the images have also been included.

A Screening Opinion was issued for the proposal earlier in 2012 (ref. 12/00242/EIA).

Consultations and Representations

Neighbour notification was not required. No representations have been received.

Consultations were undertaken with the following:

Civil Aviation Authority (CAA) - No specific comments or objections are raised. General advice is given and it is advised that other relevant aviation interests' views are to be sought.

Response - Noted. Glasgow Airport, Glasgow Prestwick Airport, the MOD and NATs have all been consulted.

BAA - no comments.

Response - Noted.

Glasgow Prestwick Airport - No safeguarding objection.

Response - Noted.

MOD - No comments.

Response - Noted. Standard advice requires the MOD to be notified of any decision approving a wind turbine.

National Air Traffic Services (NATS) - The proposed development has been examined from a technical safeguarding aspect and does not conflict with safeguarding criteria. Accordingly, NATS has no safeguarding objection to the proposal.

Response - Noted.

Environmental Health - no objections subject to conditions:
1. The wind farm noise immission level, when assessed at nearby noise sensitive premises shall not exceed 35dB LA90, 10min or shall be no more that 5dB(A) above background LA90, 10min ; whichever is greater. Wind speeds up to and including 10 ms^{-1} when measured at 10m above ground level should be considered.

2. In reckoning the background noise level, the noise generated by any other existing windfarm shall be left out of account.

3. When assessed at any noise sensitive premises the operation of the wind turbines shall not result in any audible tones.

4. At the request of North Ayrshire Council as planning authority, the applicant or future operator of the wind turbine shall measure the level of noise emission from the wind turbine in line with an agreed methodology, such that compliance with condition 1 is demonstrated.
5. The presence of any significant unsuspected contamination which becomes evident during the development of the site shall be brought to the attention of the Environmental Health Service of North Ayrshire Council. Thereafter, a suitable investigation strategy, agreed with the Environmental Health Service of North Ayrshire Council, shall be implemented and any necessary remediation works carried out prior to any further development taking place on the site.

6. Except with the prior written agreement of the Environmental Health Service of North Ayrshire Council, permitted operating times for noisy construction works shall be Mondays - Saturdays (excluding public holidays) 0800-1900 hours. Plant machinery and operating methods should be selected and used in accordance with BS 5228: Noise Control on Construction and Open Sites and the Control of Pollution Act 1974 to minimise nuisance and noise from vibration.

Response: In the event of planning permission being granted, suitably worded conditions and informatives can be attached to meet the requirements of Environmental Health, who have also contacted the applicant directly about the matters raised.

Response - Noted.

Infrastructure & Design Services (Roads) - no objections. The applicant should note that there is a weak bridge on the east access road to Titwood Farm and possibly on the north access route. This road is narrow, the applicant to apply to North Ayrshire Council (Roads) for any permissions required if the road has to be closed at any point during the delivery or construction process of the wind turbine.

Response - Noted. An informative can be attached in the event of planning permission being granted.

Analysis

The main determining issue is whether the proposal accords with the adopted Local Plan, namely, Policies INF7 (Renewable Energy) and the relevant Development Control Statement criteria.

The Ayrshire Supplementary Planning Guidance on Wind Farm Development, published by the Ayrshire Joint Planning Unit in February 2009 and the Landscape Capacity Study for Wind Farm Development in North Ayrshire - Phase Two Report, are material planning considerations.

In terms of policy INF 7, it is noted that renewable energy developments accord with the Local Plan, subject to meeting a range of criteria. A comment against each individual criterion is as follows:

Criterion (a) requires that the development is appropriate in design and scale to its surroundings. Taking account of the more localised assessment provided by the Landscape Capacity Study for Wind Farm Development in North Ayrshire - Phase Two Report, the site is located within an area where the proposed turbines would be within the "Ayrshire Lowlands" typology.

The "Ayrshire Lowlands" are described as having a "field pattern which is generally small and strongly enclosed with beech/hawthorn hedges and mature hedgerow trees and giving an often surprisingly wooded character. "In terms of overall sensitivity, it is considered that this typology could generally accommodate turbines up to a tip height of some 40m." The application site and landscape character of this area corresponds very strongly with the written description contained in the Phase Two Report, particularly in relation to the wooded character.

At a proposed height of 35 metres to blade tip, within an area that the Phase Two Report indicates that wind turbines within the lower height band of turbine typology 3 (30-70m) could be accommodated, it is considered that individually, the proposed development would fit within this landscape without unduly affecting its character. However, this must be qualified by an assessment of cumulative impact, which is discussed below (criterion (f)).

(b) Where it can be demonstrated that there is no significant adverse effect on the intrinsic landscape qualities of the area, in particular on those areas outlined in policy ENV 5 and ENV 8;

The applicant's agent has submitted information to demonstrate the likely visual impact of the proposal. This has included a zone of theoretical visibility (ZTV), based on the height of the turbine and the topography/elevation within a 15km radius of the site, in addition to a series of photomontages based on 8 viewpoints selected by the applicant's agent. The commentary in the supporting statement claims that "there would be some limited visual impact without taking into account any vegetation or manmade structures. The photomontages illustrate that when buildings and vegetation are taken into account the turbine will be almost completely screened from view from most viewpoints."

Whilst the selection of viewpoints are considered to be representative of the views towards the site from the surrounding area, it is not agreed that the "turbine will be almost completely screened from view from most viewpoints" as is suggested in the commentary. Indeed, the photomontages clearly show the turbine as a dominant

vertical feature in the landscape. The photomontages also exclude views which would be obtained from travellers using the B769, which offers long views towards the site from many locations. It is therefore unreasonable for the supporting statement to conclude that there would be almost complete screening from most viewpoints.

Detailed knowledge of the adjoining countryside and nearby settlements (eg. Kilmaurs and Cunninghamhead) would suggest that the site would not be visible from these villages due to intervening topography, the effect of distance and screening from trees/hedgerows. However, views towards the site at closer range eg. from the hamlet of Chapelton, from local farms and houses and from sections of the B769 road, do not benefit from any mitigation. This would produce an effect whereby the development would feature prominently in the landscape when considered cumulatively with the consented 2 turbine development at Wheatrig Farm.

Criterion (c) states that a proposal shall not result in unacceptable intrusion, or have a significant adverse impact on the natural and built heritage of the locality.

If not for the consented turbine development at Wheatrig Farm, it is considered that the degree of intrusion would be acceptable, and limited to a local area within approximately 1 km of the site. There would be no issue with respect to shadow flicker due to the distance between the site and the nearest houses, the separation distance between wind turbines and nearby dwellings should be at least 10 rotor diameters. With a rotor diameter of 20 metres, ten times this figure would be 200 metres, and the nearest house would be 375m from the site).

It is not considered that there would be any material intrusion in terms of noise, given the distances between the nearest housing and the proposed turbines. The applicant has submitted data which would support this assertion, which has been evaluated by Environmental Health. For the avoidance of doubt, conditions can be imposed in the event of planning permission being granted that would safeguard the amenity of nearby householders from any adverse noise that may arise.

Regarding the natural and built heritage of the locality, it is agreed that the proposal would have no significant adverse impact. In terms of natural heritage, the site and surroundings comprise improved grassland which are intensively farmed, with no evidence of any special natural heritage interests nearby that the development could affect. The limited number of scheduled monuments and listed buildings in the local area would not be significantly adversely affected by the proposal, either visually or otherwise.

In terms of criterion (d), there are no objections raised by aviation radar operators. The developer has also consulted directly with code systems telecommunications operators, who have confirmed no objections to the proposal.

Criterion (e) requires that the proposal can be satisfactorily connected to the national grid without causing negative environmental impact. The site has been chosen to minimise the distance to the nearest existing electricity transmission line. There are a number of such lines in the area, carried on timber poles. The proposal is acceptable in terms of criterion (e).

(f) when considered in association with existing sites, sites formally engaged in the Environmental Assessment process or sites with planning permission, including

those in neighbouring authorities, there should be no negative impacts due to the cumulative impact of development proposals.

In 2011, planning permission was granted for two 225kw wind turbines within an agricultural field at Wheatrig Farm on towers measuring 31.5m to hub height and 45m to blade tip height. A 40m high meteorological mast was recently erected at this location in order to measure wind speeds in advance of the main development proceeding. The distance between the Wheatrig site and the proposed site at Titwood is approximately 500m to the south.

At this distance, the proposed turbine would be visible beyond the group of 2 consented turbines at Wheatrig Farm such that it would appear as an unrelated development, occupying a seemingly arbitrary location in a field. The ground level at the Wheatrig site and the proposed site is almost the same, at approx. 73m AOD. Due to this distance and similar elevation, the Titwood proposal would have an awkward visual relationship with Wheatrig, and in so doing, would create the impression of sporadic or isolated development in the countryside. The views towards the site from the surrounding landscape would typically include all three turbines, particularly from the B769 corridor and the houses and farms close to the road.

This cumulative effect is considered to be unsympathetic to the character and amenity of this attractive rural area. Whilst there are no statutory designations affecting this lowland landscape, nor is it listed as being within a sensitive landscape in terms of the adopted Local Plan, the absence of such formal designations should not be taken to imply that this area of countryside has no scenic value nor attraction in its own right. Isolated or sporadic development can have a damaging effect in the countryside and no mitigation can be offered which would offset the cumulative visual impact. Accordingly, the proposal fails on criterion (f).

It should be noted that the issue of a potential cumulative impact was raised when the screening opinion was issued to the applicant on 30th May 2012. Despite the concerns raised by the officer, there was no further pre-application contact made by the applicant or agent.

With regards to the DC Statement it is considered that criteria (a), (b) and (c) are relevant.

In relation to (a) siting, design and external appearance, for the reasons outlined above, it is considered that the siting, design and external appearance of the proposed turbine would be unsatisfactory within the context of the surrounding landscape, having taken into account the cumulative impact of the nearby Wheatrig wind turbine development. Whilst the scale, form, massing and height of the proposed turbine would be visually acceptable on its own, the proposal cannot be viewed in isolation from its context.

With regards to (b) amenity, it is not considered that the proposed turbines would give rise to unacceptable noise. There is no evidence to suggest that the proposed development would result in vibration, nor create adverse impacts on sunlight through shadow flicker.

In relation to (c) landscape character, for similar reasons to those outlined above, principally relating to cumulative impact and the lack of mitigation, it is considered that the proposal does not comply with this criterion.

In relation to the Ayrshire Supplementary Planning Guidance on Wind Farm Development, published by the Ayrshire Joint Planning Unit in February 2009 and the Landscape Capacity Study for Wind Farm Development in North Ayrshire - Phase Two Report, it is considered that the proposals have been properly assessed against the guidance therein. The applicant's agent has considered both items of policy guidance in detail, but has not reached a satisfactory conclusion in terms of site selection.

There are no other material considerations, other than to note that Scottish Planning Policy is supportive of renewable energy developments as a vital part of the response to climate change, but critically, highlights that a key role of planning is to guide development to appropriate locations. In summary, this proposal is considered to be unacceptable by reason of its location due to the cumulative impact it would impose on the rural landscape.

Decision

Refused

Case Officer - Mr A Hume

Appendix 1 - Drawings relating to decision

Drawing Title	Drawing Reference (if applicable)	Drawing Version (if applicable)
Block Plan / Site Plan	01	
Location Plan	02	
Location Plan	03	
Proposed Elevations	SHEET 1/1	

REPORT OF HANDLING

NORTH AYRSHIRE COUNCIL

Reference No:	12/00469/PP
Proposal:	Erection of a wind turbine with a hub height of 24m and a maximum blade tip height of 35m
Location:	Titwood Farm, Kilmaurs, Kilmarnock, Ayrshire KA3 2PN
Local Plan Allocation:	Countryside/Rural Community
Policies:	POLICY INF7 Development Control Statement
Consultations:	Yes
Neighbour Notification:	
Advert:	Not Advertised
Previous Applications:	12/00242/EIA for Screening opinion for erection of single wind turbine with height to blade tip less than 33m was Scoping/Screening Agreed on 30.05.2012

Description

This report relates to the above planning application.

It is proposed to erect a wind turbine with the following specifications on a rural site associated with Titwood Farm, near Kilmaurs. The site is situated just under 500m west of Titwood Farm, although the nearest dwelling would be at Mid Broughton, located approximately 375m. The development is anticipated to have an operational period of 25-30 years. The description of the proposal is as follows:

Height to blade tip:	35m max.
Height to hub:	24m max.
Rotor diameter:	20m max, 3 blades.
Turbine power output:	225kW max.
Design:	Conical steel tower; steel hub/nacelle; fibreglass blades.
Colour:	Matt pale grey.
Site infrastructure:	Concrete foundation pad for turbine to be set below ground level and covered in soil/grass, with a 4m x 3m area visible at ground level.
Access to site:	Across agricultural land, leading from the nearest public road (no access track is proposed).

In addition to the residential dwellings mentioned above, there are a number of other isolated farmhouses and rural dwellings within the immediate area, including the hamlet of Chapelton to the north west. The village of Cunninghamhead lies to the south west. The landscape has a fairly open character, with particularly long views from north east to south west, following the general route of the B769 Irvine - Stewarton Road.

The application site is located in an area identified as Countryside within the adopted North Ayrshire Local Plan (Excluding Isle of Arran). As the proposal is for the development of a renewable energy source, it requires to be assessed against Policy INF7.

All proposals require to be considered against the relevant criteria of the Development Control Statement contained in the adopted Local Plan.

Also relevant are the Ayrshire Supplementary Planning Guidance (SPG) on Wind Farm Development and the Landscape Capacity Study for Wind Farm Development in North Ayrshire - Phase Two Report.

A range of supporting information has been submitted by the applicant, which includes commentary on planning policy in addition to various other material considerations including: landscape impact, shadow flicker, noise generation and radar systems. Photomontages and commentary associated with the images have also been included.

A Screening Opinion was issued for the proposal earlier in 2012 (ref. 12/00242/EIA).

Consultations and Representations

Neighbour notification was not required. No representations have been received.

Consultations were undertaken with the following:

Civil Aviation Authority (CAA) - No specific comments or objections are raised. General advice is given and it is advised that other relevant aviation interests' views are to be sought.

Response - Noted. Glasgow Airport, Glasgow Prestwick Airport, the MOD and NATs have all been consulted.

BAA - no comments.

Response - Noted.

Glasgow Prestwick Airport - No safeguarding objection.

Response - Noted.

MOD - No comments.

Response - Noted. Standard advice requires the MOD to be notified of any decision approving a wind turbine.

National Air Traffic Services (NATS) - The proposed development has been examined from a technical safeguarding aspect and does not conflict with safeguarding criteria. Accordingly, NATS has no safeguarding objection to the proposal.

Response - Noted.

Environmental Health - no objections subject to conditions:

1. The wind farm noise immission level, when assessed at nearby noise sensitive premises shall not exceed 35dB LA90, 10min or shall be no more that 5dB(A) above background LA90, 10min ; whichever is greater. Wind speeds up to and including 10 ms^{-1} when measured at 10m above ground level should be considered.

2. In reckoning the background noise level, the noise generated by any other existing windfarm shall be left out of account.

3. When assessed at any noise sensitive premises the operation of the wind turbines shall not result in any audible tones.

4. At the request of North Ayrshire Council as planning authority, the applicant or future operator of the wind turbine shall measure the level of noise emission from the wind turbine in line with an agreed methodology, such that compliance with condition 1 is demonstrated.

5. The presence of any significant unsuspected contamination which becomes evident during the development of the site shall be brought to the attention of the Environmental Health Service of North Ayrshire Council. Thereafter, a suitable investigation strategy, agreed with the Environmental Health Service of North Ayrshire Council, shall be implemented and any necessary remediation works carried out prior to any further development taking place on the site.

6. Except with the prior written agreement of the Environmental Health Service of North Ayrshire Council, permitted operating times for noisy construction works shall be Mondays - Saturdays (excluding public holidays) 0800-1900 hours. Plant machinery and operating methods should be selected and used in accordance with BS 5228: Noise Control on Construction and Open Sites and the Control of Pollution Act 1974 to minimise nuisance and noise from vibration.

Response: In the event of planning permission being granted, suitably worded conditions and informatives can be attached to meet the requirements of Environmental Health, who have also contacted the applicant directly about the matters raised.

Response - Noted.

Infrastructure & Design Services (Roads) - no objections. The applicant should note that there is a weak bridge on the east access road to Titwood Farm and possibly on the north access route. This road is narrow, the applicant to apply to North Ayrshire Council (Roads) for any permissions required if the road has to be closed at any point during the delivery or construction process of the wind turbine.

Response - Noted. An informative can be attached in the event of planning permission being granted.

Analysis

The main determining issue is whether the proposal accords with the adopted Local Plan, namely, Policies INF7 (Renewable Energy) and the relevant Development Control Statement criteria.

The Ayrshire Supplementary Planning Guidance on Wind Farm Development, published by the Ayrshire Joint Planning Unit in February 2009 and the Landscape Capacity Study for Wind Farm Development in North Ayrshire - Phase Two Report, are material planning considerations.

In terms of policy INF 7, it is noted that renewable energy developments accord with the Local Plan, subject to meeting a range of criteria. A comment against each individual criterion is as follows:

Criterion (a) requires that the development is appropriate in design and scale to its surroundings. Taking account of the more localised assessment provided by the Landscape Capacity Study for Wind Farm Development in North Ayrshire - Phase Two Report, the site is located within an area where the proposed turbines would be within the "Ayrshire Lowlands" typology.

The "Ayrshire Lowlands" are described as having a "field pattern which is generally small and strongly enclosed with beech/hawthorn hedges and mature hedgerow trees and giving an often surprisingly wooded character. "In terms of overall sensitivity, it is considered that this typology could generally accommodate turbines up to a tip height of some 40m." The application site and landscape character of this area corresponds very strongly with the written description contained in the Phase Two Report, particularly in relation to the wooded character.

At a proposed height of 35 metres to blade tip, within an area that the Phase Two Report indicates that wind turbines within the lower height band of turbine typology 3 (30-70m) could be accommodated, it is considered that individually, the proposed development would fit within this landscape without unduly affecting its character. However, this must be qualified by an assessment of cumulative impact, which is discussed below (criterion (f)).

(b) Where it can be demonstrated that there is no significant adverse effect on the intrinsic landscape qualities of the area, in particular on those areas outlined in policy ENV 5 and ENV 8;

The applicant's agent has submitted information to demonstrate the likely visual impact of the proposal. This has included a zone of theoretical visibility (ZTV), based on the height of the turbine and the topography/elevation within a 15km radius of the site, in addition to a series of photomontages based on 8 viewpoints selected by the applicant's agent. The commentary in the supporting statement claims that "there would be some limited visual impact without taking into account any vegetation or manmade structures. The photomontages illustrate that when buildings and vegetation are taken into account the turbine will be almost completely screened from view from most viewpoints."

Whilst the selection of viewpoints are considered to be representative of the views towards the site from the surrounding area, it is not agreed that the "turbine will be almost completely screened from view from most viewpoints" as is suggested in the commentary. Indeed, the photomontages clearly show the turbine as a dominant vertical feature in the landscape. The photomontages also exclude views which would be obtained from travellers using the B769, which offers long views towards the site from many locations. It is therefore unreasonable for the supporting statement to conclude that there would be almost complete screening from most viewpoints.

Detailed knowledge of the adjoining countryside and nearby settlements (eg. Kilmaurs and Cunninghamhead) would suggest that the site would not be visible from these villages due to intervening topography, the effect of distance and screening from trees/hedgerows. However, views towards the site at closer range eg. from the hamlet of Chapelton, from local farms and houses and from sections of the B769 road, do not benefit from any mitigation. This would produce an effect whereby the development would feature prominently in the landscape when considered cumulatively with the consented 2 turbine development at Wheatrig Farm.

Criterion (c) states that a proposal shall not result in unacceptable intrusion, or have a significant adverse impact on the natural and built heritage of the locality.

If not for the consented turbine development at Wheatrig Farm, it is considered that the degree of intrusion would be acceptable, and limited to a local area within approximately 1 km of the site. There would be no issue with respect to shadow flicker due to the distance between the site and the nearest houses, the separation distance between wind turbines and nearby dwellings should be at least 10 rotor diameters. With a rotor diameter of 20 metres, ten times this figure would be 200 metres, and the nearest house would be 375m from the site).

It is not considered that there would be any material intrusion in terms of noise, given the distances between the nearest housing and the proposed turbines. The applicant has submitted data which would support this assertion, which has been evaluated by Environmental Health. For the avoidance of doubt, conditions can be imposed in the event of planning permission being granted that would safeguard the amenity of nearby householders from any adverse noise that may arise.

Regarding the natural and built heritage of the locality, it is agreed that the proposal would have no significant adverse impact. In terms of natural heritage, the site and surroundings comprise improved grassland which are intensively farmed, with no evidence of any special natural heritage interests nearby that the development could affect. The limited number of scheduled monuments and listed buildings in the local area would not be significantly adversely affected by the proposal, either visually or otherwise.

In terms of criterion (d), there are no objections raised by aviation radar operators. The developer has also consulted directly with code systems telecommunications operators, who have confirmed no objections to the proposal.

Criterion (e) requires that the proposal can be satisfactorily connected to the national grid without causing negative environmental impact. The site has been chosen to minimise the distance to the nearest existing electricity transmission line. There are a number of such lines in the area, carried on timber poles. The proposal is acceptable in terms of criterion (e).

(f) when considered in association with existing sites, sites formally engaged in the Environmental Assessment process or sites with planning permission, including those in neighbouring authorities, there should be no negative impacts due to the cumulative impact of development proposals.

In 2011, planning permission was granted for two 225kw wind turbines within an agricultural field at Wheatrig Farm on towers measuring 31.5m to hub height and 45m to blade tip height. A 40m high meteorological mast was recently erected at this location in order to measure wind speeds in advance of the main development proceeding. The distance between the Wheatrig site and the proposed site at Titwood is approximately 500m to the south.

At this distance, the proposed turbine would be visible beyond the group of 2 consented turbines at Wheatrig Farm such that it would appear as an unrelated development, occupying a seemingly arbitrary location in a field. The ground level at the Wheatrig site and the proposed site is almost the same, at approx. 73m AOD. Due to this distance and similar elevation, the Titwood proposal would have an awkward visual relationship with Wheatrig, and in so doing, would create the impression of sporadic or isolated development in the countryside. The views towards the site from the surrounding landscape would typically include all three turbines, particularly from the B769 corridor and the houses and farms close to the road.

This cumulative effect is considered to be unsympathetic to the character and amenity of this attractive rural area. Whilst there are no statutory designations affecting this lowland landscape, nor is it listed as being within a sensitive landscape in terms of the adopted Local Plan, the absence of such formal designations should not be taken to imply that this area of countryside has no scenic value nor attraction in its own right. Isolated or sporadic development can have a damaging effect in the countryside and no mitigation can be offered which would offset the cumulative visual impact. Accordingly, the proposal fails on criterion (f).

It should be noted that the issue of a potential cumulative impact was raised when the screening opinion was issued to the applicant on 30th May 2012. Despite the concerns raised by the officer, there was no further pre-application contact made by the applicant or agent.

With regards to the DC Statement it is considered that criteria (a), (b) and (c) are relevant.

In relation to (a) siting, design and external appearance, for the reasons outlined above, it is considered that the siting, design and external appearance of the proposed turbine would be unsatisfactory within the context of the surrounding landscape, having taken into account the cumulative impact of the nearby Wheatrig wind turbine development. Whilst the scale, form, massing and height of the proposed turbine would be visually acceptable on its own, the proposal cannot be viewed in isolation from its context.

With regards to (b) amenity, it is not considered that the proposed turbines would give rise to unacceptable noise. There is no evidence to suggest that the proposed development would result in vibration, nor create adverse impacts on sunlight through shadow flicker.

In relation to (c) landscape character, for similar reasons to those outlined above, principally relating to cumulative impact and the lack of mitigation, it is considered that the proposal does not comply with this criterion.

In relation to the Ayrshire Supplementary Planning Guidance on Wind Farm Development, published by the Ayrshire Joint Planning Unit in February 2009 and the Landscape Capacity Study for Wind Farm Development in North Ayrshire - Phase Two Report, it is considered that the proposals have been properly assessed against the guidance therein. The applicant's agent has considered both items of policy guidance in detail, but has not reached a satisfactory conclusion in terms of site selection.

There are no other material considerations, other than to note that Scottish Planning Policy is supportive of renewable energy developments as a vital part of the response to climate change, but critically, highlights that a key role of planning is to guide development to appropriate locations. In summary, this proposal is considered to be unacceptable by reason of its location due to the cumulative impact it would impose on the rural landscape.

Decision

Refused

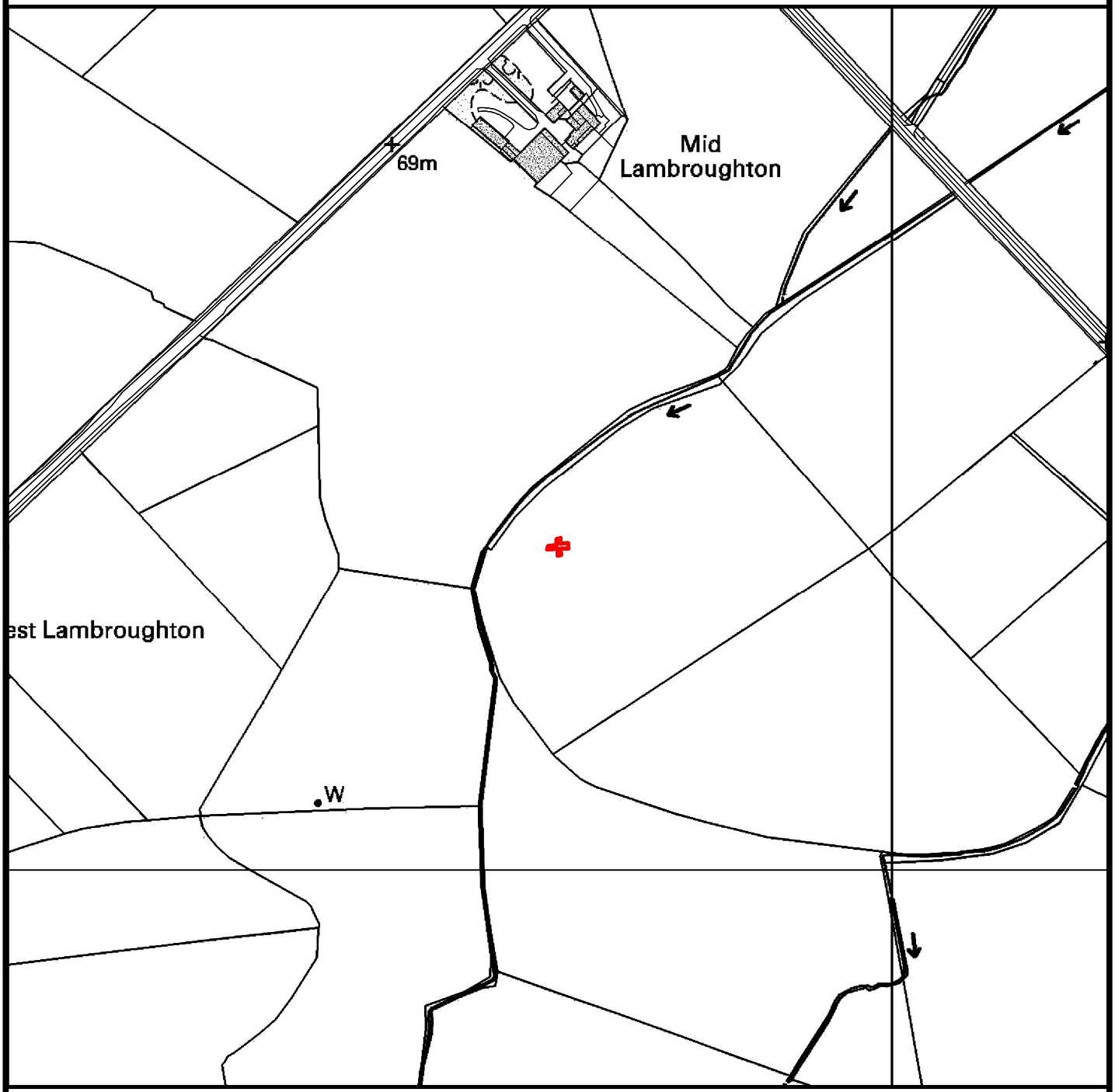
Case Officer - Mr A Hume

Appendix 1 - Drawings relating to decision

Drawing Title	Drawing Reference (if applicable)	Drawing Version (if applicable)
Block Plan / Site Plan	01	
Location Plan	02	
Location Plan	03	
Proposed Elevations	SHEET 1/1	

Local Review Body

12/00469/PP



NORTH AYRSHIRE COUNCIL

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Not To Scale

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NORTH AYRSHIRE
COUNCIL

IAN T. MACKAY : Solicitor to the Council (Corporate Services)

No N/12/00469/PP
(Original Application No. N/000046238-001)

REFUSAL OF PLANNING PERMISSION Type of Application: Local Application

TOWN AND COUNTRY PLANNING (SCOTLAND) ACT, 1997,
AS AMENDED BY THE PLANNING ETC (SCOTLAND) ACT 2006.
TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT PROCEDURE) (SCOTLAND)
REGULATIONS 2008

To : Mr M Montgomerie
c/o Fine Energy Fao Nicola Thomson-Jack
5 Kingsknowe Park
Edinburgh
EH14 2JQ

With reference to your application received on 29 August 2012 for planning permission under the above mentioned Acts and Orders for :-

Erection of a wind turbine with a hub height of 24m and a maximum blade tip height of 35m

at Titwood Farm
Kilmaurs
Kilmarnock
Ayrshire
KA3 2PN

North Ayrshire Council in exercise of their powers under the above-mentioned Acts and Orders hereby refuse planning permission on the following grounds :-

1. The proposed development would be contrary to criterion (f) of Policy INF 7 of the adopted North Ayrshire Local Plan (excluding Isle of Arran) by reason of the unacceptable cumulative impact the proposed development would have on the countryside, in combination with the consented Whearig Farm wind turbine development, to the detriment of the setting and character of the area.

Dated this : 17 October 2012

.....
for the North Ayrshire Council

(See accompanying notes)

NORTH AYRSHIRE
COUNCIL

TOWN AND COUNTRY PLANNING (SCOTLAND) ACT 1997
AS AMENDED BY THE PLANNING ETC (SCOTLAND) ACT 2006.
TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT PROCEDURE) (SCOTLAND)
REGULATIONS 2008 – REGULATION 28

IAN T. MACKAY : Solicitor to the Council (Corporate Services)

FORM 2

1. If the applicant is aggrieved by the decision to refuse permission for or approval required by a condition in respect of the proposed development, or to grant permission or approval subject to conditions, the applicant may require the planning authority to review the case under section 43A of the Town and Country Planning (Scotland) Act 1997 within three months from the date of this notice. The notice of review should be addressed to Committee Services, Chief Executive's Department, Cunninghame House, Irvine, North Ayrshire, KA12 8EE.

2. If permission to develop land is refused or granted subject to conditions and the owner of the land claims that the land has become incapable of reasonably beneficial use in its existing state and cannot be rendered capable of reasonably beneficial use by the carrying out of any development which has been or would be permitted, the owner of the land may serve on the planning authority a purchase notice requiring the purchase of the owner of the land's interest in the land in accordance with Part 5 of the Town and Country Planning (Scotland) Act 1997.