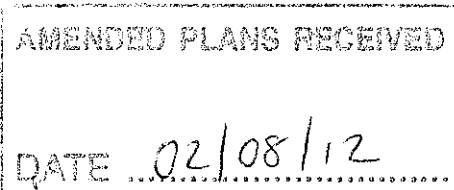


320110734P

**DESIGN & ACCESS STATEMENT
+
PLANNING STATEMENT
+
SUPPORTING DOCUMENTATION**

For the erection of one wind turbine for Mr John Proctor at

BROWS FARM, HIGHER ROAD, LONGRIDGE, PRESTON, PR3 2XY



PREPARED BY

JENNINGS DESIGN ASSOCIATES LTD - ARCHITECTS

Revisions

- A - Changes to the manufacturer and model of the wind turbines 01/11/2011
- B - Change to the location and the shadow flicker zone of the proposed wind turbines.
Changes made to Design and Access Statement; Chapters 1, 2, 3 and 11. 03/01/12
- C - Removed Turbine two and amended shadow flicker.
Changes made to entire Design and Access Statement to reflect this change. 01/08/2012

INTRODUCTION

This statement aims to demonstrate that the proposed turbine provides environmental, economic and social benefits to the farm and the wider community whilst any social impacts have been minimised, through careful consideration of location, scale, design and various other site specific circumstances, which provide the special circumstances to outweigh any perceived harm to the Countryside.

This statement should be read in conjunction with all other documentation and, whilst there is a level of repetition within the main body of text, this statement sets out national and regional policy directly relating to Green Belt and openness to ensure clarity to the issues involved.

This document moves through the following relevant sections to demonstrate the appropriateness of the turbine at the Farm:

- 1 The Applicant and Reasons for the Application
- 2 Design and Access Statement
 - a. Location and Situation
 - b. Scale and Appearance
 - c. Technical aspects of the site
 - d. Construction
 - e. Access for construction works
 - f. Highway safety standards
 - g. Technology Suppliers and installers
- 3 National Policy

3.1 Planning Policy 1 3.2 Planning Policy Statement 3.3 Planning Policy Statement 7 3.4 Planning Policy Statement 22	Delivering Sustainable Development Planning and Climate Change Supplement to Planning Policy Statement 1 Sustainable Development in Rural Areas Renewable Energy PPS 22 Companion Guide
---	--

Environmental Impact Statement

- 4 Local Policy – Core Strategy
- 5 Economic, Social and Environmental Assessment of the proposed Development
- 6 Noise Assessment
- 7 Shadow Flicker
- 8 Historic and Cultural Assessment
- 9 Ecology and Hydrology

10. Public Safety and security
11. Landscape and Visual Assessment
12. Access
13. Decommissioning
14. Conclusion

APPENDICES

- Appendix 1 Location Plan 1:10,000 Scale
- Appendix 2 Site Plan 1:2,500 Scale
- Appendix 3 Turbine Specification and Elevation drawings
- Appendix 4 Manufacturer's Information
- Appendix 5 Acoustic Report and Noise Data
- Appendix 6 Consultations
- Appendix 7 Photographs / Photo Montage



The Applicant

The applicant is Mr John Proctor, the landowner of Brows Farm, Higher Road, Longridge, Preston, PR3 2XY. The Turbine provider "Kinetica" have made this application on their behalf with "JDA Architects acting as agents

Reasons for the Application

The applicant has occupied and owned the farm for a number of years, and due to the recession and rising costs the family are looking for more financially viable ways to sustain the farm and its surrounding areas, and are therefore looking to diversify and achieve long term stability. The family are also concerned about the on-going rise in cost for energy.

The applicant wishes to use the locally abundant winds to generate electricity for domestic and agricultural use and in doing so assist in meeting the regional and national targets for increasing the proportion of energy from renewable sources.

The applicant is proposing to install one "Evoco 10KW" wind turbine in a field to the North East of the Farm. Any surplus electric generated at times when the turbine is operational would be exported to the National Grid for public distribution via the District Network Operator for the benefit of the community.

Summary of reasons:-

- To lower the farms carbon footprint
- To break away from on-going rising energy costs
- To achieve a steady, sustainable future for the holding.
- To achieve savings in revenue that can be re-invested into the farm.
- To assist in the "greening" of the farm and its local environment.

Installing one wind turbine on the farm is considered the best option of providing renewable energy production on the farm. The primary reason being that the wind speed on the farm have recorded at 5.8 m/s which is excellent for micro generation wind turbine.

As an alternative to wind energy the family have looked at Photovoltaic cells. However these are based on complex technology and require a large surface area to create the same amount of electricity. They also have a potentially greater visual impact on the landscape than wind turbine.

DESIGN and ACCESS STATEMENT

Location and Situation

The Location Plan is shown in Appendix 1 at 1:10,000 scale to allow the full envelope of land owned by the applicant which surrounds the proposed site to be shown, including the location of the proposed turbine in relation to other local properties.

A Site Plan at 1:2500 and 1:1250 scale is shown in Appendix 2. This is the lowest possible scale to clearly identify the proposed location field and its boundaries. The site plan shows the proposed position of the wind turbine edged in red.

Scale and Appearance

The turbine will be installed on a 15m tall tower with 9.7m diameter blades. Please see Appendices 3 and 4 for elevation drawings and specification of the wind turbine. The tower to be installed is a tapered self-supporting galvanised steel structure. The turbine nacelle and blades are white. This design is specifically to minimise the visibility of the structure by blending in with the skyline.

Technical aspects of the site

Please note that Paragraph 20 of the Supplement to PPS1, in referring to LPAs developing their core strategy and supporting local development documents, indicates that LPAs should not require applicants for energy development to demonstrate either the overall need for renewable energy and its distribution, nor question the energy justification for why a proposal for such development must be sited in a particular location.

Notwithstanding, careful consideration has been taken to site the wind turbine ensuring that the positioning will not cause any significant detriment to the landscape or wildlife in the area as discussed in "impacts" below, but also ensuring that the position of the turbine are in an area that maximises the potential energy capture from 'clean' wind available across the site.

The proposed site location has been selected for a variety of reasons:

- A) The wind speed; the site has an average wind speed of 5.8 m/s at 10m above ground level.
- B) The absence of wind barriers; the wind turbine on this site will experience no hindrance from obstacles such as buildings and trees, which could set up wind eddies and vortices and limit efficient energy production.
- C) The limited impact on the landscape; wildlife and surrounding residential dwellings – is covered later in the planning application documentation.

The wind turbine installed here will be able to work efficiently to produce electricity for the farm and associated properties with the potential capacity of producing excess electricity that can be fed into the National Grid.

Construction

The Turbine

The application area that will be disturbed during the construction of the base and tower will be 9m². On completion of construction any disturbed area will be reinstated to full agricultural use. The final base, including the control box, will occupy an area of less than two metres by three metres.

Access for Construction Works

The dotted line on the Location and Site map indicates the access route for delivery of the turbine, tower and foundations. This temporary access route across the location field will not require any permanent hard surface or change in the makeup of the ground surface. There are no plans to excavate any soils other than for the turbine's foundations. Conditions and routes across the field are suitable for heavy equipment and are well understood. It should be noted that there is no requirement for a regular vehicle access to the turbine site other than for delivery and installation of the foundations and wind turbine itself.

Highway safety safeguards

The proposed wind turbine site will not require any changes to the local highways for access or maintenance.

No extra traffic will be generated as a result of the installation of the wind turbine, other than for the initial delivery of the equipment and an annual routine maintenance visit. Transportation of the wind turbine, blades and tower to the farm will be via lorry, using standard transport planning procedures to comply with highway safety standards.

Technology suppliers and installers

The turbine's manufacturer is Evoco Energy Ltd, St Pegs Mill, Thornhill Beck Lane, Brighouse, West Yorkshire, HD6 4AH and details of the turbine's specification can be viewed in the Appendices.

The wind turbine will be installed and commissioned by a Micro-generation Certified Scheme (MCS) certified installer.

3. National Policy

3. NATIONAL POLICY

Making the case for wind turbines / promoting energy recycling

The Stern report 2006 clearly demonstrated that climate change must be managed if we are to avoid catastrophic social and environmental effects. Planning is identified as an important tool to combat climate change. Climate change and sustainable development have been firmly placed at the heart of the planning system, which must make a fundamental contribution to reducing carbon dioxide emissions, stabilising climate change and advancing a low-carbon economy

The UK has a target for 10% of electricity to come from renewable sources by 2010, and 15% by 2015. In addition the UK has agreed to a binding target that 20% of the EU's energy consumption must come from renewable sources by 2020, with a proposed UK contribution of 15% by 2020. The bulk of these targets are expected to be delivered locally, through the planning system.

Onshore wind farms are identified as having a vital role in meeting renewable energy targets there is less clarity over the impact of individual / domestic wind turbines

The benefits of wind electricity

- **Wind is a plentiful energy source:** the UK has 40 per cent of Europe's total wind energy
- **Cuts carbon footprint:** wind electricity is renewable energy
- **Lower Fuel Bills:** the Energy Saving Trust is reporting on a range of micro wind systems to discover how much energy they can save. However, at the moment there is not enough data from existing wind turbine installations to provide a figure
- **Feed-in Tariffs (FITs):** Micro and small wind turbines are eligible for FITs <50kW and above 50kW for both FITs and ROCs <5 MW from 2010

Planning Policy Statement (PPS) 1 – Delivering Sustainable Development (January 2005)

PPS1 sets out the Government's approach to delivering sustainable development through the Planning system, and indicates that planning should facilitate and promote sustainable and inclusive patterns of urban and rural development by:

- Making suitable land available for development in line with economic, social and environmental objectives to improve people's quality of life;
- Contributing to sustainable development;
- Ensuring high quality development through good and inclusive design, and the efficient use of resources; and,
- Ensuring that development supports existing communities and contributes to the creation of safe, sustainable, liveable and mixed communities with good access to jobs and key services for all members of the community

Response

The proposal for one wind turbine to generate electrical power for the farm and its associated agricultural usage is wholly consistent with PPS1, and its suggestion of sustainable and inclusive development.

Planning Policy Statement: Planning and Climate Change – Supplement to Planning Policy Statement 1 (December 2007)

The supplement to PPS1 further reinforces the Government's commitment to climate change and energy generation. In reference to renewable and low-carbon energy generation Paragraphs 19 and 20 states:

19. In developing their core strategy and supporting local development documents, **planning authorities should provide a framework that promotes and encourages renewable and low carbon energy generation**. Policies should be designed to promote and not restrict renewable and low-carbon energy and supporting infrastructure
20. In particular, planning authorities should:
 - not require applicants for energy development to demonstrate either the overall need for renewable energy and its distribution, nor question the energy justification for why a proposal for such development must be sited in a particular location;
 - ensure any local approach to protecting landscape and townscape is consistent with PPS22 and does not preclude the supply of any type of renewable energy other than in the most exceptional circumstances;
 - alongside any criteria-based policy developed in line with PPS22, consider identifying suitable areas for renewable and low-carbon energy sources, and supporting infrastructure, where this would help secure the development of such sources, but in doing so **take care to avoid stifling innovation including by rejecting proposals solely because they are outside areas identified for energy generation**; and
 - **expect a proportion of the energy supply of new development to be secured from decentralised and renewable or low-carbon energy sources.**

Response

In this instance the provision of the wind turbine is again in accordance with this policy, and that the council has a local policy that encourages the inclusion of such technology. Whilst we understand this local policy looks to protect the countryside, the policy will not preclude the supply of wind turbine and with this in mind; the proposals are wholly suitable to the policy

PLANNING POLICY STATEMENT 7 – Sustainable Development in Rural Areas

The Government's objectives for rural areas set out in PPS7 are:

- (i) To raise the quality of life and the environment in rural areas;
- (ii) To promote more sustainable patterns of development;
- (iii) Promoting the development of the English regions by improving their economic performance so that all are able to reach their full potential; and
- (iv) To promote sustainable, diverse and adaptable agriculture sectors.

Sustainable development is the core principle underpinning land use planning. The following key principles should be applied in combination with all the policies set out in PPS7:

- (i) Decisions on development proposals should be based on sustainable development principles ensuring an integrated approach to the consideration of:
 - social inclusion, recognising the needs of everyone;
 - effective protection and enhancement of the environment;

- prudent use of natural resources; and
- maintaining high and stable levels of economic growth and employment

Response

It is considered the proposal for a wind turbine complies with this guidance.

Planning Policy Statement 22 - Renewable Energy (2004)

The Key Principles identified in PPS22 for Local Planning Authorities to follow in their approach to planning for renewable energy are as follows:

(i) Renewable energy developments should be capable of being accommodated throughout England in locations where the technology is viable and environmental, economic, and social impacts can be addressed satisfactorily.

(ii) **Regional spatial strategies and local development documents should contain policies designed to promote and encourage, rather than restrict, the development of renewable energy resources.** Regional planning bodies and local planning authorities should recognise the full range of renewable energy sources, their differing characteristics, locational requirements and the potential for exploiting them subject to appropriate environmental safeguards

(iii) At the local level, planning authorities should set out the criteria that will be applied in assessing applications for planning permission for renewable energy projects. **Planning policies that rule out or place constraints on the development of all, or specific types of, renewable energy technologies should not be included in regional spatial strategies or local development documents without sufficient reasoned justification.** The Government may intervene in the plan making process where it considers that the constraints being proposed by local authorities are too great or have been poorly justified

(iv) **The wider environmental and economic benefits of all proposals for renewable energy projects, whatever their scale, are material considerations that should be given significant weight in determining whether proposals should be granted planning permission.**

(v) Regional planning bodies and local planning authorities should not make assumptions about the technical and commercial feasibility of renewable energy projects (e.g. identifying generalised locations for development based on mean wind speeds). Technological change can mean that sites currently excluded as locations for particular types of renewable energy development may in future be suitable.

(vi) Small-scale projects can provide a limited but valuable contribution to overall outputs of renewable energy and to meeting energy needs both locally and nationally. **Planning authorities should not therefore reject planning applications simply because the level of output is small.**

(vii) **Local planning authorities, regional stakeholders and Local Strategic Partnerships should foster community involvement in renewable energy projects and seek to promote knowledge of and greater acceptance by the public of prospective renewable energy developments that are appropriately located.** Developers of renewable energy projects should engage in active consultation and discussion with local communities at an early stage in the planning process, and before any planning application is formally submitted

(viii) Development proposals should demonstrate any environmental, economic and social benefits as well as how any environmental and social impacts have been minimized through careful consideration of location, scale, design and other measures.

Response

With regard to the current proposal for a wind turbine, points iv) and vi) above are of particular relevance. The smaller output of electricity should be considered to have real value and provides the optimum balance between sufficiently viable and sustainable energy production and minimal impact upon the landscape and Green Belt openness.

The site allows the environmental and social impacts to interested stakeholders to be minimised through extremely careful consideration of location and siting and with the mast being considered a "small" scale turbine we believe the design is also in accordance with the relevant policy.

PPS 22- A Companion Guide – Planning for Renewable Energy

Community Involvement

The government advises that, at its simplest level, a community involvement process should ensure that people:

- Have access to information
- Can put forward their own ideas and feel confident that there is a process for considering ideas;
- Can take active part in developing proposals and options;
- Can comment on formal proposals; and
- Get feedback and be informed about progress and outcomes

"There are many methods of community involvement that may be appropriate at different stages of the planning process. Under the planning system, applicants for significant development proposals are also required to undertake a certain amount of community consultation."

"Local Authorities will have the power to identify the level of community involvement they consider appropriate for different types of "significant" planning application".

Response

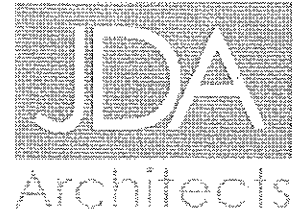
Whilst the applicant has no objection in the community sharing the relevant information, and respond to the planning application in the normal way. The scale of the proposal for a "small" turbine does not represent a "significant" application – and therefore should not be burdened with cumbersome large scale "Community Involvement" scenario

Environmental Impact Assessment (EIA)

DETR Circular 02/99 Environmental Assessment suggests that a formal EIA is more likely to be Required if a wind farm has more than five turbine or if its generating capacity is greater than 5 MW.

PPG 9 on Nature Conservation advises that In practice the effect of a Schedule 2 development on an SSSI will often be such as to require EA. Whilst each case should be judged on its merits, EA would normally be required where a Ramsar site or a potential or classified SPA, or a candidate, agreed or designated SAC could be affected

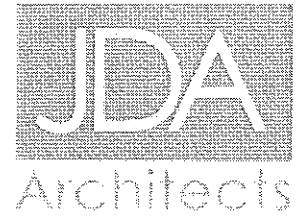
A companion Guide to PPS22 "Planning for Renewable Energy" section 5.16 states "smaller renewable energy applications that do not require full environmental assessment, landscape and visual assessment should be considered"



Response

In this case the application is for one wind turbine (10kW each) of far less than 1MW capacity, and therefore should not require an Environmental Impact Assessment. However the consideration of this small scale turbine is offered within this document and the accompanying photographs.

(1megawatt = 1000 kilowatts)



Local Policy



LOCAL POLICY – RIBBLE VALLEY BOROUGH COUNCIL

Development Plan Considerations

Regional

Regional Planning Guidance 13: North West England
Regional Spatial Strategy 13 (Draft): North West Plan

County

Cumbria & Lake District Joint Structure Plan (2001-2016)
Cumbria Wind Energy Supplementary Planning Document (draft 2006)

District

- Policy G1 - Development Control
- Policy ENV1 - Forest of Bowland AONB
- Policy ENV24 - Renewable Energy
- Policy ENV 25 - Renewable Energy
- Policy ENV26 - Wind Energy

POLICY ENV1 States:-

The landscape and character of the Forest of Bowland Area of Outstanding Natural Beauty will be protected, conserved and enhanced. In addition development will also need to contribute to the conservation of the natural beauty of the area. The environmental effects of proposals will be a major consideration and the design, materials, scale, massing and landscaping of development will be important factors in deciding planning applications (see Policy G1) The protection, conservation and

The principal duties of the local planning authorities that administer this area are the conservation and enhancement of its natural beauty. This does not mean that no development will be allowed in the area.

Indeed other policies in this plan accept that there is a need for development to allow for appropriate employment generating facilities, countryside recreation opportunities and housing for those in need.

Response

The development site sits within an area of Outstanding Natural Beauty, within a landscape of agricultural farmland. It is acknowledged that wind turbines are not a traditional structure however the size and output of the turbine reflects the power requirements of the farm and the ability to provide excess electricity to the national grid.

The Cumbria & Lake district joint structure plan allows for the consideration of small turbine with a hub height of up to 25m. In this case the hub height is 15m.

The Lancashire Joint Structure Plan, supplementary study "Landscape Sensitivity to Wind Energy Development in Lancashire" does not preclude developments in sensitive areas however it does place emphasis on the appropriateness of the location and development scale.

With the careful siting and scale of the turbine, the proposal will have very little impact (if any) on the landscape of the forest of Bowland AONB and will therefore not be contrary to policy.

The proposal is a 'small' scale turbine within agricultural fields providing power to assist with the employment and economic sustainability of the farm, and therefore complies with the policy without a detrimental impact on the AONB.

POLICY ENV24 States :-

In view of the general environmental benefits associated with harnessing renewable energy sources, the Borough Council will support the development of renewable energy schemes provided it can be shown that such developments would not cause unacceptable harm to interests of acknowledged importance in the local environment.

The Government's policy is to stimulate the development of new and renewable energy sources wherever they have prospects of being economically attractive and environmentally acceptable in order to contribute to:- diverse, secure and sustainable energy supplies; reduction in the emission of pollutants; and encouragement of internationally competitive industries. National planning policy guidance is set out in PPG22 together with technical annexes

The Borough Council acknowledge that new and renewable energy sources can potentially contribute to energy needs in a significant and sustainable way. Renewable energy sources offer the hope of increasing diversity and security of supply, and of reducing harmful emissions to the environment.

Response

The proposal is a 'small' scale turbine within agricultural fields, as such will not cause harm to interests of acknowledged importance, and will economically attractive and environmentally acceptable sustainable energy supply. The Council should therefore support this application.

POLICY ENV25 States:-

In assessing proposals for renewable energy schemes, the Borough Council will have particular regard to the following issues:

(ii) the measures that would be taken, during and after construction, to minimise the impact of the development on local land use and residential amenity;

(iii) the local and wider benefits the proposal may bring; and

(iv) the fact that certain renewable energy resources can only be harnessed where the resource occurs.

(i) The immediate and wider impact of the proposed development on the landscape; and AONB in particular the need to protect features and areas of natural, cultural, historic and archaeological interest;

Response

The proposal will have minimal impact in the existing field only requiring a minimal amount of excavation during the construction period, and no requirement for either a permanent or temporary access road

The local and wider benefits include:

- *Reduction of carbon dioxide emissions in order to slow climate change;*
- *A reduction in the use of fossil fuels.*
- *Reduction of the country's dependence on traditional energy sources:*
- *Energy Production from wind turbines occurs at times of peak electricity demand, e.g. cold, windy winter days.*

The location is ideal with a local wind speed of 5.8m/s at 10m above ground level.

There are no local cultural, historical or archaeological features which will be impacted.

WIND ENERGY

POLICY ENV26 States:-

The Borough Council will approve proposals for wind turbine generators providing:

1) About the Proposal

- i) the visual impact of the proposal on the wider landscape is justifiable;**
- ii) the proposal does not harm any wildlife habitat or area of historical or architectural importance;**
- iii) the degree of nuisance caused by noise and shadow flicker to nearby residential amenities, agricultural operations, recreational areas or the function of the countryside is minimal;**
- iv) the proposal does not interfere with electromagnetic signals;**
- v) the design, colour layout and scale of turbines and ancillary structures including access roads must be appropriate to the character of the area;**
- vi) connections to electrical grids and sub stations etc. must be acceptable in the landscape setting;**
- vii) adequate restoration and after use provision must be made:**
- iii) suitable parking facilities should be provided where appropriate**

Response

The turbine is of a small scale and appropriate to the agricultural landscape having minimal visual impact on the wider landscape

The accompanying documentation proves that the turbine is located appropriately away from any wildlife habitat – trees hedges etc, as can be seen from the impact assessment drawings. Similarly there are no structures of historic or architectural importance in the near vicinity.

The impact assessment drawings indicate that noise and shadow flicker will not impact upon residential amenity

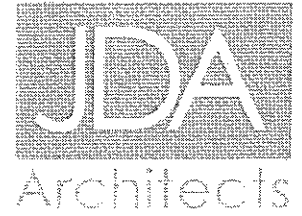
The turbine is of minimal size and do not impact upon electromagnetic fields and have previously been successfully located in close proximity to telephone masts at TV transmission towers

There will be no requirement for a sub-station and the turbine can easily be connected to the electrical grid at the farm with underground cables.

The land can be easily restored to its previous condition, by simply "grubbing up" the foundations and replacing the topsoil should the turbines no longer be required.

Parking facilities will not be required other than short term building contractor's plant in the field.

We therefore believe that the proposal for a wind turbines used by the farm and its associated agricultural uses is wholly consistent with Policy and the suggestion of sustainable and inclusive development. The accompanying documents prove that there is no significant noise, or other impact on local residents including the applicant. Similarly the accompanying documents prove that the proposals do not adversely impact on key land resources, or the natural landscape, and therefore the council should support the application.



5. Economic, Social and Environmental Assessment of the proposed Development

5. Economic, Social and Environmental Assessment of the proposed Development

Economic benefits

It is proposed that the wind turbine will produce electricity for the residential unit on the site and for the agricultural working of the site. The electricity produced will replace/reduce the mains electricity supplied to the farm and reduce the running costs over time.

It is also proposed that a 'small' turbine will generate an income from the sale of any surplus electricity generated at times when the turbines are operational but demand is low which would be exported back to the National Grid for public distribution via the District Network Operator for the benefit of the community.

Indirect benefits include marketing the local area as "forward thinking" and "green".

- Job creation: direct & indirect
- Increased security and reliability of supply
- Cheaper fuel bills
- Increased income for landowners
- Farm diversification/revitalisation

Social Benefits

Installing the wind turbine will provide the Farm with an alternative source of electricity ensuring that the farm will have power for lighting, heating and machinery into the future, assisting in the retention of employment in a rural area and contributing to social stability

The turbine will offer educational opportunities, leading to a wider awareness of renewable energy and an increased interest in environmental issues

The turbine will also assist the government in meeting the regional and national targets for increasing the proportion of energy from renewable sources.

Indirect benefits include marketing the local area as "forward thinking" and "green".

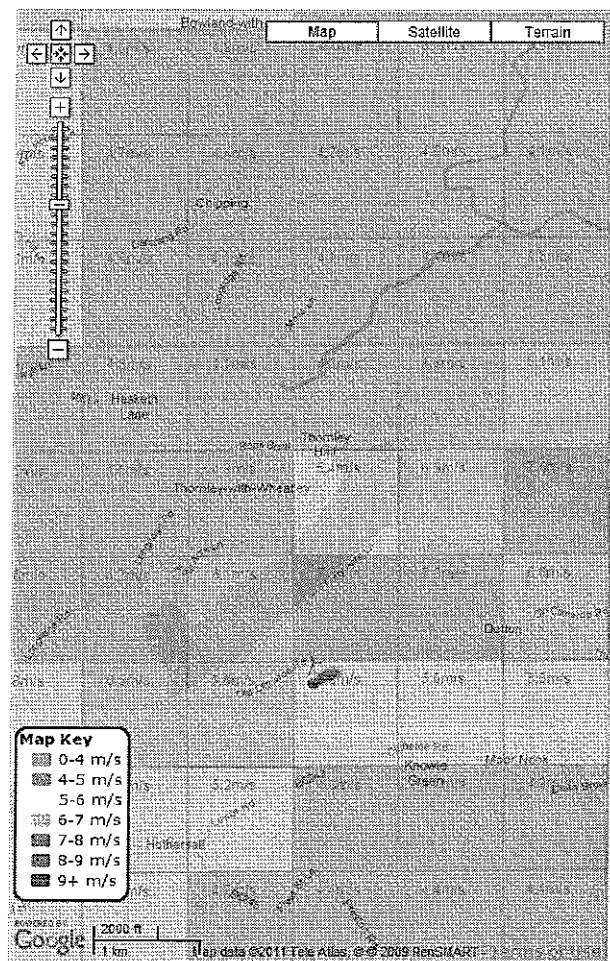
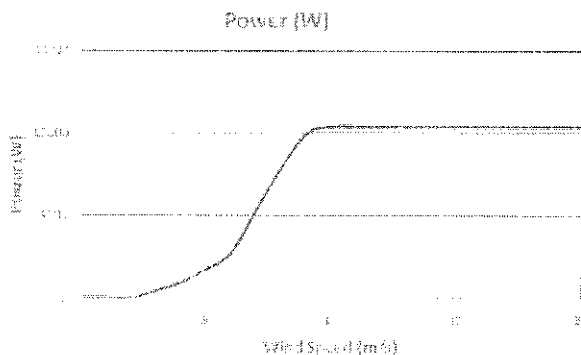
Environmental Benefits

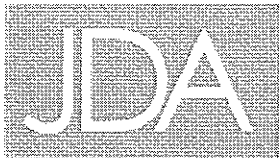
The wind turbine will produce 30,400KwH of renewable energy per turbines (based upon manufacturer's literature at a wind speed of 6m/s) typical at this site for use by the farm annually. This will have a direct impact on reducing carbon emissions and thus reducing the rate of global change. Other benefits will be improved air quality through the reduction in the use of fossil fuels and a reduction in landfill associated with traditional energy providers waste.

- Reducing carbon emissions
- Air quality improvements
- Landfill reduction

Where the turbine has produced more energy in excess of what is required at the property the surplus energy is exported back to the National Grid for redistribution. The Inspector's report for the appeal application at Upper Prospect Farm (APP/Z4718/A10/2138246) acknowledged that 'the proposal would secure very significant benefits through the generation of electricity from a renewable source.' He considered "these benefits to be a consideration that clearly outweighs any harm by reason of inappropriateness, and other harm identified." The inspector also stressed that electricity exported to the grid, in addition to that generated to support the farm, serviced to 'magnify' benefits and not diminish it.'

Power Curve





6. Noise

Planning Policy Statement 22 Companion Guide states:-

"Well-specified and well-designed wind farms should be located so that increases in ambient noise levels around noise-sensitive developments are kept to acceptable levels with relation to existing background noise. This will normally be achieved through good design for the turbines and through allowing sufficient distance between the turbines and any existing noise-sensitive development, so that noise from the turbines will not normally be significant. Noise levels from turbines are generally low and, under most operating conditions, it is likely that turbine noise would be completely masked by wind-generated background noise"

There are two quite distinct types of noise within a wind turbine. The mechanical noise produced by the gearbox, generator and other parts of the drive train; and the aerodynamic noise produced by the passage of the blades through the air. Since the early 1990s there has been a significant reduction in the mechanical noise generated by wind turbines and it is now usually less than, or of a similar level to, the aerodynamic noise. Aerodynamic noise from wind turbines is generally unobtrusive – it is broad-band in nature and in this respect is similar to, for example, the noise of wind in trees "

There is no evidence that ground transmitted low frequency noise from wind turbines is at a sufficient level to be harmful to human health.

A study found that:

- Vibration levels 100m from the nearest turbine were a factor of 10 less than those recommended for human exposure in critical buildings, (i.e. laboratories for precision measurement)
- Tones above 30 Hz were found to attenuate rapidly with distance – the higher frequencies attenuating at a progressively increasing rate.

Noise Assessment

A site visit was made to identify the most suitable design and location for the turbine. The site chosen maximises the exposure to the prevailing winds and minimises the risk of turbulence from trees or buildings in the vicinity.

Background Noise levels

The installation has been appropriately specified, designed and located to allow sufficient distance between the turbine and any existing noise-sensitive developments – the only residence within audible distance is the applicants own farm and as such the noise from the generator will not be a nuisance or a material consideration in deciding the planning application.

Predicted noise levels

The manufacturers of the turbines have focused on minimising noise output throughout the operating range of turbines. The manufacturer's noise specification is attached as an Appendix.

The only noise that is audible is the gentle 'swooshing' noise of the blades cutting through the air. Whilst it is not possible to eradicate this noise completely, the blades are designed to be aerodynamic so cutting through the air and reducing noise levels. Due to the proposed site for these wind turbines it is extremely unlikely that local residents would be troubled by any noise generated.

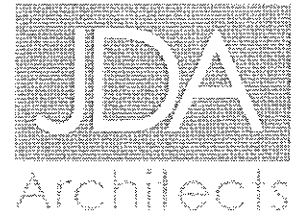
See Appendix 5 – Acoustic Report & Noise Data, Evoco 10kW Wind Turbine Generator - Noise - indicative site suitability guidance Report prepared by M Potts BSc (Hons), MSc, MIOA, and Browns Farm Turbines Noise Assessment prepared by Echo Acoustics

Proposed mitigation/compensation

No mitigation or compensation is required.

Conclusion

The proposed wind turbine can be constructed at the proposed location and operated in accordance with best practice without causing nuisance or materially affecting the amenity of others



7. Shadow Flicker

7. Shadow Flicker

Site Appraisal

Planning Policy Statement 22 Companion Guide states:-

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

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 depend upon:

- *The direction of the resident 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 turbine operates*
- *The frequency of bright sunshine and cloudless skies (particularly at low elevations above the horizon); and*
- *The prevailing wind direction*

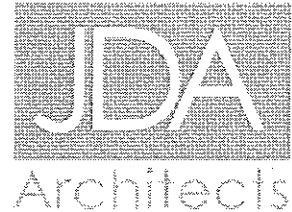
Only properties within 130 degrees either side of north, relative to the turbine can be affected at these latitudes in the UK – turbines do not cast long shadows on their southern side.

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*

Shadow flicker can be mitigated by siting wind turbine at sufficient distance from residences likely to be affected. Flicker effects have been proven to occur only within ten rotor diameters of a turbine. Therefore, if the turbine has 80m diameter blades, the potential shadow flicker effect could be felt up to 800m from a turbine.

Around 0.5% of the population is epileptic and of these around 5% are photo-sensitive. Of photo-sensitive epileptics less than 5% are sensitive to lower frequencies of 2.5-3 Hz, the remainder are sensitive only to higher frequencies. The flicker caused by wind turbine/s is equal to the blade passing frequency. A fast-moving three-bladed machine will give rise to the highest levels of flicker frequency. These levels are well below 2 Hz. The new generation of wind turbine is known to operate at levels of below 1 Hz.



Turbines can also cause flashes of reflected light which can be visible for some distance. Careful choice of blade colour and surface finish can help reduce the effect. Light grey semi-matt finishes are often used for this.

Summary

Shadow flicker occurs when the rotating blades of the turbine interrupt the light from the sun. The effect occurs early in the morning and late in the evening and is more likely in the winter months when the sun is lower in the sky casting shadows further.

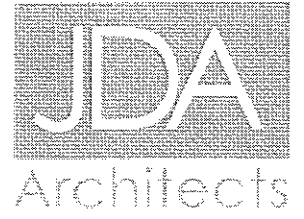
Care should be taken to ensure that any property within 96m of the turbine at a direction from 130degrees west and 130degrees east does not have a light sensitive outlook towards the turbine.

An assessment of the site shows that the nearest property to the turbines is the applicants own farm and this is 80m from the turbines, as this is the only property affected by the shadow flicker there is no need for mitigation.

Conclusion

The drawings in the appendices give a more accurate guide to potential shadow flicker zones. Only the applicant's property is affected.

In this case, the separation distance to all other sensitive receptors is well in excess of the recommendations and demonstrates that shadow flicker is not a material consideration in the determination of this case



8. Historic and Cultural Assets

8. Historic and Cultural Assets

Site Appraisal

The field where the turbine is to be located is currently used for agricultural purposes.

Predicted Impacts

- No listed buildings are affected by the proposed construction or operation of the turbine.
- The location is not within a conservation area.
- No scheduled monuments or known sites of archaeological interest are affected by the proposed construction or operation of the turbine.

Measures to be taken

The applicant wishes to assist the local planning authority to meet the ambitions of PPS16 (Planning and Archaeology). Accordingly during excavation of the void for the base of the turbine should any building foundations, artefacts or other unusual finds be made then these will be notified to the County Archaeologist in accordance with the Code of practice.

Conclusion

There are no foreseeable impacts that will affect any built or cultural heritage assets but measures implemented during the construction stages will ensure that any artefacts found can be identified and recorded

9. Ecology and Hydrology

9. Ecology and Hydrology

Site Appraisal

The turbine has been located in an open field that is currently used for agricultural purposes. With the nature of the farming practices that take place, no species have been able to establish long term habitats on the field floor and therefore there are no species or habitats of value that will be affected by the construction or operation of the turbine.

Searching the natural England website shows that the site is:

- Not within a Nature reserve or Country Park
- Not a site of special scientific interest (SSSI)
- Not a Ramsar site
- Not in a Biosphere reserve
- Not in a special protection area
- Not in a RSPB reserve
- Not in a traditional orchard
- Part of an Agri-environment scheme namely the Environmental Stewardship Scheme (ESS) and allocated as (ELS) entry level stewardship
- Allocated as Less Favoured Area under the Statutory Rural Designations
- The land and general vicinity of the turbine is not designated as having any local, regional, national or international ecological interest.
- The locality contains no locally rare or protected species of plant, animal or bird.
- There are no nearby sites designated for ecological value.
- No ecological assets of any significance will be affected by the construction or operation of the turbines

Birds and Bats

Planning Policy Statement 22 Companion Guide states:-

"The impact of a wind farm on the local ecology should be minimal. A typical wind farm will usually leave the land between the turbines totally unaffected. There is little evidence that domesticated or wild animals will be affected by a wind farm – indeed, there are examples of cows and sheep grazing right up to the base of turbine/s

PPG9 on nature conservation gives advice about the inter-relationship between nature conservation and development control. Apart from the movement of the blades, the development of wind turbine/s warrants no different approach in terms of ecological considerations from any other development. Evidence suggests that the risk of collision between moving turbines blades and birds is minimal both for migrating birds and for local habitats. The attention of local planning authorities and developers is particularly drawn to the "Ramsar Convention on Wetlands of International Importance (Cmnd 6465)", EC Council Directive on the Conservation of Wild Birds (Directive 79/409/EEC), the EC Council Directive on the conservation of natural habitats and of wild fauna and flora (92/43/EEC) and the Berne Convention on the Conservation of European Wildlife and Natural Habitats

Experience indicates that bird species and their habitats are rarely affected by wind turbine/s developments and the impact of an appropriately designed and located wind farm on the local bird life should, in most cases, be minimal. To date, the most common concern has been the risk of 'bird strike', i.e. birds flying through the area swept by the blades and being hit, causing injury or death. This is most likely to occur if a wind turbine/s is erected directly in a migration path, or where there are high concentrations of particular species, (i.e. birds feeding). Most birds in flight can be expected to take action to avoid obstacles but different species will vary in their reaction."

Natural England have produced "Bats and onshore wind turbines" technical information note TIN051. This technical note states that:

"Evidence in Britain is that most bat activity is in close proximity to habitat features. Research has shown that bat activity declines at 35m from hedge / tree lines" (Natural England Technical Information Note TIN051).

The proposed location of the turbine has been chosen to meet the requirements set out in the Natural England Technical Information Note (TIN051), ensuring that the wind turbine blade tips are the recommended distance from the existing hedges/trees, to minimise/mitigate the risk to birds or bats whilst flying along the hedge rows to feed. This has been calculated using Natural England Formulae in TIN051. For these particular turbines, the distance is 55m from hedge/tree lines.

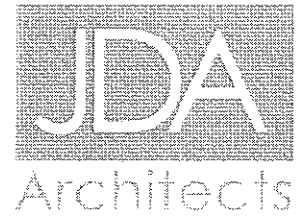
Predicted Impacts

A small amount of excavation will be required for the concrete base to anchor the turbine tower. Any excavated subsoil will be retained on the farm and the topsoil will be spread around the tower on completion of the construction and cultivated to marry in with the surrounding undisturbed adjoining agricultural land.

No designated main rivers, private watercourses, or ground Water Protection zones will be materially affected by the construction of the concrete pads to support the turbines.

Conclusion

The site plan indicates an area of potential bird and bat impact, and proves that no trees or hedgerows are in close proximity. The proposed construction and operation of the turbine can be carried out without having an impact on the ecology or hydrology of the site.



10. Public Safety and security

10. Public Safety and security

Site Appraisal

There are no public footpaths or bridleways in or near to the field where the turbine is to be located.

Predicted Impacts

The wind turbine are erected in accordance with manufacturer's instructions are stable and safe structures. In accordance with best practice the turbine has been located to achieve a setback of at least fall over distance from nearby roads, buildings, paths and public access routes.

Planning Policy Statement 22 Companion Guide states:-

"The minimum desirable distance between wind turbine and occupied buildings to meet safety requirements will be far less than the distances required to mitigate noise and visual impacts. Experience indicates that properly designed and maintained wind turbine is a safe technology. The very few accidents that have occurred involving injury to humans have been caused by failure to observe manufacturers' and operators' instructions for operation of the machines. There has been no example of injury to a member of the public.

The only source of possible danger to human or animal life from a wind turbine/s would be the loss of a piece of the blade, or, in most exceptional circumstances, of the whole blade. Many blades are composite structures with no bolts or other separate components. Blade failure is therefore most unlikely. Even for blades with separate control surfaces on or comprising the tips of the blade, separation is most unlikely.

The minimum desirable distance between wind turbine and occupied buildings calculated on the basis of expected noise levels and visual impact will often be greater than that necessary to meet safety requirements. Fall over distance (i.e. the height of the turbine to the tip of the blade) plus 10% is often used as a safe separation distance."

Measures to be taken

No additional measure to those already proposed

Conclusion

The measures already proposed for the location, construction and operation of the turbine will effectively manage any risks to local public safety and security.

11. Landscape and Visual Assessment

11. Landscape and Visual Assessment

Bearing in mind the size and scale of this proposal for a single 'small' wind turbine, a fully detailed assessment of the landscape and visual impacts is not considered appropriate or necessary by European and UK legislation.

Landscape Character

According to the Defra's 'Magic' Service the landscape character of the area is "neutral and acid pastures and deciduous woodlands; acid communities, such as bracken and gorse in the uplands". The soilscape is "freely draining slightly acid loamy soils". The main landcover is "arable and grassland".

The landscape character of the area based upon the "Lancashire County Councils Landscape Character Assessment Map" for the Forest of Bowland Area of Outstanding Natural Beauty is "Moorland Fringe" and has a "Moderate to High Sensitivity to wind energy development".

The 'Forest of Bowland AONB landscape Character Assessment' (September 2009) identifies the key characteristics of the area as;

1. *'Traditional stone field barns are a recognisable landscape feature.'*
2. *'Dry stone walls of rough-hewn blocks create strong patterns within the landscape and reflect the underlying geology.'*
3. *'Sheep grazing is the predominant land use, interspersed in places with a patchwork of traditionally managed meadows, wet rushy pastures, in-byes and acid grassland.'*

The site is classed as "less Favoured" or "Disadvantaged land".

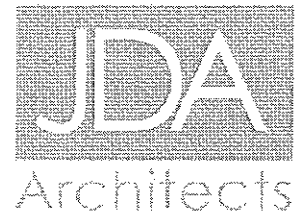
Disadvantaged land means land;

- Which is, in the opinion of the appropriate Minister, inherently suitable for extensive livestock production but not for the production of crops in quantity materially greater than that necessary to feed such livestock as being capable of being maintained on such land, and
- Whole agricultural production is, in the opinion of the appropriate Minister, restricted in its range by, or by any combination of, soil, relief, aspect or climate.

Impact on the visual landscape

It must be noted that one of the main benefits of wind turbine are that they do not have a permanent impact on the environment. Once the turbines ceases to produce electricity it can be removed and the land can be returned to its former condition.

It is believed that the erection of the wind turbine would not dominate the appearance of the surrounding landscape to the extent that it would seriously harm the appreciation of the landscape from either individual dwellings or the settlements as a whole. The photo graphs in the Appendices highlight this.



As mentioned above in the Design and Access statement the site has been chosen so that visual impact is kept at a minimum without compromise to wind speed and power output. The location of the turbines has been kept near to the farm complex, thereby creating less of a visual impact on the landscape. The careful design and structure of the micro wind turbine creates an appearance that is aesthetically pleasing to the eye. The design and colour minimises the visibility of the structure, mitigating the impact of the turbine.

Landform – The landform in the vicinity of the farm is smooth, convex and free flowing and therefore less sensitive to the installation of wind energy.

Landcover – the landcover in the vicinity of the farm is simple, uncluttered with extensive areas of consistent ground cover separated by stone walls and rows of tree lining roads and surrounding properties and is therefore less sensitive to the installation of wind energy.

Skylines & settings – The Skylines & settings in the vicinity of the farm are not prominent and have already been affected by built development with local farms and villages, and are therefore less sensitive to the installation of wind energy. The Silo adjacent to The Hills Farm located to the North East of the turbine is a wider vertical feature on the landscape and proves that the turbine is not an incongruous feature on the landscape and also prevents views of the turbine from the North East...

Visibility & Views – The Visibility & Views in the vicinity of the farm is open and we accept that the turbine can be seen from a number of vantage points in the surrounding area, however the general distance of these vantage points show the turbine as a small vertical structure in close proximity to Browns Farm, and in some instances it appears as the turbine is within the farm complex limiting its impact on the landscape. The nearest road and public foot path is located over 100 metres away to the North and West, views onto the site from the road show an incline up towards the site and then a decline forming a barrier which will help screen the turbines.

The location of the turbine in comparison to local sensitive receptors such as neighbouring properties has helped determine the final location of the turbine, its location takes advantage of the rising landform to limit overall views of the turbine at eye level and means that views from ground floor windows should not be effected by the introduction of the turbine.

The visibility of the wind turbine from a long distance will have minimal impact on the overall visual quality of the area and on the existing character of the landscape; examples of a number of viewpoints onto the site are included in Appendix 7.

The 'Forest of Bowland AONB landscape Character Assessment' (September 2009) describes the 'Moorland Fringe' as having 'isolated farmsteads' and 'a general absence of hamlets or villages', these features help bring a feeling of exposure and openness to the landscape. Although this may be the case in other 'Moorland Fringe' areas we argue that the local landscape surrounding the site of the turbine has already been affected by the built environment and natural elements which reduces the feeling of exposure and openness. The general proximity of surrounding properties tied in with the nearby town of Longridge and Golf Course all help to reduce the isolated appearance, coupled with the tree lines which appear around properties and on Higher Road which are an unusual feature within the 'Moorland Fringe' prove that the turbine would not be an incongruous feature on the landscape.

We do accept that the erection of the turbine will introduce a new feature on the landscape and during the planning process we have removed the second proposed turbine to help limit its impact over a wider area, remove the potential 'picture-framing' effect two turbines can create and reduce the cumulative effect two turbines could have on the landscape. Finally the slender nature of the turbine allows good visual permeability and retains the distant views to and from the Forest of Bowland AONB; the single solitary vertical structure would help reinforce the feeling on isolation of the landscape in keeping with the characteristic detailed in the 'Forest of Bowland AONB landscape Character Assessment' (September 2009). The design and scale of the turbine will mean that the overall landscape will remain unchanged.

Capacity Assessment

Turbine groupings
Single – 1 turbine
Small group – up to 3 turbines
Small wind farm – up to 5 turbines
Medium wind farm – 6 to 10 turbines
Large wind farm – 11 to 20 turbines
Very large wind farm – 21 to 30 turbines
Turbine height
Very small – 25m or less to blade tip (average power rating around 12kW)
Small – 25-60m to blade tip (average power rating around 0.5MW)
Medium – 60-90m to blade tip (average power rating around 1MW)
Large – 90-130m to blade tip (average power rating around 2.5MW)

The proposal is for a single "very small" turbine.

Conclusion

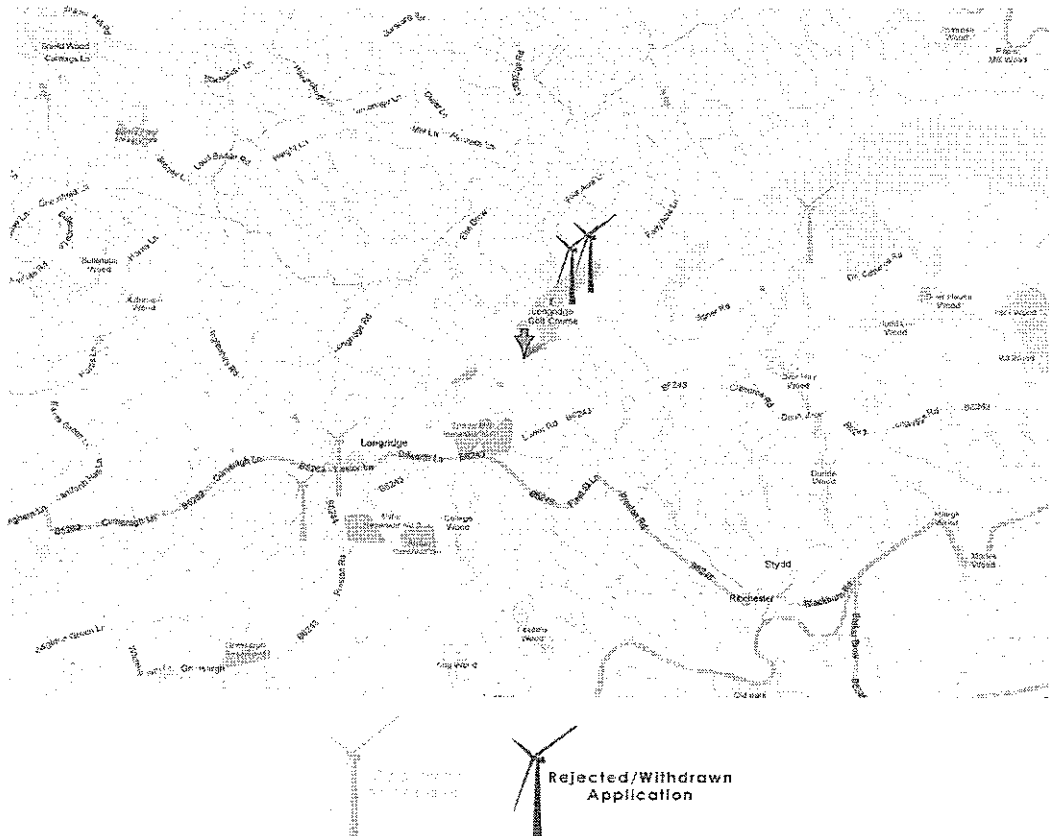
With the Landscape character type proving that the area has the capacity to absorb "very small" scale turbines, the application should be considered appropriate development. We argue that the introduction of the wind turbine into the landscape will not affect any of the key characteristics described in the 'Forest of Bowland AONB landscape Character Assessment' (September 2009).

Cumulative impact

Paragraph 21 of PPS22 refers to the need to take account of the cumulative effect of any wind generation projects.

Cumulative effect:

"The impact in which a series of wind turbines have an effect greater than the sum of their individual effects, when the relationship between the two can be expressed in linear form".



A desktop study of wind turbine applications has found the following;

Within 1.5km from the application site;

3/2012/0161 - The erection of one Endurance E-3120 24.6m (34.2m to blade tip) high wind turbine at Forty Acre Farm, PR3 2TU – Application Invalid (approximately 1Km to the North East)

3/2011/1069 - Erection of 12Kw small scale wind turbine at Stonecroft, PR3 2TU – Application Withdrawn (approximately 1.5Km to the North East)

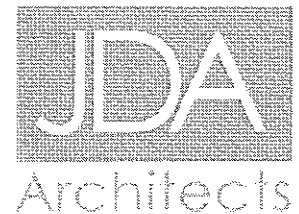
3/2010/0127 - Proposed wind turbine on a free standing 15m mast on the grounds of the Dutton Doghouse, PR3 2YU – Application Approved (over 3 Km to the North East)

3/2004/1071 - Erection of 15m high wind turbine at Longridge High School, PR3 3AR – Application Approved (Approximately 2.6km to the South West)

3/2006/0980 - Installation of wind turbine to apex of roof at 46 Mardale Road, PR3 3EU – Application Approved (over 3 Km to the South West)

Other Wind Turbine Related Applications;

3/2011/0964 - Request for screening opinion re: installation of a 50kw 25m high wind turbine at Hills Farm, PR3 2YX – Application Pending (Approximately 190m to the West)



3/2010/0975 - Application for a non-material amendment to planning consent 3/2010/0127P to allow the substitution of the previously approved 15m Eoltec wind turbine, with a C&F Green Energy CF6e wind turbine at Moor Game Hall, PR3 2YU – Application Approved (over 3 Km to the North East)

The study has found two wind turbine applications and one screening opinion within 1.5km of the proposed site; none of the applications are operational. The study has also found three wind turbine applications and one non-material amendment application over 1.5km away from the proposed site, all of which have been approved and are operational

The introduction of the proposed turbine into the landscape compared to those already in operation will have a minimal cumulative impact on the surrounding, the 'very small' size of the turbine, the sheer distances involved and the landscape topography of the site and locality in general it is felt that the cumulative impact of the proposed turbine will be minimal. We argue that The locations of existing turbine siting lower on the landscape (especially Longridge High School and 46 Mardale Close) compared to the proposed turbine would limit collective views of the structures, the proposed turbine is also in keeping with the existing turbine being of the same size and shape

The introduction of other larger vertical features within a close proximity to the proposed turbine, especially on the South facing hillside has the risk of increasing the cumulative effect; the decision by the applicant to reduce the number of turbines from two to one is to address this fact and promotes the solitary and exposed characteristic of the 'Moorland Fringe' landscape.

The visibility of the wind turbines from a long distance will have minimal impact on the overall visual quality of the area and on the existing character of the landscape. The photomontage provided with the application gives an indication of how the turbines will feature on the landscape complementing the varied vertical features on the local landscape, both built and natural.

The design and scale of the turbines will mean that the overall landscape will remain unchanged. Their position away from other existing turbine reduces their cumulative effect and limits opportunity to view the proposed turbine with any other turbine development.

The erection of the turbine will have little effect on access issues or amenity in the local vicinity.

Conclusion

The submission demonstrates that the turbine can be constructed and operated with minimal impact on the character and value of the local landscape.

Precedents – Appeal Decisions

The following list summarises a number of national appeal decisions where inspectors have allowed turbines of similar size and number in or near areas of Green Belt, AONB and National Parks.

In all cases, the wind turbines are accepted to cause harm to the Greenbelt / AONB / National Parks and / or create an incongruous feature in the landscape. However the appeal inspector found that the significant benefits of renewable energy outweighed the localised harm.

Appeal Decision App/L3245/A/11/2164542

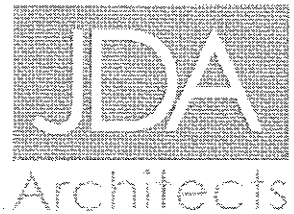
The main issues in this appeal are whether the proposed turbine would have a harmful effect on the character and quality of the landscape and on the outlook of neighbouring properties and, if so, whether this would be outweighed by the benefits associated with the generation of renewable energy. The proposed turbine would be a prominent, isolated feature in this agricultural landscape, being considerably taller and bulkier than the pole mounted power lines in the vicinity, and its stark utilitarian appearance would be out of keeping with the rural character of the area.

However, insofar as it would cause harm to the character and quality of the landscape and the outlook of neighbouring residents, the proposed turbine would run counter to the aims of Policy CS17 of the Shropshire Core Strategy which, amongst other things, seeks to protect the diversity, high quality and local character of Shropshire's natural environment. On the other hand there are benefits associated with the generation of renewable energy. This is recognised by Policies CS6 and CS8 of the Shropshire Core Strategy which seek to ensure that the need for renewable energy is adequately addressed and indeed encouraged where this does not have a significant adverse effect on the environment. Moreover, the Government recognises that climate change is the greatest long term challenge facing the country and urgent need for action at all levels is required. Planning Policy Statement 22: *Renewable Energy* (PPS 22) stresses that the increased development of renewable energy resources is vital to facilitating the delivery of the Government's commitments on climate change and renewable energy. Recognising that small-scale projects can provide a limited but valuable contribution to increasing the amount of renewable energy available, PPS 22 indicates that the wider environmental and economic benefits of all proposals for renewable energy should be given significant weight in determining their acceptability.

On balance, therefore, the harm to the character and quality of the countryside and to the views of neighbouring occupants would not be so significant as to outweigh the contribution it would make to the sum of renewable energy provision and the consequent mitigation of the adverse effects of climate change. In other words the conflict of the proposed turbine with Policy CS17 is overridden by its compliance with Policies CS6, CS8 and PPS22 and the proposed development would be in accordance with the Shropshire Core Strategy as a whole.

Appeal Decision APP/W9500/A/11/2149823

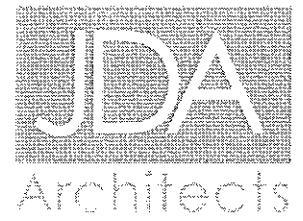
The main issue is the visual effect of the proposed wind turbine on the landscape and whether any harm in this regard is outweighed by wider social, environmental and economic benefits.



I believe that wherever the turbine was to be located, it would be visible to some extent as a vertical feature in the landscape. It would also need to be located some distance away from the buildings and caravan site to avoid noise disturbance. I attach great weight to the environmental and other benefits of the scheme as a renewable energy project.

However, having regard to the particular landscape characteristics of the locality, which are pleasant but not especially noteworthy, the relatively small size of the turbine and the very limited range of public viewpoints from where it could be seen, I am inclined to the view that the landscape impact of the proposed turbine is not so great that the benefits of the development are outweighed.

I conclude that it is acceptable. The appeal is allowed and planning permission is granted.



12. Access

Access

Site Appraisal

Planning Policy Statement 22 Companion Guide states:-

"The road access to a wind farm site will need to be able to accommodate trailers carrying the longest loads (usually blades), as well as the heaviest and widest loads (generally the cranes required in erection). Amendments to existing roads required to gain access to site should be detailed in any wind farm planning application.

On-site tracks need to meet the weight and dimensional requirements detailed above.

Larger hard standings are also required next to each turbine to act as bases for cranes during turbine erection and component lay down areas. These are generally treated as temporary features and are decommissioned after construction.

Transportation of the wind turbine, blades and tower to the farm will be via a standard lorry, using standard transport planning procedures to comply with Highway safety standards.

Vehicular access to the site is via the standard roads and onto the farm premises. This access route will be used to deliver the turbines and construction equipment to the farm. From the farm the turbines will be transported to its final location across a field utilising an existing track. There are no plans to excavate any soils to form additional tracks or hard standings. Should additional support be required this can be provided by temporary matting.

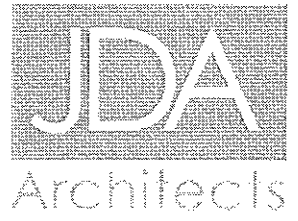
It should be noted that there are no requirements for a regular vehicle access to the turbine sites, other than for delivery and installation and decommissioning

The turbine site will not require any changes to the local highways for access or maintenance.

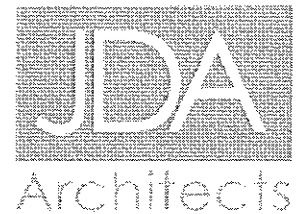
No extra traffic will be generated as a result of the installation other than the initial deliveries and annual maintenance visits.

Conclusion

The construction and operation of the turbines will have no detrimental effect on local highway network, and relatively easy access for 4x4 construction traffic onto the site is available without the need for the construction of any permanent access track.



13. Decommissioning



13. Decommissioning

The design of the turbine is such that when it comes to the end of their useful life (after approximately 20-25yrs), they can be refitted – subject to planning approval of any changes, or they can be dismantled with ease and the restoration of the site can be carried out without major disruption to the landscape.

The turbine and mast parts can be sent for recycling or repair and re-use

Concrete foundations can be “grubbed up” if required and removed from site, and the landscape returned to its natural condition.

Conclusion

The proposal is in accordance with national, regional and local development plan policy.

We feel that the proposal will have no negative effects on the local landscape due to the construction, design, materials and finishes to be used on the turbine

Compared with other “power station” generation apparatus, wind turbine offer an easy, economical method for complete removal, recycling and site restoration

14. Summary

14. SUMMARY

The introduction states that:

This statement aims to demonstrate that the proposed turbines provide environmental, economic and social benefits to the farm and the wider community. Any social impacts have been minimised through careful consideration of location, scale, design and various other site specific circumstances which provide the special circumstances to outweigh any perceived harm to the countryside

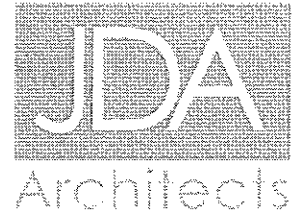
Planning Policy Guidance states that:-

The successful development of wind energy always entails detailed consideration of a number of factors.

- Access – can large delivery vehicles gain access to the site without major modifications to the public road network?
- Extent of site – is the site large enough to accommodate sufficient turbine? (As a rule of thumb, 1 km² of unconstrained land can accommodate 1.3MW turbines)
- Wind speed – Is there sufficient resource for a viable project?
- Planning permission – Is there a reasonable prospect of obtaining planning permission?
- Grid Connection – Is the grid infrastructure within a reasonable distance?
- Proximity to dwellings – Is the site constrained by a population centre or scattered dwellings?
- Air safeguarding and Electromagnetic Interference (EMI).
- Landscape and ecological designations.
- Meets the requirements of applicable development plan policies
- Does not compromise the reasons behind any relevant area designation, or if it does, provides a substantive case for allowing the project to proceed, (e.g. by demonstrating that any economic, social or environmental benefits clearly outweigh the reasons for the designation), and,
- Addresses the issue of visual impact and cumulative visual impact, where relevant

Environmental and economic benefits:

- The development will enable the farm to diversify in order to strengthen the business (helping rural business to stay in business and grow" is a key target of the RES
- Generating electricity will enable the farm to reduce costs, keeping the farm competitive in a tough market.



- Not only would the farm be providing their own electricity, excess energy would be supplied back into the National Grid, providing benefits for the community as a whole.
- By helping to sustain rural enterprise, it will enable the farm to continue to maintain and manage the landscape, thus helping to protect the character and appearance of the surrounding countryside for future generations.

CONCLUSION

The proposal is in accordance with national, regional and local development plan policy.

We feel that the proposal will have no negative effect on the local landscape due to the construction, design, materials and finishes to be used on the turbines

Compared with other "power station" generation apparatus, wind turbines offer an easy economical method for complete removal, recycling and site restoration

The Design and Access Statement section of this document provides supporting information to prove that the proposed turbine is of appropriate scale and appearance and that the project can be safely constructed on site.

National Policy is very supportive of reducing carbon dioxide emissions and advancing a low carbon economy and, in particular, PPS1, and PPS22 encourage local authorities to support wind turbine and wind farm development.

Local Policies again support sustainable inclusive development where developers provide evidence to support their proposals.

The economic, social and environmental benefits of wind turbine development projects are clearly stated in all national and local policies and numerous study papers

Noise and shadow flicker have been considered for the site and the combination of high specification equipment and siting have eliminated any nuisance to residents or the farm.

Based upon DEFRA site check reports there are no historic or cultural assets in the area of the proposed development

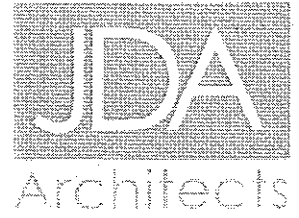
Research on the Ecology and Hydrology of the site and of the wind turbine has proved that the development will not have a negative impact

Public safety and security assessments have proved that turbines in general are safe structures and that the proposed location avoids any public footpaths, bridleways or buildings

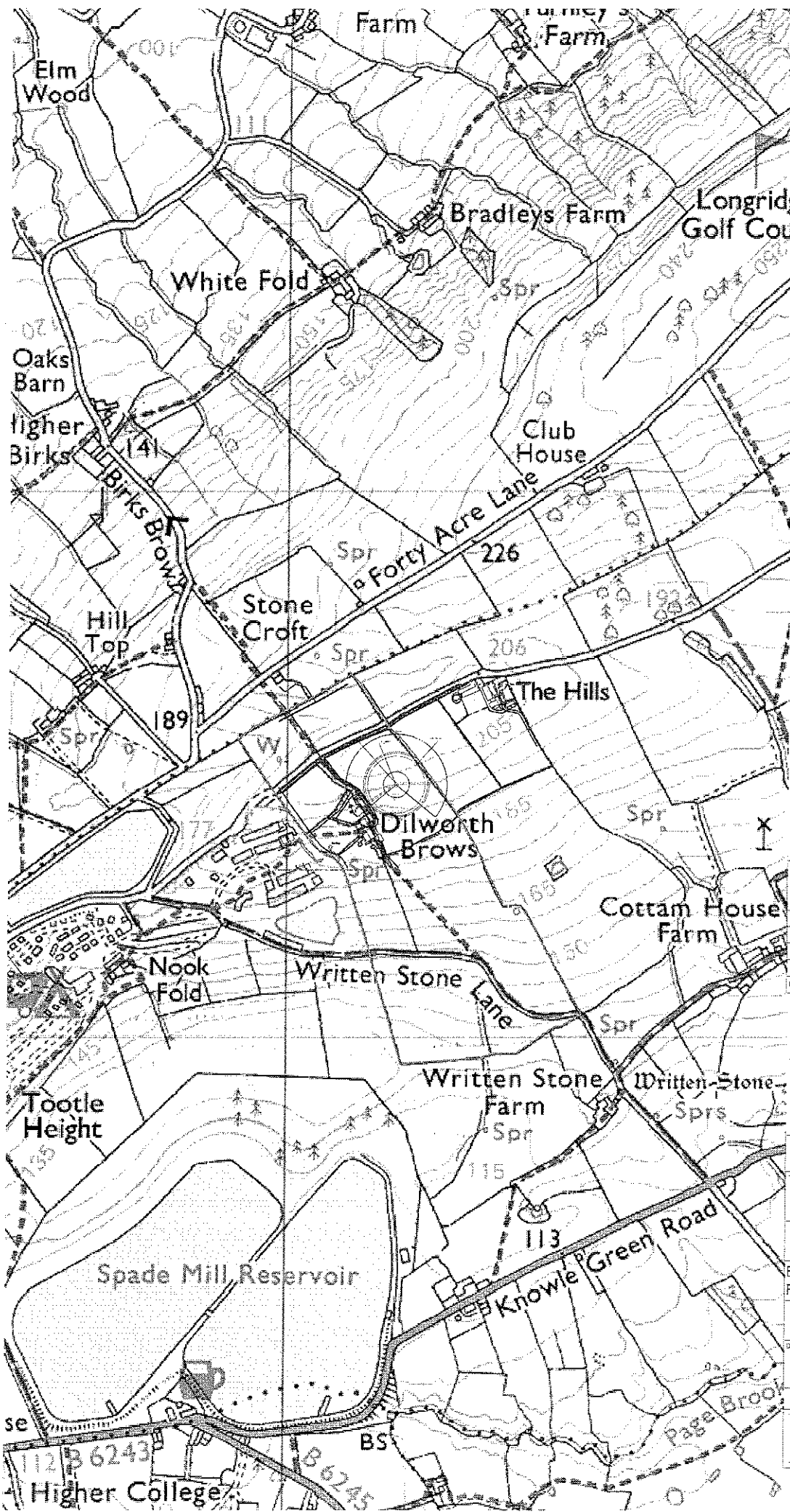
The proposed location is not a site of special scientific interest and therefore ideally suited for wind turbines development

The site is easily accessible for the standard vehicles that will be required to construct the wind turbines development and decommissioning can, just as earlier, be carried out as and when appropriate.

The proposals for the wind turbine provide many benefits to the farm and the wider community without impacting on the local residents, flora or fauna. We therefore ask that the Planning Application receives a positive response.



**APPENDIX 1 –
LOCATION PLAN 1 :10,000 SCALE**



Notes

Jennings Design Associates take no responsibility for any dimensions obtained by scaling from this drawing. If no dimension is shown the recipient must ascertain the dimension specifically from the Architect or by site measurement. Scaling 1:10,000 in digital form is solely for convenience and no tolerance may be placed on digital data. All data must be checked against hard copy. Dimensions must be checked on site. Any discrepancies must be reported to the Architect immediately. This drawing is copyright of Jennings Design Associates.



Proposed installation of 1 No Wind Turbines

TURBINE 1
362198 - Easting
438464 - Northing

Rev	Description	Date	By
D	Revised Turbine Two, Change 1:1000 to Shadow Flicker Zone	01-08-2011	NS
C	Change to turbine location, Change 1:1000 to Shadow Flicker Zone	05-01-2012	NS
B	Added Site Boundary	13-10-2011	NS
A	Removed Zone of Audibility	05-10-2011	NS

Jennings Design Associates
Architects

Architects Designers Project Managers
The Warehouse, Saxon Street, Denton, Manchester M34 3DS
Tel: 0161 338 8011, Fax: 0161 320 0512, E: jda@jda-architects.co.uk

Mr John Proctor

Brows Farm, Higher Road Longridge
Preston, PR3 2YX - Wind Turbines

Location Plan 1: 10 000

Drawing Number	Rev	Scale	Sheet	Date
KE0033-003	D	1:10,000	A4	31-09-2011
		Drawn by:	Checked by:	
		Craig M	BJ	

Pr	Preliminary	C	Contract
P	Feasibility	Cn	Construction
T	Tender	Other	As Built

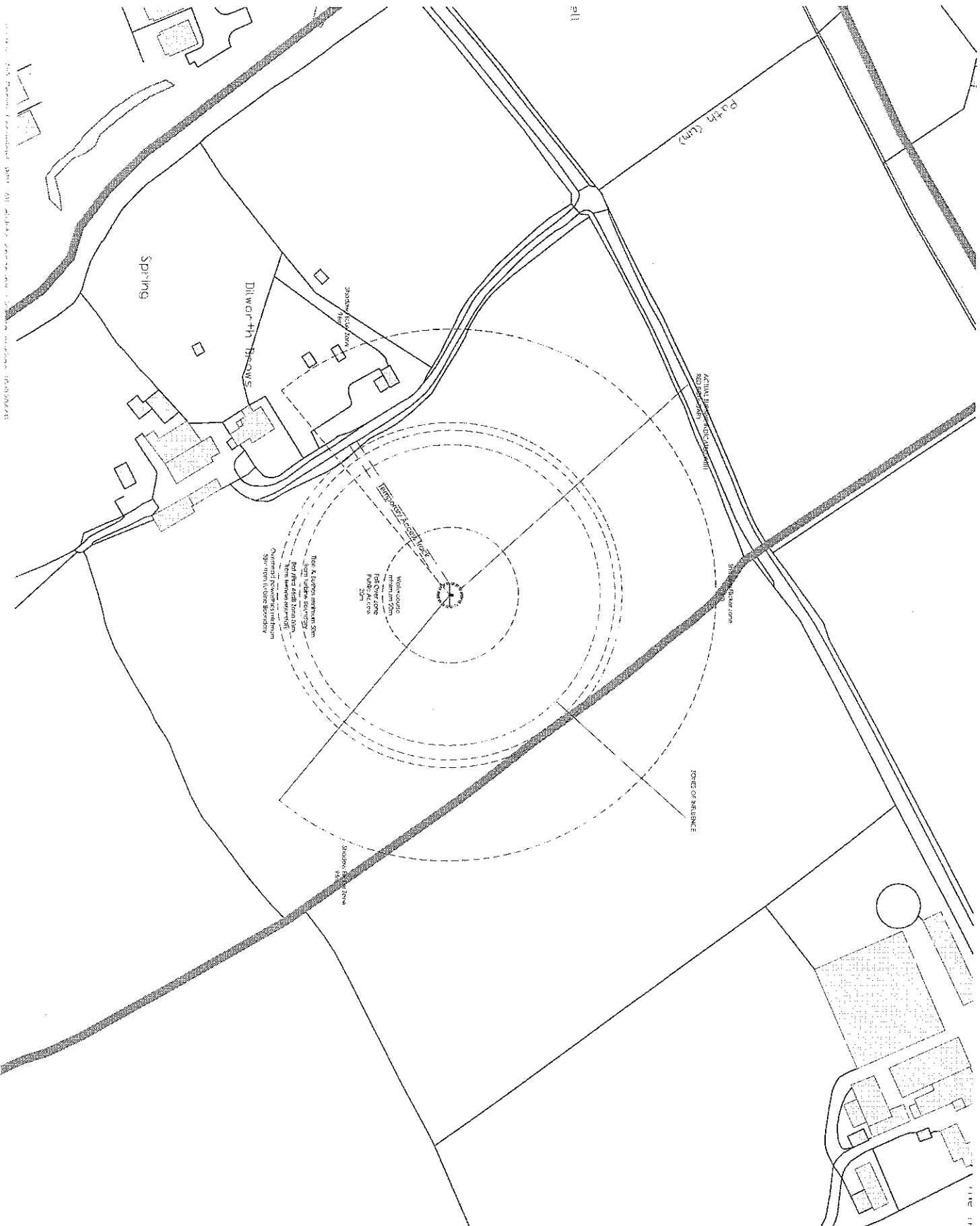
APPENDIX 2 – PLANS

SITE PLAN 1: 1250 SCALE

Location Plan 1:2500 SCALE

TURBINE CONSTRAINTS PLAN 1:1000 SCALE

AERIAL VIEW 1:1250 SCALE



Notes

1. The site plan is a general guide only and should not be used for any other purpose without the written consent of the author.

2. The site plan is not a legal document and should not be used for any legal purpose without the written consent of the author.

3. The site plan is not a survey and should not be used for any surveying purpose without the written consent of the author.

4. The site plan is not a map and should not be used for any mapping purpose without the written consent of the author.

5. The site plan is not a drawing and should not be used for any drawing purpose without the written consent of the author.



Proposed installation of 1 No
Wind Turbines

TURBINE 1
362198 - Easting
438464 - Northing

Item	Description	Quantity	Unit
1	Wind Turbine	1	No
2	Foundation	1	No
3	Access Road	1	No
4	Foundation	1	No
5	Access Road	1	No

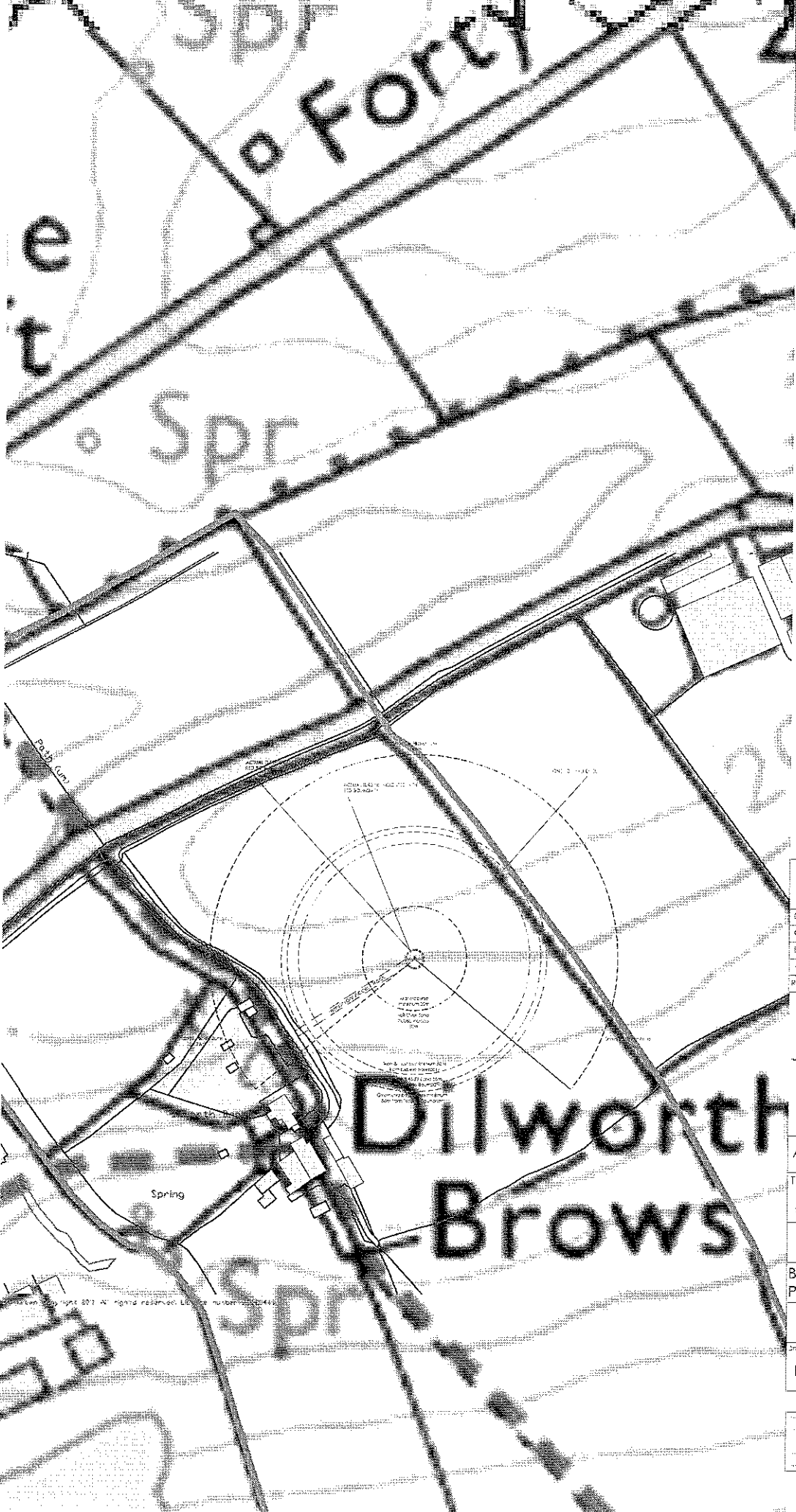
Jennings Design Associates
ARCHITECTS

Architects Design Project Manager
The Warehouse, 2000 Street, Gorton,
Manchester M14 3DS
Tel: 0161 275 1111 Fax: 0161 275 1112 Email: info@jenningsdesign.co.uk

Mr. John Proctor
Brows Farm, Higher Road, Longridge,
Preston, PR3 2YX - Wind Turbines

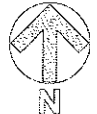
Site Plan 1:1250
KE003-001 D 1/1250 AS 21/06/2011
CEN 14 10/15/11

Item	Description	Quantity	Unit
1	Foundation	1	No
2	Access Road	1	No
3	Foundation	1	No
4	Access Road	1	No



Notes

Jennings Design Associates takes no responsibility for any dimensions obtained by scaling from this drawing. If no dimension is shown the resident must ascertain the dimension specifically from the Architect or by site measurement. Supplying this drawing in digital form is solely for convenience and no reliance may be placed on digital data. All data must be checked against hard copy. Dimensions must be checked on site. Any discrepancies must be reported to the Architect immediately. This drawing is copyright of Jennings Design Associates.



Proposed installation of 1 No
Wind Turbines

TURBINE 1
362198 - Easting
438464 - Northing

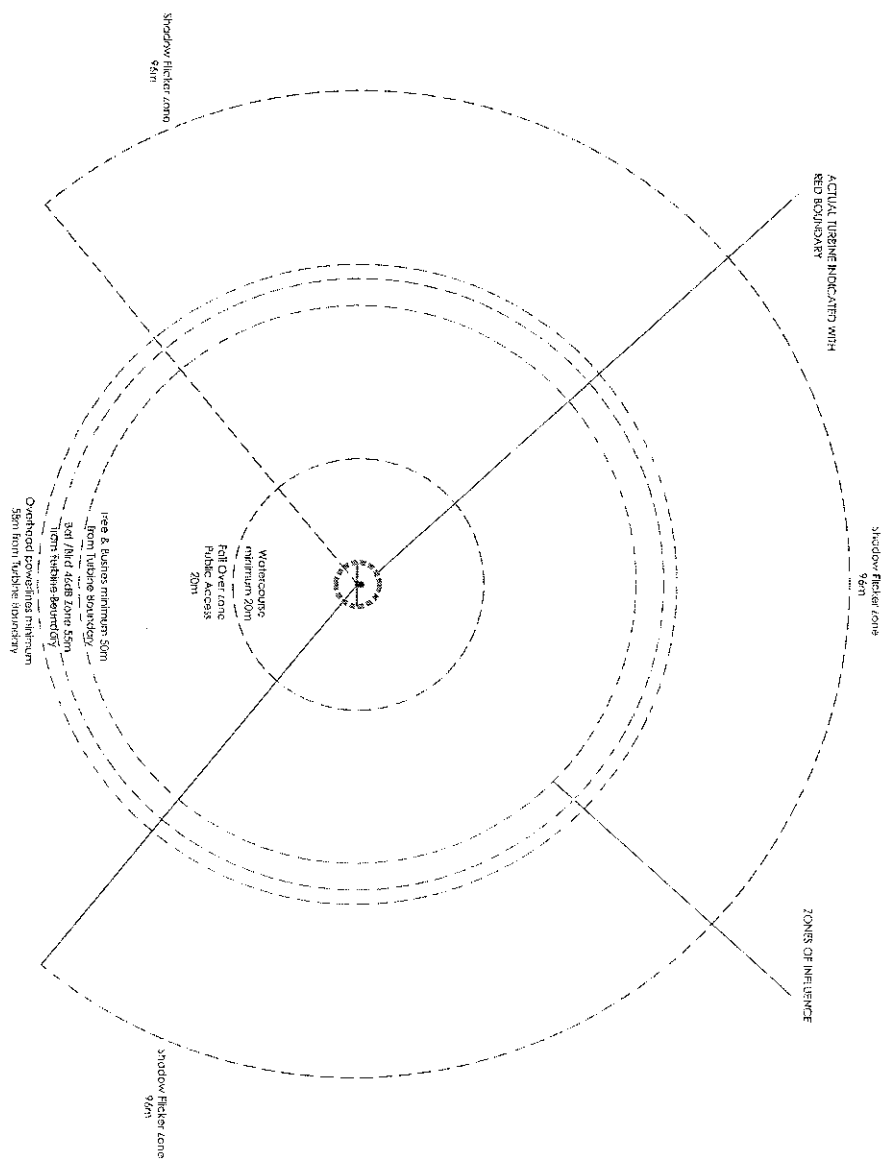
Rev	Description	Date	By
D	Removed turbine two. Changes made to Shadow Flicker zone	01-10-2011	JS
C	Change to turbine location. Changes made to Shadow Flicker zone	05-01-2012	NS
B	Added Site Boundary	13-04-2011	NS
A	Removed Zone of Audibility	04-10-2011	NS

Jennings Design Associates
Architects

Architects Designers Project Managers			
The Warehouse, Saxon Street, Denton, Manchester M34 3DS			
T: 0161 336 5011 P: 0161 320 0512 E: jda@jda-architects.com			
Mr John Proctor			
Brows Farm, Higher Road Longridge, Preston, PR3 2YX - Wind Turbines			
Site Plan 1: 2 500			
Drawing Number	Rev	Scale	Date
KE0033-002	D	1:2500	31-08-2011
Drawn by		Checked by	
Craig M		BJ	

Pr	Preliminary	C	Contract
F	Feasibility	Cr	Construction
P	Planning	As	As Built
T	Tender	Other	

Z:\N630 - Kinetica Energy\N1 TURBINE PROJECTS\KE0033 John Proctor - The Brows Farm - Longridge\Drawings\Xref\Xref1-John Proctor - Brows Farm.dwg



Notes

☐ Yes ☐ No ☐ Don't Know	☐ Yes ☐ No ☐ Don't Know
--	--

Jennings Design Associates
ARCHITECTS

Architects Designers Project Managers
The Warehouse, Saxon Street, Denton
Manchester M34 3DS
T: 0161 336 5011 F: 0161 370 0122 E: info@man-architects.com

Mr John Proctor
Browns Farm, Higher Road, Longlidgate
Preston, PR3 2YX - Wind Turbines

Turbine Plan 1 : 1,000

DocId:32146416	Doc	Topic	Sub	Page
KE0033-007	-	1.1600	A3	01-48/201
	NE	Page 10		Page 10 of 10

Pl	Flightiness	C	Control
F	Possibly	Cn	Construction
B	Flourishing	A	As Ball
T	Tender	Other	

APPENDIX 3 – EQUIPMENT ELEVATIONS & TURBINE SPECIFICATION

Technical Specification Evoco 10kw

General

Turbine Type:	Downwind Horizontal Axis, Self Regulating
Life expectancy	20 years
Service/maintenance	Initial 3 month inspection / Annual thereafter
Nominal power	10 kW
Cut in wind speed	< 3 m/s (<6.7mph)
Nominal wind speed	10 m/s (22.2mph)
Survival wind speed	59.5 m/s (132mph)
Passive power regulation	Pitch to Stall
Safety	Manual Pitch Control Electrical Brake
Noise emission	<54dB @ 60m and 5m/s* (11.1mph)
Warranty	5 years standard

Estimated Annual Generation

5m/s – 19,000kwh

6m/s – 28,500kwh

7m/s – 37,000kwh

Standards

CE, BS EN 61400, BS7671, BS 5760-7, G-83/1
MCS Product Certification

Electrical

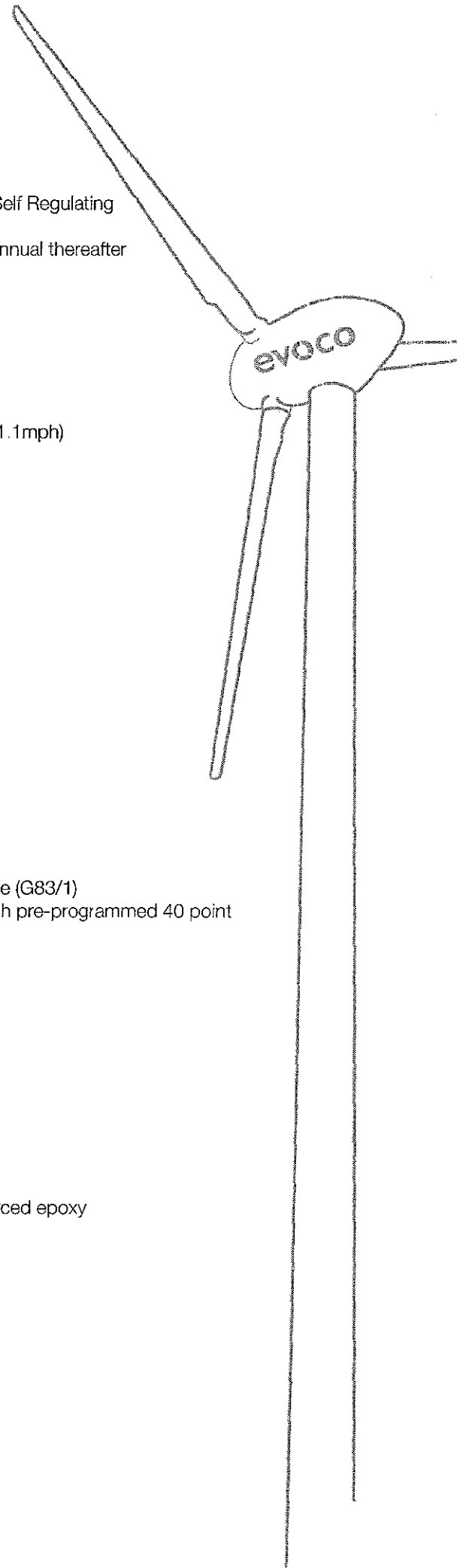
Grid voltage	230V/400V $\pm 10\%$ (1ph/3ph)
Grid frequency	50/60Hz $\pm 3\text{Hz}$
# Phases	Single (G59/1) or Three-Phase (G83/1)
Converter type	Custom Grid Tied Inverter with pre-programmed 40 point power curve
Control System	Overvoltage Control System

Rotor

Number of blades	3
Diameter	9.6 m
Position	Downwind
Swept area	72 m ²
Speed	Variable 0 – 120rpm @ 10kw
Power regulation	Passive Pitch
Blade length	4.75m
Construction	Carbon and glass fibre reinforced epoxy

Generator

Gearbox	None
Generator	Brushless PMG
Voltage:	0-500V
Frequency	Variable



Tower Options

12m

Type	Tubular – hydraulic tilt up
Number of sections	3
Tower height	12m
Material	Hot dip galvanised steel

15m

Type	Tubular - hydraulic tilt up
Number of sections	4
Tower height	15m
Material	Hot dip galvanised steel

18m

T B C	Please call for details
-------	-------------------------

Weights

Nacelle excluding rotor	460	kg
Rotor	375	kg
Blades (each)	50	kg

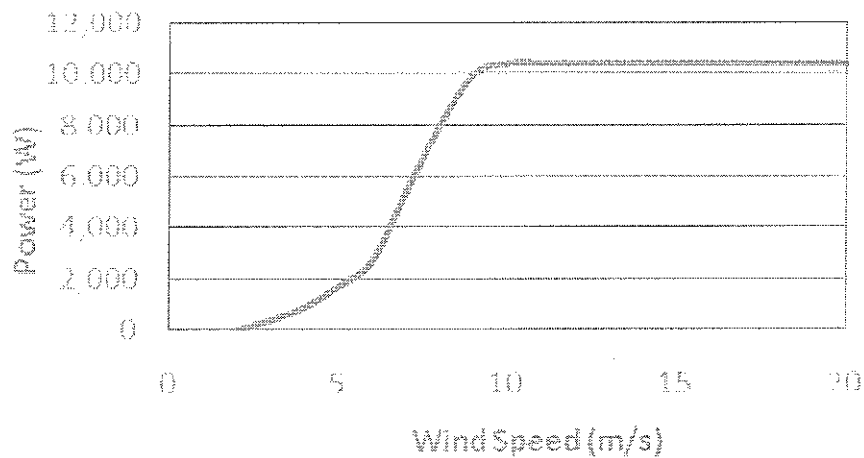
12m Tower

Base Section	280	kg
Lower Section	1135	kg
Top Section	650	kg

15m Tower

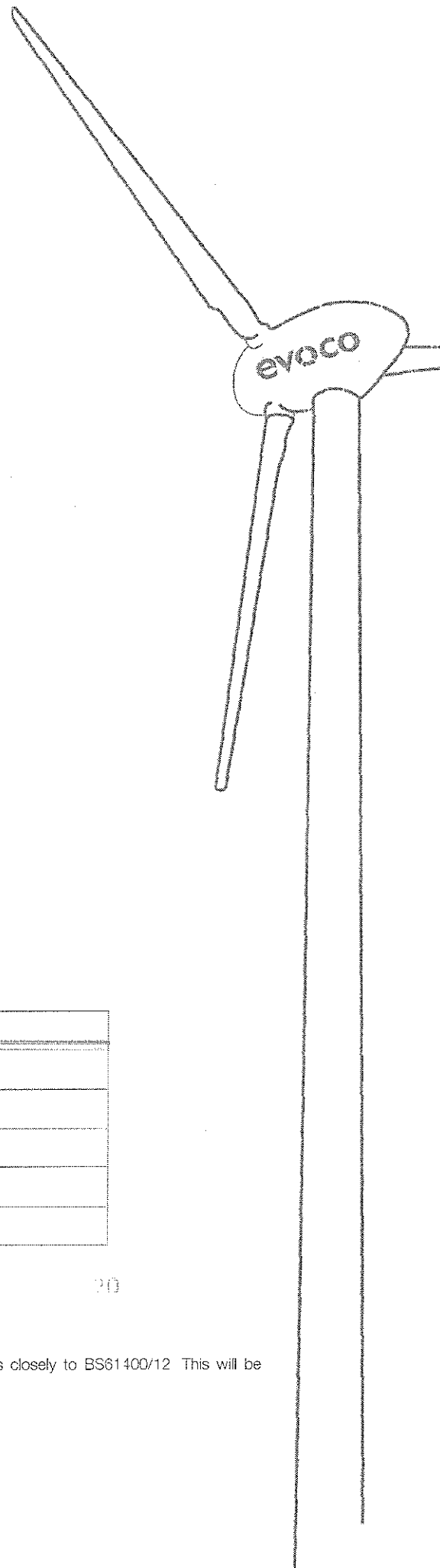
Base Section	366	kg
Lower Section	1150	kg
Middle Section	942	kg
Top Section	583	kg

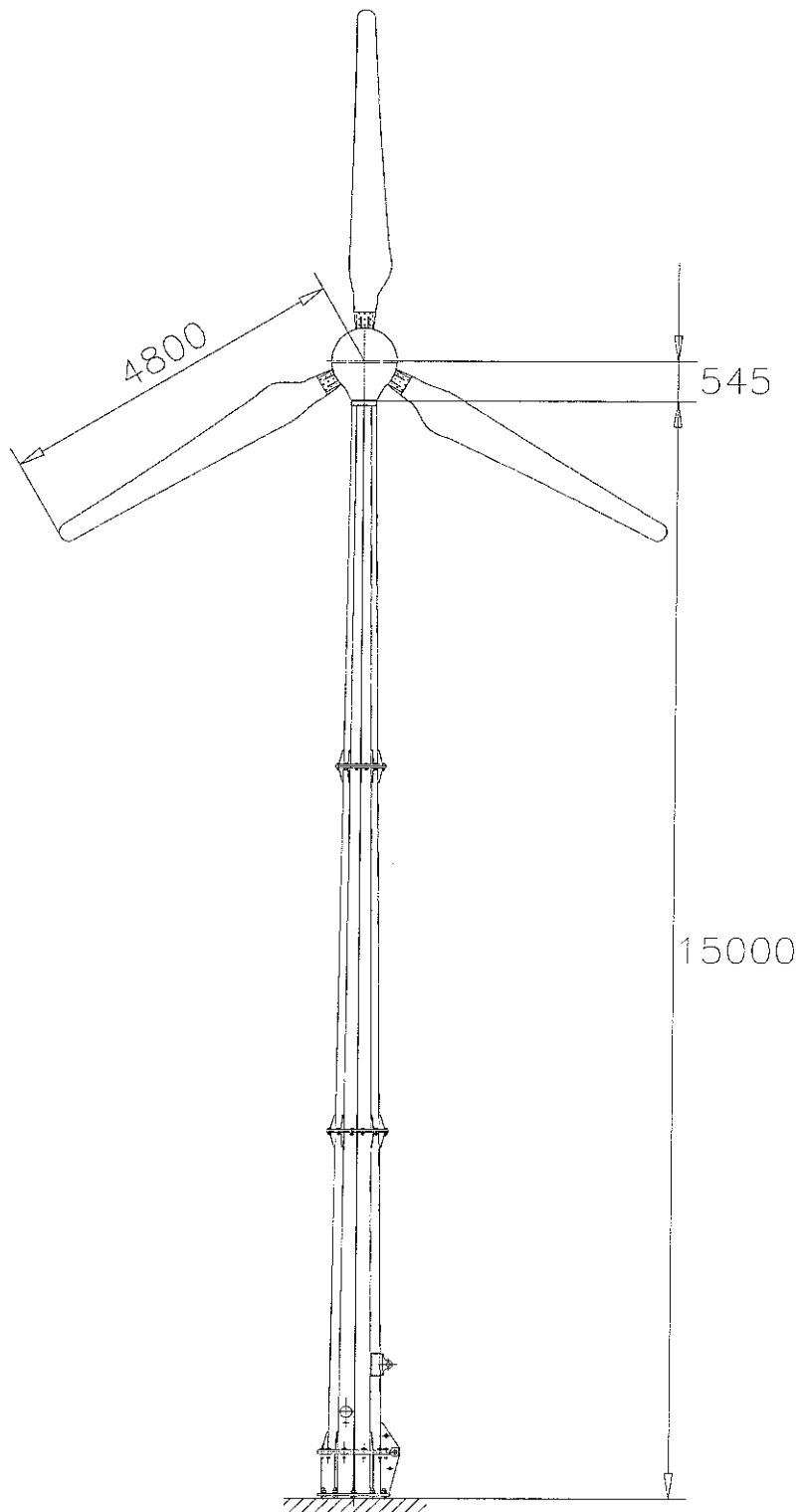
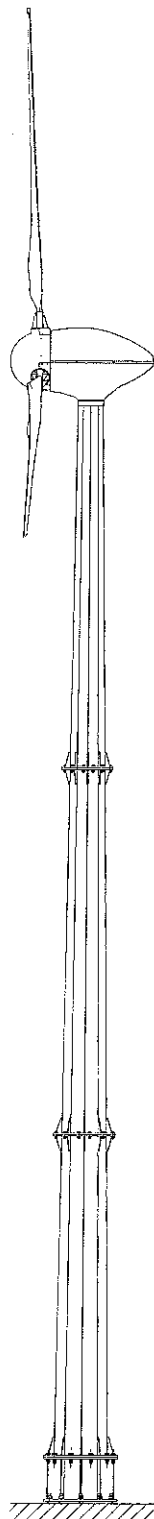
Power Curve



Provisional power curve – Pre-MCS This power curve has been measured as closely to BS61400/12 This will be updated upon release of MCS approved power curve

* Full noise report will be available following MCS noise testing

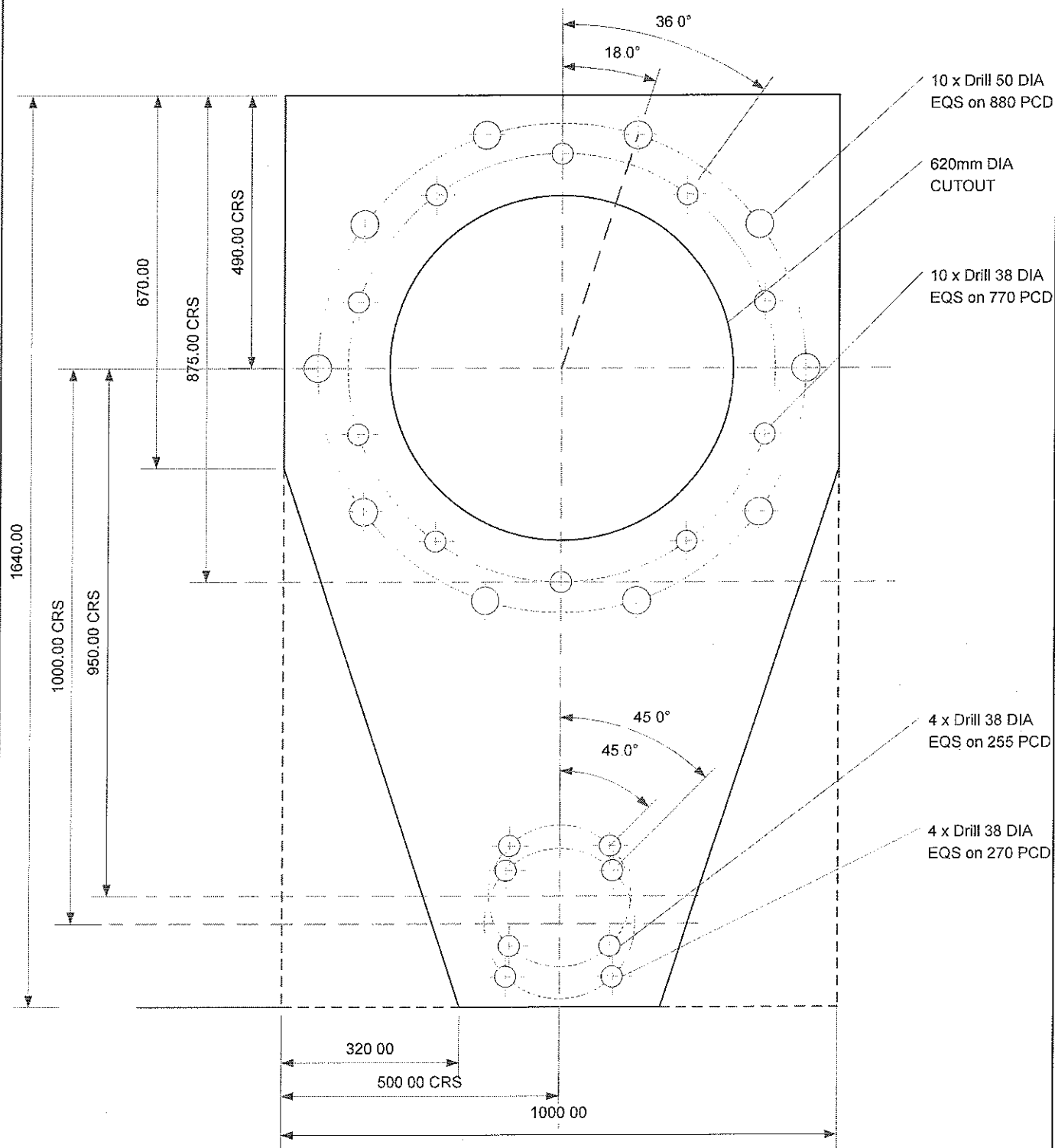




evoco
wind energy

	NAME	DATE
DRAWN	BH	
CHECKED	SW	
ENG APPR.		
MFG APPR		
Q.A.		
COMMENTS:		

TITLE: EVOCO 10kW WIND TURBINE 15m TOWER		
Evoco Energy Ltd St Pegs Mill, Thomhill Beck Lane, Brighouse. HD6 4AH. United Kingdom. Tel: +44 (0) 1484 475 800 info@evocoenergy.com		
All rights reserved		
DIM mm	DWG. NO PL EVO10-15M	REV 22
SCALE: 1:100		DATE: 27/05/2009
		SHEET 1 OF 1



Material - BSEN 10025 S275
6mm Thick Plate

Evoco Energy Ltd.
St Pegs Mill, Thornhill Beck Lane
Brighouse, HD6 4AH
United Kingdom

Tel: +44(0)1484 475 800
info@evocoenergy.com

evoco
energy

Drawing Name:

Evoco 10 12m and 15m
Foundation Template

Drawing No:

DRW-E10-005-V0

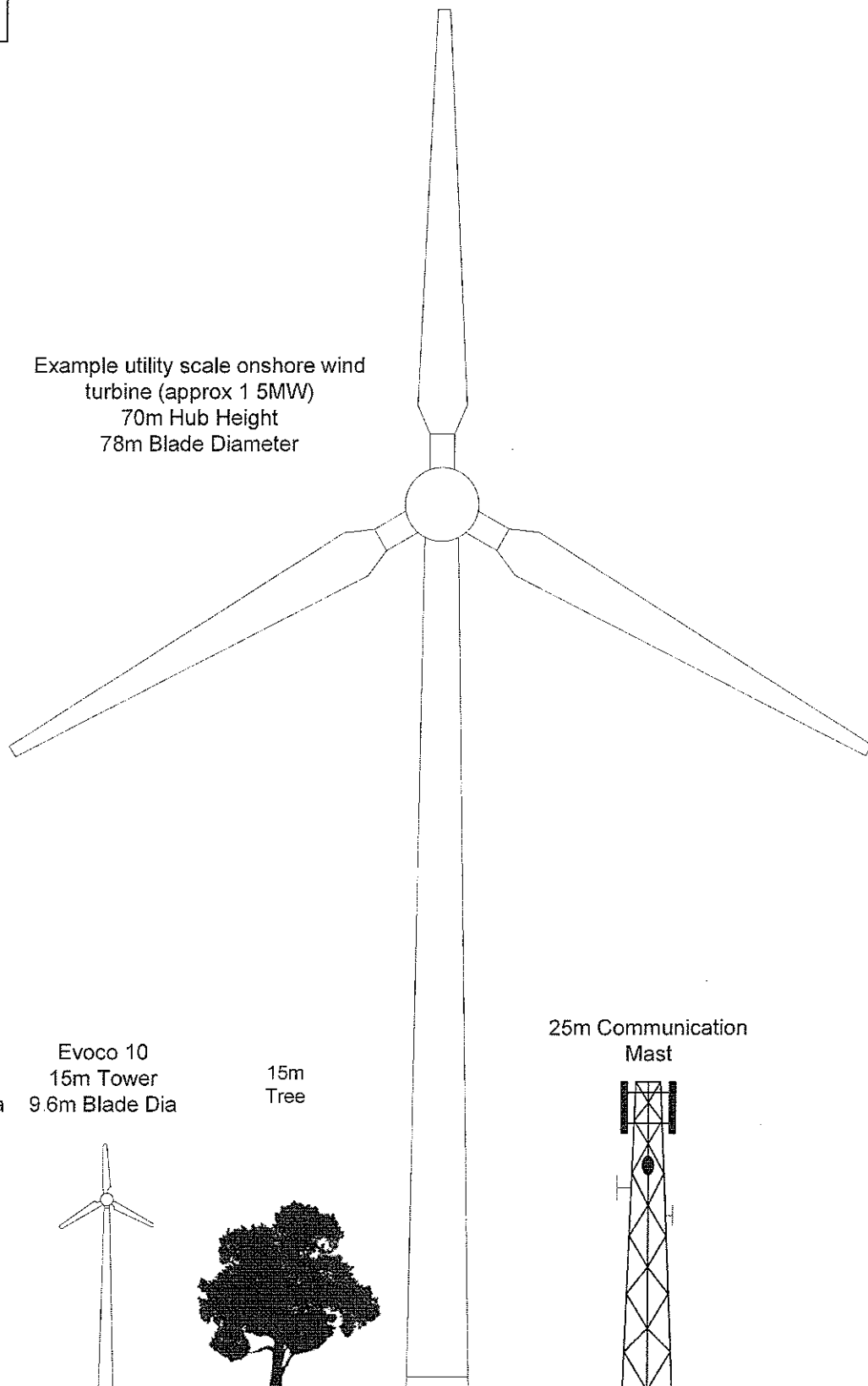
Scale: 1:10

Drawn: BH

Checked: SW

Date: 4/06/10

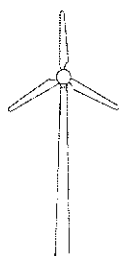
Example utility scale onshore wind
turbine (approx 1.5MW)
70m Hub Height
78m Blade Diameter



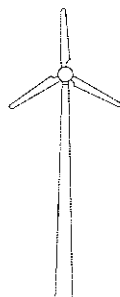
8.5m
House



Evoco 10
12m Tower
9.6m Blade Dia



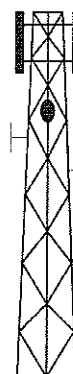
Evoco 10
15m Tower
9.6m Blade Dia



15m
Tree



25m Communication
Mast



Evoco Energy Ltd.
St Pags Mill, Thornhill Beck Lane
Brighouse, HD6 4AH
United Kingdom

Tel: +44(0)1484 475 800
info@evocoenergy.com

evoco
energy

Drawing Name:

Turbine size
comparison

Scale: 1:500

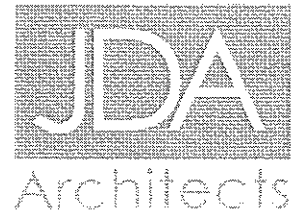
Drawn: BH

Checked: SW

Date: 21.02.10

Drawing No:

DOC-T-E10-004 V1



APPENDIX 4 – MANUFACTURER'S INFORMATION



About Us

"Evoco" means "to produce" in latin and romance languages. So, what are we about? Evoco Energy - the clue's in the name!

Due to our technology's ability to 'produce' we can offer the highest possible performance and financial return, and the shortest possible payback period from a small-scale wind turbine.

Maximising capacity without maximising costs, our high performance turbines also lead the way at the cutting edge of design, offering contemporary yet robust aesthetics coupled with supreme build quality. Our confidence in our products and promise is sky high, enabling us to offer a five-year warranty.

With 30 years of global trading you can depend on us to deliver on the Evoco promise.

About the 10kW

Our flagship 10kW turbine, billed as the next generation wind turbine, has been designed from the outset to epitomise what Evoco stands for, delivering a renewable and financial return on investment unrivalled in the small wind sector.

Through efficient manufacturing and innovative design, and without compromising on quality or robustness, Evoco have been able to develop a turbine with superior performance and durability, yet at a price point which allows unbeatable return on investment.

The Evoco 10kW is specifically designed for high reliability, low maintenance and automatic operation in adverse weather conditions, yet a low rotation speed ensures that the Evoco 10kW remains quiet and inobtrusive.

The Evoco 10kW is grid connected, practical and perfect for supplying electricity to properties such as farms, large residences, schools, offices, businesses and public buildings. An Evoco Energy wind turbine allows you to generate your own green energy, effectively reducing your carbon footprint and publicly promoting your commitment to renewable energy.

Put simply, the Evoco 10kW is a turbine that delivers.

Key Statistics

21,100kWh p.a. at 5m/s
mean wind speed

30,400kWh p.a. at 6m/s
mean wind speed

38,100kWh p.a. At 7m/s
mean wind speed

Payback 2.5 to 4.5 years
(5.5m/s to 7.5m/s)

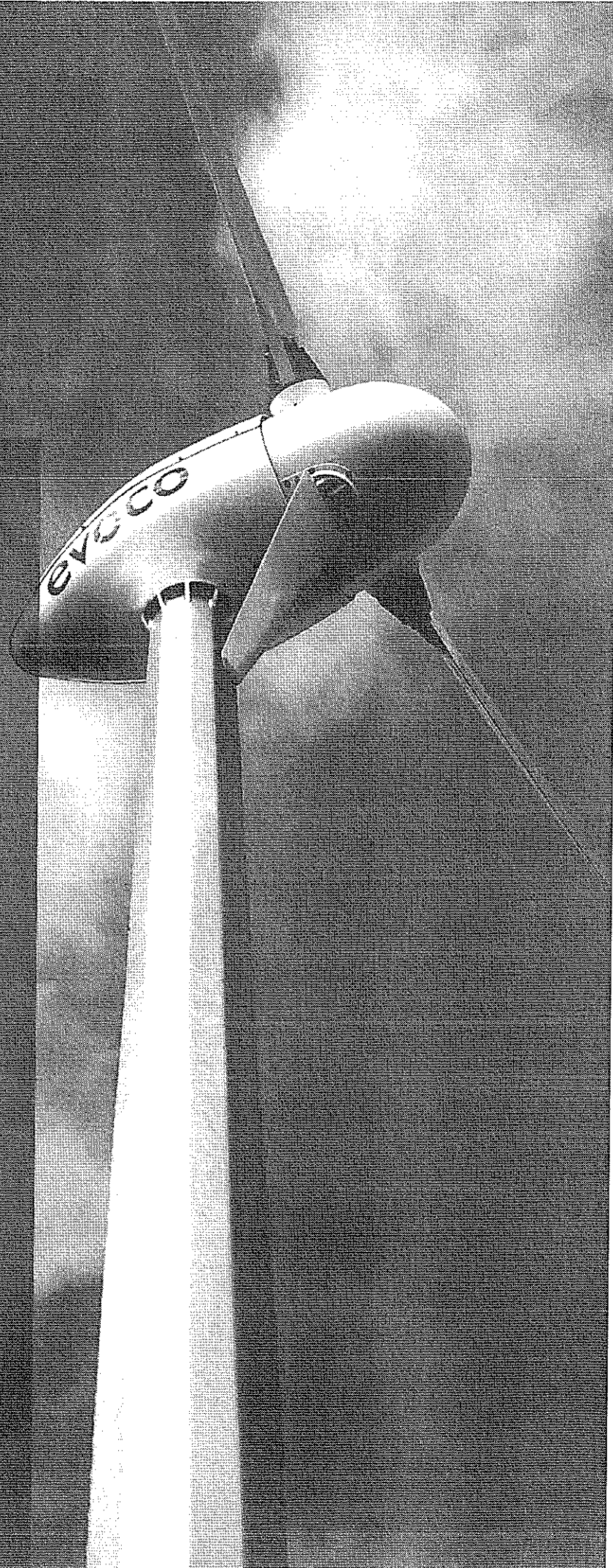
MCS Transition Product
231 - Clean Energy
Cash-back - 26.7p/kWh

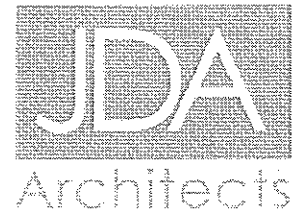
Effective annual income up
to £15,000 p.a.

St Pegs Mill,
Thornhill Beck Lane
Brighouse, West Yorkshire,
HD6 4AH, United Kingdom

t:+44 (0)1484 475 800
f:+44 (0)1484 475 802

info@evocoenergy.com
www.evocoenergy.com





APPENDIX 5 – WIND TURBINE ACOUSTIC REPORT & NOISE DATA

Evoco Energy Evoco 10kW Acoustic Report

Introduction

The Evoco 10kw wind turbine has undergone acoustic testing by an independently accredited testing laboratory (Narec) and independently accredited certification body (BRE Global) in accordance with the BWEA Small Wind Turbine Performance and Safety Standard (2008), a specific implementation of British Standard BS EN 61400-11. Both BRE Global and Narec work under the supervision from Gemserv, the master licensee under the government-mandated Microgeneration Certification Scheme (MCS).

This document presents this independently verified Noise Label and provides an explanation on its use and interpretation.

Noise Label

The noise label for the Evoco 10kw is below in Figure 1. The key results are the Declared Apparent Emission Sound Power Level, $L_{wd,8m/s}$, at 8m/s hub height wind speed and noise immission predictions for a range of slant distances and hub height wind speeds.

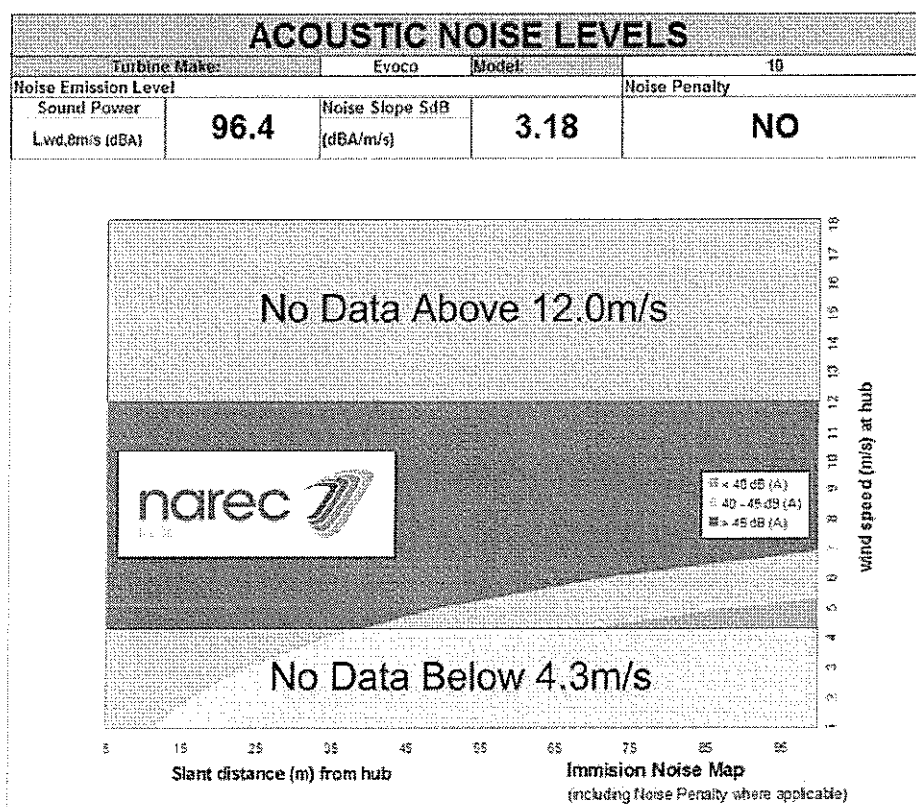


Figure 1

Note that in accordance with section 3.4.15 of the BWEA standard regarding tonal assessment, the Evoco 10kW does not exhibit any tonal quality and therefore no penalty should be applied.

The BWEA Reference Sound Levels at 25m and 60m at an 8m/s hub height wind speed are:

$$L_{p,25m} = 60.5 \text{ dB (A)}$$

$$L_{p,60m} = 52.9 \text{ dB (A)}$$

About the Noise Label

The noise label shown in Figure 1 contains a summary of the acoustic measurements performed to the BWEA Small Wind Turbine Performance and Safety Standard (2008). It should be noted that the Immission Noise Map shown in the noise label is only for slant distances up to 100m. This is a requirement of the BWEA standard and is calculated with a high degree of certainty using hemispherical propagation noise modelling.

The general method for assessing the likelihood of wind turbines to cause complaint is to assess the noise level against the World Health Organisation (WHO) community noise guide level i.e. a maximum allowable night-time noise level of 45dB(A). This is the approach specified in the large wind turbine ETSU-R97 method and therefore is similarly followed by the BWEA Small Wind Turbine Standard.

The regions shown in the noise label correspond to this 45dB(A) noise level. Red regions are unlikely to be given planning permission as they exceed the 45dB(A) level. Amber regions fall between 40dB(A) and 45dB(A) and would generally be acceptable depending on local factors. Locations in the Green region fall well below the 45dB(A) level and are highly likely to be acceptable.

As can be seen from Figure 1, the noise label region under 100m is largely red. This means that it will be more usual to be trying to predict noise levels for the Evoco 10 at distances greater than the 100m given in the standard BWEA noise label. At distances over 100m, atmospheric noise propagation effects make predictions more difficult and tend to overestimate the expected noise levels.

Using the Noise Label

The noise immission from a wind turbine relies heavily on local topology, background noise levels and expected wind speeds. This means assessment should usually be done on a site by site basis taking these factors into account.

An estimate of the noise immissions from the wind turbine can be calculated using the method below:

- a) Establish 10m altitude mean wind speed for proposed location using the NOABL (Numerical Objective Analysis of Boundary Layer) database. The national database of approximate wind speeds published by the UK government (referred to as NOABL) can be found here:

<http://old.berr.gov.uk/windspeed-database/page27326.html#>

NB. If you have a measured, annualised mean wind speed for the installation site, skip to step d.

- b) Use NOABL to get the mean average annual wind at 10m height for the location. $V_{avg\ 10}$
- c) Correct the NOABL wind speed for local topology and wind shadowing effects, as described in MIS 3003 – MCS Micro and Small Wind Standard. An extract from MIS 3003 appears at Appendix 1. This correction should also account for turbine height to give V_a .
- d) Assume a Rayleigh wind distribution, calculate the 90% wind $V_{90\ H}$ as:

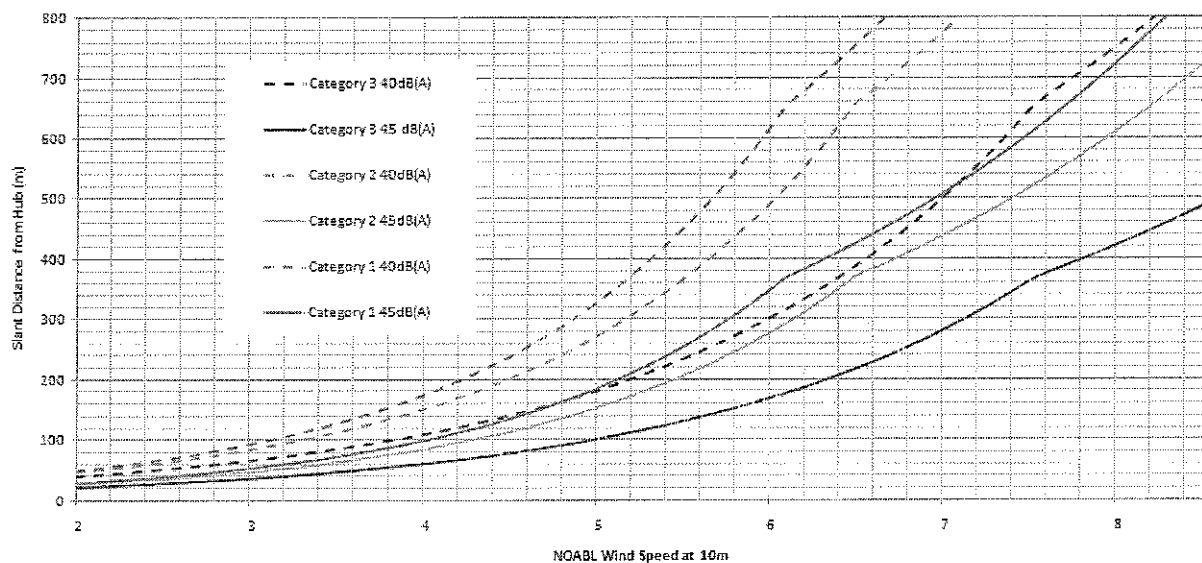
$$V_{90\ H} = 1.72 \times V_a$$

- e) Draw a horizontal line on the Emission Noise Map in the BWEA Noise Label at $V_{90\ H}$.
- f) Read-off the distance for the acoustic dB(A) values of interest.
- g) Compare these distances with the slant distance from the turbine hub to the nearest noise sensitive location(s) for the planned installation.

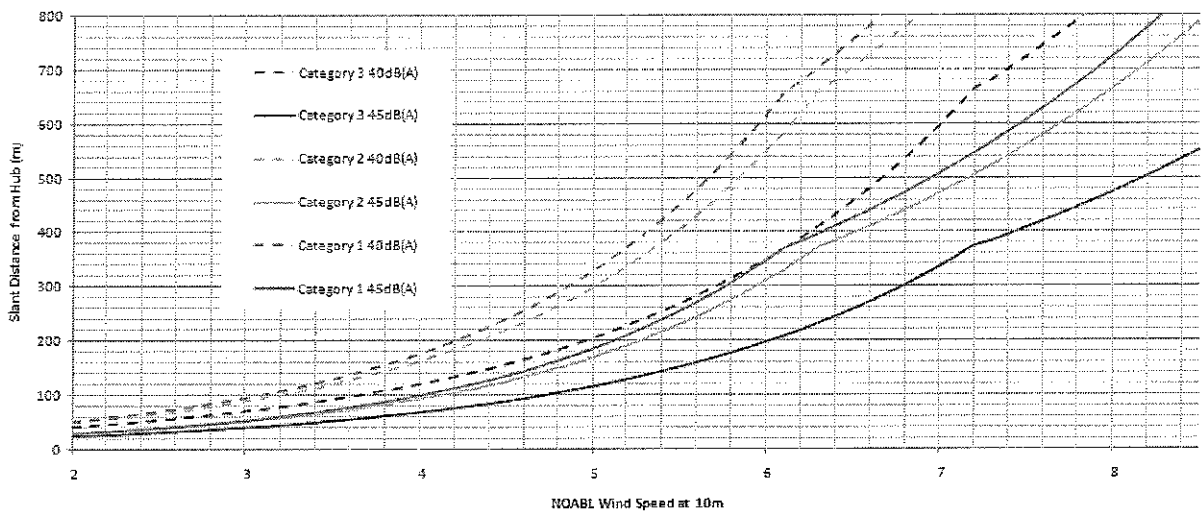
As previously mentioned the BWEA noise label only shows slant distances up to 100m. To simplify the process above, and provide guidance on distances greater than 100m, Evoco have already carried out the calculation for both the 12m and 15m towers. These can be seen in Figure 2 & 3 and have already been site corrected for Category 1 -3 wind sites, as defined in MIS 3003 installer standard, an extract of which appears at Appendix 1

The x-axis is the annual mean wind speed at 10m height and can be found from the NOABL database as described above. The graph lines provide the slant distance that is predicted to meet the 45dB(A) or 40dB(A) noise criterion for the wind speed that will not be exceeded for 90% of the time at a site with the chosen NOABL wind speed level. If using these graphs the calculations and adjustments in the previous section do not need to be performed as these have already been taken into account

12m Tower NOABL Lookup



15m Tower NOABL Lookup



Example Application

"A rural site with very minor obstructions (Category 2) with a NOABL wind speed of 5m/s. The turbine is to be installed on a 12m tower."

Simply look up a NOABL wind speed of 5m/s on the graph shown in Figure 2. Follow this up to the solid green line (45 dB(A) Category 2) and read off the slant distance from the Y axis. This gives a 45dB(A) threshold of approximately 150 meters

If a 40dB(A) threshold was required this would give a slant distance of approximately 275 meters.

In plain English, this demonstrates that on a site with 5m/s mean wind speed with topography corresponding to the class 2 description, that at a distance of 150m we are 95% certain that the noise level will be lower than 45dB for 90% of the time.

In the language of statistics, a 90% confidence interval ($t=1.645$) has been applied to the Standard Error of the noise readings and this has been combined with the reading for the wind speed that corresponds to the wind speed on a Rayleigh distribution which represents 90% of the area under the curve (or 90% of the time).

Appendix 1

Site Categories from MIS3003

If these regions include areas described by more than one of these categories then choose the category that is numerically highest:

Category 1: Flat grassland, parkland or bare soil, without hedges and only a few isolated obstructions.

Category 2: Gently undulating countryside, fields with crops, fences or low boundary hedges and few trees.

Category 3: Farmland with high boundary hedges, occasional small farm structures, houses and trees etc.

Category 4: Woodland or low rise urban/suburban areas (E.g. domestic housing) with a plan area density of up to about 20%

Category 5: Dense urban areas and city centres (e.g. buildings of four-stories or higher) with a plan area density of greater than about 20%

MIS3003 contains scaling factors to take into account the effect of the terrain on the NOABL predicted wind speed.

For the purposes of this report the following factors from this document have been used:

Category 2 Sites:

12m Tower: 0.94

15m Tower: 0.97

Category 3 Sites:

12m Tower: 0.81

15m Tower: 0.85

Evoco 10kW Wind Turbine Generator - Noise - indicative site suitability guidance

Report prepared by M Potts BSc (Hons), MSc, MIOA

The following report has been prepared by Echo Acoustics Ltd and is intended to assist indicative (strategic-level) assessment of site suitability for the installation of an Evoco 10 kW wind turbine generator (WTG). The report is based upon data from the Microgeneration Certification Scheme (MCS) acoustic test report for an Evoco 10kW turbine¹, undertaken at an open agricultural location in the north of England.

Table 1 presents:

- The calculated hub-centre sound power level for a single turbine, over the normal operational range of wind speeds for the turbine.
- The predicted background noise for each wind speed; this is based on a regression analysis of the background noise measurements, correlated with wind speed (measured at 12m above ground level), obtained during the turbine acoustic test.
- External receptor noise level at 100m, 200m and 250m from the turbine.
- Indicative distances at which the turbine noise levels would reduce to 45 dB(A) and 40 dB(A) [dB(A) in this context means dB L_{Aeq}], at each given wind speed; these criteria are based on guidance from Renewables UK², which suggests that noise within the region 40 dB(A) to 45 dB(A), at potentially noise-sensitive receptors, would generally be deemed acceptable.

Table 1: Indicative single-turbine noise calculations

Wind speed (m/s)	dB(A)					Distance to..	
	Background noise	WTG sound power level [dB L_{AW}]	WTG @ 100m	WTG @ 200m	WTG @ 250m	45 dB(A) [dB L_{Aeq}]	40 dB(A) [dB L_{Aeq}]
5	36.7	85.7	31.7	25.6	26.7	30m	54m
6	38.3	88.8	34.8	28.8	29.9	44m	78m
7	39.9	92.0	38.0	32.0	33.1	63m	113m
8	41.5	95.2	41.2	35.2	36.3	91m	162m
9	43.1	98.4	44.4	38.4	39.4	132m	234m
10	44.7	101.6	47.6	41.6	42.6	190m	338m
11	46.3	104.8	50.8	44.7	45.8	274m	488m
12	47.9	108.0	54.0	47.9	49.0	396m	704m

The tabulated data are graphically presented in Figure 1

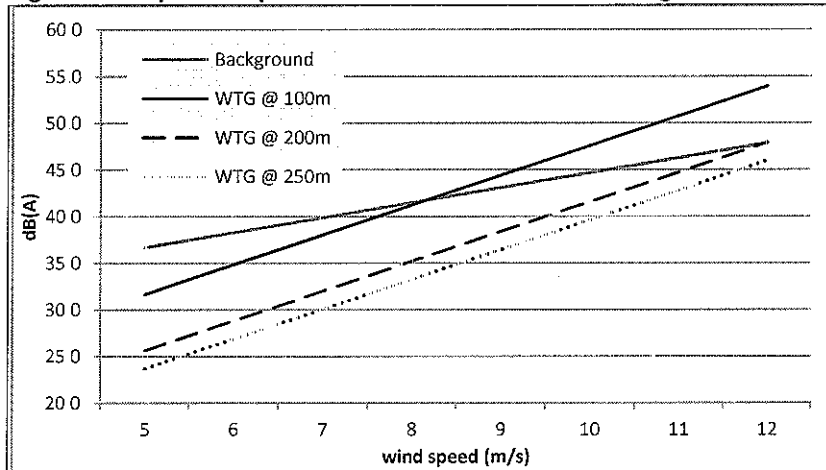
¹ Narec Development Services Ltd, 2010 "Acoustic Test Report For Evoco 10 Horizontal Axis Wind Turbine" Ref. No. 1603/01/A

² British Wind Energy Association, 2008 "Small Wind Turbine Performance and Safety Standard"

Evoco 10kW Wind Turbine Generator - Noise - indicative site suitability guidance

Report prepared by M Potts BSc (Hons), MSc, MIOA

Figure 1: Graphical representation of WTG noise v background noise



It is often asserted, in discussions related to planning for wind turbines, that rural background noise levels may be as low as 20 to 30 dB L_{A90} , but this disregards the significant consideration that such low noise levels generally occur under calm meteorological conditions with no wind; in these circumstances the turbines would not operate and no noise would be generated. Assessment of turbine noise as winds increase cannot be undertaken without due regard for the associated increase in background noise.

Additional significant considerations are:

1. Is the receptor property shielded from direct line of sight of the turbine by agricultural buildings or other structures? Limited additional sound attenuation will be provided by such 'shielding', but studies have shown a positive correlation between visual perception of wind turbines and perception of noise.
2. Is the receptor surrounded by agricultural buildings, trees and other structures which all tend to increase background noise with increasing wind speeds? In this case, it is highly likely that the actual wind-generated background noise at a receptor property due to wind interacting with buildings and trees is likely to be higher than presented in the Table and Figure above which are simply mathematical extrapolations. It is reasonable to infer that the back-ground noise at the residential property would show on the Figure as a rising or exponential line and that wind turbine noise would never exceed background noise. It is also worth observing that at high wind speeds, towards the upper operational range of the turbines, local residents are very likely to be indoors with windows closed - the external wind turbine noise levels may become somewhat irrelevant in these circumstances.
3. Is a receptor in a particularly sheltered location i.e. valley-bottom, where background noise levels may be very low relative to high-speed turbine operation?
4. Alternatively, are receptors close to other significant noise sources such as roads etc, which might allow a lesser turbine set-back distance.
5. Small wind turbines do not give rise to significant levels of low frequency noise or infrasound, nor to unusual noise characteristics (such as amplitude modulation) that can sometimes occur with large turbines.
6. Ground-borne vibration is rarely perceptible from small wind turbines and is certainly unlikely to be perceptible at distances of more than 10 or 20 metres from the turbine base.

Evoco 10kW Wind Turbine Generator - Noise - indicative site suitability guidance

Report prepared by M Potts BSc (Hons), MSc, MIOA

Mike Potts

Director

Echo Acoustics Ltd

Tel: 07913 392792

E-mail: mike@echo-acoustics.co.uk

Web: www.echo-acoustics.co.uk

LinkedIn: <http://uk.linkedin.com/in/mikepotts>

Tweet: <http://twitter.com/EchoAcoustics>

Brows Farm Wind Turbines Noise Assessment

J Proctor

Echo Acoustics Ltd 01 November 2011
--

Echo Acoustics Ltd, a company registered in England & Wales

Registered number: 7360875

Registered address: 58 Norwood Road, Stockport, Sk2 7JN

www.echo-acoustics.co.uk

*Echo
Acoustics*

EXECUTIVE SUMMARY

A desk-based assessment has been undertaken, of the potential noise effects associated with the operation of two Evoco 10kW turbines, as assessed at two receptor locations located no closer than 169 metres from the nearest turbine. The assessment related noise from the turbines, as calculated at the closest potential residential receptor position and operating over a range of wind speeds between 4 and 12 metres per second, with a fixed noise limit of 40 dB L_{Aeq} and also with calculated background noise levels taking account of potential increases in background noise as wind speeds increase.

The (predictive) assessment indicated that at moderate wind speeds of up to 8 m/s, no significant adverse noise effects would occur at any receptor location. The assessment indicated that potentially significant turbine noise levels, of greater than 5 dB above the set limit or background noise level, might occur at wind speeds of 10 m/s and more at the Hills Farm, and at wind speeds of 11 m/s and more at Stone Croft

However, at higher wind speeds it is reasonable to infer that the interaction of the wind with trees, buildings and other structures may significantly increase the wind-related (masking) background noise levels, effectively reducing any predicted noise impact.

In view of these considerations, it is our judgement that the installation and operation of the two turbines is unlikely to result in any noise disturbance for the residents of the properties

Table of Contents

1. INTRODUCTION	1
2. METHODOLOGY AND GUIDANCE	1
3. ASSESSMENT RESULTS / CALCULATIONS	3
4. SUMMARY	4
5. APPENDICES	5

1. INTRODUCTION

- 1.1 This report presents the results of an assessment of the potential noise emissions associated with the operation of two Evoco 10 kW turbines at Brows Farm, Longridge, Preston.
- 1.2 The turbines are to be located on open agricultural land belonging to the farm, to the north east of the village of Longridge. The assessment of potential noise impacts was undertaken in respect of the two nearest residential properties, Stone Croft and The Hills Farm: the residential property at Stone Croft is located to the north west of the two turbines, at a distance of 264 metres and 330 metres from each turbine respectively; the residential property at The Hills Farm is located to the north east of the two turbines, at a distance of 240 metres and 250 metres from each turbine respectively.
- 1.3 In discussion with the Environmental Protection Department at Ribble Valley Borough Council, it was agreed that assessment of noise impacts at The Hills Farm would be undertaken with respect to a generic receptor position on the western facade of the western-most existing farm buildings, a position closest to, and facing, the turbines; this allows for the possibility that the buildings could be converted to residential use in the future. The closest point of these buildings to each of the proposed wind turbines is 169 metres and 177 metres respectively.
- 1.4 The assessment comprised a desk-based study of predicted noise levels from the operation of the turbines, over the normal operational range of wind speeds for the turbines. It was agreed with the Environmental Protection Department that the predicted turbine receptor noise levels would be assessed against a set limit value of 40 dB L_{Aeq} (external free-field) with correlation against calculated background noise levels at moderate wind speeds of up to 8 m/s, which allows for potential increases in background noise that occur with increasing wind speed.
- 1.5 The use of a 40 dB L_{Aeq} external noise level conservatively assumed 10 dB of attenuation through an open window, and was thus set to ensure that internal noise levels of 30 dB L_{Aeq} would be achieved in accordance with guidance provided in British Standard 8233¹.
- 1.6 A glossary of acoustic terminology is presented at Appendix A.

2. METHODOLOGY AND GUIDANCE

- 1.7 The assessment made reference to the following guidance:

¹ British Standards Institution (1999) *Sound insulation and noise reduction for buildings – Code of practice* BSI, London.

- British Wind Energy Association (BWEA) 2008 *Small Wind Turbine Performance and Safety Standard*. The Standard suggests that turbine receptor noise levels of between 40 and 45 dB(A) are unlikely to be a significant concern with respect to noise (dB(A) in this context is taken to mean dB L_{Aeq}). Annex A of the Standard also provides a means for approximating wind-associated background noise at ground level, based on research carried out in Europe and the UK, using the formula: $L_{p\text{bgd}} = 28 + 2.25 * V$, where V is the wind speed in metres per second (m/s) at ground level (the resultant value is taken to be dB L_{Aeq}); this formula is generally a conservative (worst case approximation, particularly at high wind speeds, and is generally only applicable to open sites away from trees and buildings; it is therefore applicable for rural settings where wind turbines are sited, but it is worth noting that around residential properties, the presence of trees, farm buildings, telegraph poles etc, are likely to significantly increase the level of background noise as wind speeds increase such that (masking) background noise at receptors is likely to be higher than that predicted using the formula presented above.
 - NOABL national wind forecast database, which shows that the average annual wind speed at this site, at a height of 10 metres above ground, is 6.6 metres per second (m/s).
 - British Standard 8233: 1999 *Sound insulation and noise reduction for buildings – Code of practice*, which suggests that internal noise levels of 30 dB L_{Aeq} would be commensurate with “good” conditions for rest and sleep.
- 1.8 The source noise data for the turbines was based upon the MCS approved noise test data for the Evoco 10 kW turbine². The test data indicate that the turbines exhibit no acoustic tonality, and this situation would not be expected to change with the operation of two turbines. Calculation of turbine noise level at the receptors utilised a conventional spherical propagation model assuming transmission of the noise over soft, noise-absorbent ground.
- 1.9 As the turbines operate over a range of wind speeds of up to 12 m/s, in addition to assessing the noise from the turbines as wind speeds increase, it is additionally necessary to assess the potential background noise increase that occurs with increasing wind speed. The assessment thus examined the (turbine) receptor noise levels in the context of predicted background noise levels at each wind speed between 4 and 12 m/s, using the BWEA method described previously. It was agreed with the local authority that the assessment would consider, in particular, potential noise impacts at moderate wind speeds between 5 and 8 m/s; above this wind speed it is possible that background noise may be higher than predicted (as discussed previously at paragraph 1.7) and it becomes more likely that occupants will close windows, potentially reducing the effect of any wind turbine noise.
- 1.10 Because the NOABL wind speeds are given for a 10-metre reference height, i.e. turbine hub height, the background noise levels presented in Table 1 used wind speeds

² Narec, 2010. *Acoustic Test Report For Evoco 10 Horizontal Axis Wind Turbine* (Ref No. 1603/01/A)

corrected, using a standard power law, in accordance with IEC 61400-2³, to a height of 3.5 metres above ground level (AGL), approximately equivalent to the height of a first floor bedroom window.

3. ASSESSMENT RESULTS / CALCULATIONS

- 1.11. Table 1 presents the calculated turbine noise data at the residential receptor location, over the normal operational range of wind speed for the turbines. The Table shows the comparison of turbine noise against the set limit of 40 dB L_{Aeq} as well as the comparison with calculated background noise at each wind speed.

Table 1: Predictive calculations of wind turbine noise compared with set limit (40 dB L_{Aeq}) and background noise adjusted for wind speed

and background noise adjusted for wind speed								
Wind speed @ 10m AGL (m/s)	Calculated BG noise (dB L_{Aeq})*	WTG Sound power level (dB L_{Aeq})**	WTG 1 - 169m	WTG 2 – 177m	Combined turbine receptor noise level dB L_{Aeq}	Set limit value dB L_{Aeq}	Diff v limit value (dB)	Diff v BG (dB)
The Hills Farm								
4	33.9	79.5	23.9	23.5	26.7	40.0	-13.3	-7.1
5	35.2	82.7	27.1	26.7	29.9		-10.1	-5.2
6	36.5	85.8	30.3	29.9	33.1		-6.9	-3.4
7	37.8	89.0	33.5	33.1	36.3		-3.7	-1.5
8	39.1	92.2	36.7	36.3	39.5		-0.5	0.4
9	40.3	95.4	39.8	39.4	42.7		2.7	2.3
10	41.6	98.6	43.0	42.6	45.8		5.8	4.2
11	42.9	101.8	46.2	45.8	49.0		9.0	6.1
12	44.2	105.0	49.4	49.0	52.2		12.2	8.0
Stone Croft								
4	33.9	79.5	20.0	18.1	22.2	40.0	-17.8	-11.7
5	35.2	82.7	23.2	21.3	25.4		-14.6	-9.8
6	36.5	85.8	26.4	24.5	28.6		-11.4	-7.9
7	37.8	89.0	29.6	27.7	31.7		-8.3	-6.0
8	39.1	92.2	32.8	30.8	34.9		-5.1	-4.1
9	40.3	95.4	36.0	34.0	38.1		-1.9	-2.2
10	41.6	98.6	39.1	37.2	41.3		1.3	-0.3
11	42.9	101.8	42.3	40.4	44.5		4.5	1.5
12	44.2	105.0	45.5	43.6	47.7		7.7	3.4

*BWEA calculation, wind speed corrected to 3.5 metres AGL

**Calculated from Narec MCS test data

³ International Electrotechnical Commission (2006) IEC 61400-2 *Design requirements for small wind turbines*. IEC, Geneva

- 1.12. The data in Table 1 indicate that at an annual average wind speed of 8 m/s, the noise from the turbines will be marginally (0.5 dB) below the **40 dB L_{Aeq} limit value** but marginally (0.4 dB) above the **predicted background noise level** at The Hills Farm, and significantly (0.4 to 0.5 dB) lower than either the 40 dB L_{Aeq} limit value or the predicted wind-related background noise level at Stone Croft; internal noise levels commensurate with "good" sleeping and resting conditions, in accordance with the guidance presented in BS 8233, would be achieved at all receptor locations. Only at wind speeds of approximately 10 m/s or greater do the quantitative data in Table 1 indicate that potentially significant turbine noise levels (+5 dB or greater) start to affect The Hills Farm. Potentially significant turbine noise levels (+5 dB or greater) start to affect Stone Croft only at wind speeds of 11 m/s or greater.
- 1.13. At these higher wind speeds it is likely that residents would close their windows, providing at least 30 dB of sound attenuation
- 1.14. In view of the above considerations, therefore, it is our judgement that the installation and operation of the turbines is unlikely to give rise to adverse noise disturbance for the existing or future residents at Stone Croft or The Hills Farm.

4. SUMMARY

- 1.15. The assessment of turbine noise, based on MCS-approved test data, predicted that at moderate wind speeds of up to 8m/s, the 40 dB L_{Aeq} limit value at the nearest receptor would be met, and noise levels commensurate with "good" sleeping conditions, as described in BS 8233, would be achieved; at 9 m/s wind speed the limit value was predicted to be marginally exceeded by 2.7 dB.
- 1.16. The assessment also indicated that when compared to wind speed-related background noise levels, at moderate wind speeds of up to 8 m/s, the background noise level at the closest receptor would be marginally exceeded by +0.4 dB. Only at high wind speeds above 10 m/s was the likelihood of potentially significant noise impacts predicted to occur, according to the predictive calculations presented in Table 1, but this must be considered in the context of potentially greater than predicted background noise levels.
- 1.17. It was predicted that the operation of the turbines at Brows Farm is unlikely to give rise to adverse noise impacts at any existing or potential future residential properties.

5. APPENDICES

Appendix A: Glossary of acoustic terms

Airborne sound: sound transmitted through the air as a medium rather than through solids, liquids or through the structure of buildings.

Ambient noise: all-encompassing noise from sources both near and far

Background noise: the general noise in an area, in the absence of specific noise sources, and against which the impacts of noisy development are often compared. In UK guidance, the 'background' noise is conventionally (quantitatively) defined as the 90th percentile noise level (dB L_{A90}) or the noise level that is exceeded for 90% of the measurement/assessment period.

Decibel (dB): a unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 micro-Pascals (μPa), the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

dB(A) / A-weighting: decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change (in steady noise) of 3 dB(A) is the minimum perceptible under normal conditions and a change of 10 dB(A) corresponds roughly to halving or doubling the *loudness* of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A)⁴. In this assessment, and in some guidance documents, dB(A) is now understood to mean dB L_{Aeq} .

⁴ DEFRA, (1997). Planning Policy Guidance Note (PPG) 24 "Planning and noise" TSO, London

L_{Aeq,T}: the equivalent continuous sound level - the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). *L_{Aeq}* is used to describe many types of noise and can be measured directly with an integrating sound level meter.

Noise: any audible sound. Often defined as unwanted sound. Can be damaging to hearing if it is too loud or can be just annoying if it interferes with the normal enjoyment of others.

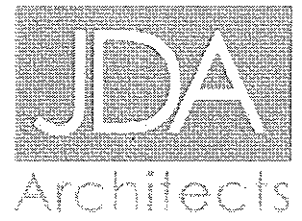
Noise propagation: the geometrical transmission of sound energy away from a source. The sound 'waves' may radiate outwards (spread) in all directions into 'free space' (spherical propagation) or may be constrained by one or more reflective surfaces. In environmental noise assessment, spherical propagation models are conventionally used when noise radiates into open air i.e. from an aeroplane or source high above the ground, or when the ground between source and receiver is absorbent of sound energy, whilst hemi-spherical propagation models are used when hard, sound-reflective surfaces, such as concrete, are present between source and receiver.

Sound / sound pressure: a fluctuation in air pressure over the static ambient pressure.

Sound/noise attenuation: the reduction in intensity of a sound signal

Sound power level (SWL): the total acoustic energy emitted by a source, relative to a standard reference power of 2×10^{-12} watts on the decibel scale

Sound pressure level: the sound pressure relative to a standard reference pressure of 20 μ Pa (20×10^{-6} Pa) on the decibel scale: [20 μ Pa = 20 micro-Pascals]



APPENDIX 6 – CONSULTATION

For this small scale wind turbine application it would be overly onerous to expect a full public consultation. However it is understood that the normal planning procedure will encompass advertising the application and writing to neighbours for comments.

The site is within The Forest of Bowland "Important Bird Areas", however it is outside the RSPB Bird reserves and is located in open farmland. The turbines have been located over 60 m from any natural habitat – hedges trees etc. and therefore will not impact upon rare species or habitats.

The following "Site Check report" proves there are no contentious issues within 500m of the site location, and therefore no further consultation should be necessary.

Site Check Report

Report generated on September 5 2011

You clicked on the point:

Grid Ref: SD 630 388

Full Grid Ref: 363055 , 438898

The following features have been found within 500 metres of your search point:

Counties, Metropolitan Districts and Unitary Authorities (England)

Name	Geographic Level
LANCASHIRE COUNTY	

NUTS1 - Government Office Regions (England)

Reference	Name	Hotlink
UKD	NORTH WEST	http://www.statistics.gov.uk/geography/nuts_nw.asp

Forestry Commission Conservancy Boundaries (England)

Reference	Name
1	NORTH WEST ENGLAND

Natural England Regions (England)

Name	Reference	Hotlink
NORTH WEST REGION	1420317	HTTP://WWW.NATURALENGLAND.ORG.UK/REGIONS/NORTH_WEST/DEFAULT.ASP

English Heritage Regions (England)

Reference	Name	Link
NW	NORTH WEST	HTTP://WWW.ENGLISH-HERITAGE.ORG.UK/SERVER/SHOW/NAV.8542

Environment Agency - Public Face Areas

Area Office Address	Region Name
DODD WAY OFF SEEDLEE ROAD BAMBER BRIDGE PRESTON PR5 8BX	NORTH WEST

Environment Agency - Water Management Areas

Area	Office Address	Region Name
DODD WAY OFF SEEDLEE ROAD	BAMBER BRIDGE PRESTON PR5 8BX	NORTH WEST

Environment Agency - Public Face Regions

Region Name	Regional Office	Address
NORTH WEST	RICHARD FAIRCLOUGH HOUSE	WARRINGTON

Environment Agency - Water Management Regions

Region Name	Regional Office	Address
NORTH WEST	RICHARD FAIRCLOUGH HOUSE	WARRINGTON

Parliamentary Constituencies (England)

Reference	Name
24827	RIBBLE VALLEY CO CONST

NUTS2 - Combined Counties (England)

Reference	Name
UKD4	LANCASHIRE

NUTS3 - Counties and Groups of Unitary Authorities (England)

Reference	Name
UKD43	LANCASHIRE CC

LAU1 - Districts and Unitary Authorities (England)

Reference	Name
UKD4308	RIBBLE VALLEY

Parishes (England)

Name	Description	Administrative Region
LONGRIDGE CP	Civil Parish or Community	LANCASHIRE_COUNTY
THORNLEY-WITH-WHEATLEY CP	Civil Parish or Community	LANCASHIRE_COUNTY

Counties, Metropolitan Districts and Unitary Authorities (GB)

Name	Geographic Level
LANCASHIRE	COUNTY

NUTS1 - Government Office Regions (GB)

Name	Reference	Hotlink
NORTH WEST	UKD	http://www.statistics.gov.uk/geography/nuts_nw.asp

National Cycle Network (GB)

There are no features within your search area.

Biosphere Reserves (GB)

There are no features within your search area.

National Nature Reserves (GB)

There are no features within your search area.

Ramsar Sites (GB)

There are no features within your search area.

Special Areas of Conservation (GB)

There are no features within your search area.

Special Protection Areas (GB)

There are no features within your search area.

Important Bird Areas (GB)

Site reference	Name	Description
960127	FOREST OF BOWLAND	THE FOREST OF BOWLAND FORMS A WESTERN OUTLIER TO THE PENNINES, WITH GENTLE SLOPES AND LEVEL GROUND ON RIDGES. FAST-FLOWING STREAMS DRAIN AN EXTENSIVE AREA OF UPLAND MOORLAND AND BLANKET MIRE AND PTERIDIUM AQUILINUM MAY DOMINATE ON LOWER GROUND

Sites of Special Scientific Interest (GB)

There are no features within your search area.

RSPB Reserves (GB)

There are no features within your search area.

Traditional Orchards - Provisional (England)

There are no features within your search area.

Limestone Pavements (England)

There are no features within your search area.

Undetermined Grassland (England)

There are no features within your search area.

Blanket Bog (England)

There are no features within your search area.

Purple Moor Grass and Rush Pasture (England)

There are no features within your search area.

Lowland Raised Bogs (England)

There are no features within your search area.

Lowland Heathland (England)

There are no features within your search area.

Lowland Dry Acid Grassland (England)

There are no features within your search area.

Lowland Calcareous Grassland (England)

There are no features within your search area.

Fens (England)

There are no features within your search area.

Coastal and Floodplain Grazing Marsh (England)

There are no features within your search area.

Lowland Meadows (England)

There are no features within your search area.

Upland Heathland (England)

There are no features within your search area.

Reedbeds (England)

There are no features within your search area.

Upland Hay Meadows (England)

There are no features within your search area.

Upland Calcareous Grassland (England)

There are no features within your search area.

Ancient Woodland (England)

There are no features within your search area.

Forestry Commission Woodland (England)

There are no features within your search area.

National Inventory of Woodland and Trees (England)

There are no features within your search area.

Coastal Vegetated Shingle (England)

There are no features within your search area.

Coastal Sand Dune (England)

There are no features within your search area.

Maritime Cliff and Slope (England)

There are no features within your search area.

Mudflat (England)

There are no features within your search area.

Saline Lagoons (England)

There are no features within your search area.

Natural Areas (England)

Reference	Name	Hotlink
12	FOREST OF BOWLAND	http://www.naturalareas.naturalengland.org.uk/science/natural/details.asp?na_id=12&s=&r=2

National Character Areas (England)

Reference	Name	Hotlink
33	BOWLAND FRINGE AND PENDLE HILL	HTTP://WWW.NATURALENGLAND.ORG.UK/OURWORK/LANDSCAPE/ENGLANDS/CHARACTER/AREAS/BOWLAND FRINGE AND PENDLE HILL

2001 Settlements (England)

There are no features within your search area.

Landscape Typology (England)

Landscape Character Type	Definitive Attributes - Explanation of Coding	Contributions of Land Use	Land Use Associated Features	Contributions of Land Use Associated Features
UDW	HTTP://WWW.MAGIC.GOV.UK/WEBSITE/TYOLOGY/LANDSCAPE_GLOSSARY.PDF	APPARENT	HEATH AND MOOR	APPARENT

Agricultural Land Classification - Provisional (England)

Reference	Name
4	GRADE 4

Soilscape (England)

Reference	Name	Main Surface Texture Class	Natural Drainage Type	Natural Fertility	Characteristic Semi-natural Habitats	Main Land Cover
6	FREELY DRAINING SLIGHTLY ACID LOAMY SOILS	LOAMY	FREELY DRAINING	LOW	NEUTRAL AND ACID PASTURES AND DECIDUOUS WOODLANDS; ACID COMMUNITIES SUCH AS BRACKEN AND GORSE IN THE UPLANDS	ARABLE AND GRASSLAND
17	SLOWLY PERMEABLE SEASONALLY WET ACID LOAMY AND CLAYEY SOILS	LOAMY	IMPEDED DRAINAGE	LOW	SEASONALLY WET PASTURES AND WOODLANDS MAINLY, BUT NOT EXCLUSIVELY ON THE UPLAND FRINGE	GRASSLAND WITH SOME ARABLE AND FORESTRY
18	SLOWLY PERMEABLE SEASONALLY WET SLIGHTLY ACID BUT BASE-RICH LOAMY AND CLAYEY SOILS	LOAMY	IMPEDED DRAINAGE	MODERATE	LOWLAND SEASONALLY WET PASTURES AND WOODLANDS	GRASSLAND AND ARABLE SOME WOODLAND
31	WATER					

Scheduled Monuments (England)

There are no features within your search area.

Protected Wreck Sites (England)

There are no features within your search area.

Nitrate Vulnerable Zones (England)

There are no features within your search area.

Local Nature Reserves (England)

There are no features within your search area.

Biosphere Reserves (England)

There are no features within your search area.

National Nature Reserves (England)

There are no features within your search area.

Ramsar Sites (England)

There are no features within your search area.

Special Protection Areas (England)

There are no features within your search area.

Special Areas of Conservation (England)

There are no features within your search area.

Sites of Special Scientific Interest Units (England)

There are no features within your search area.

Sites of Special Scientific Interest (England)

There are no features within your search area.

World Heritage Sites (England)

There are no features within your search area.

Nitrate Sensitive Areas (England)

There are no features within your search area.

Areas of Outstanding Natural Beauty (England)

Reference	Name	Date Designated	Hotlink
13	FOREST OF BOWLAND	FEB-64	HTTP://WWW.NATURALENGLAND.ORG.UK/OURWORK/CONSERVATION/DESIGNATEDAREAS/AONB/BOWLAND.ASPX

Environmentally Sensitive Areas (England)

There are no features within your search area.

National Parks (England)

There are no features within your search area.

Moorland Line (England)

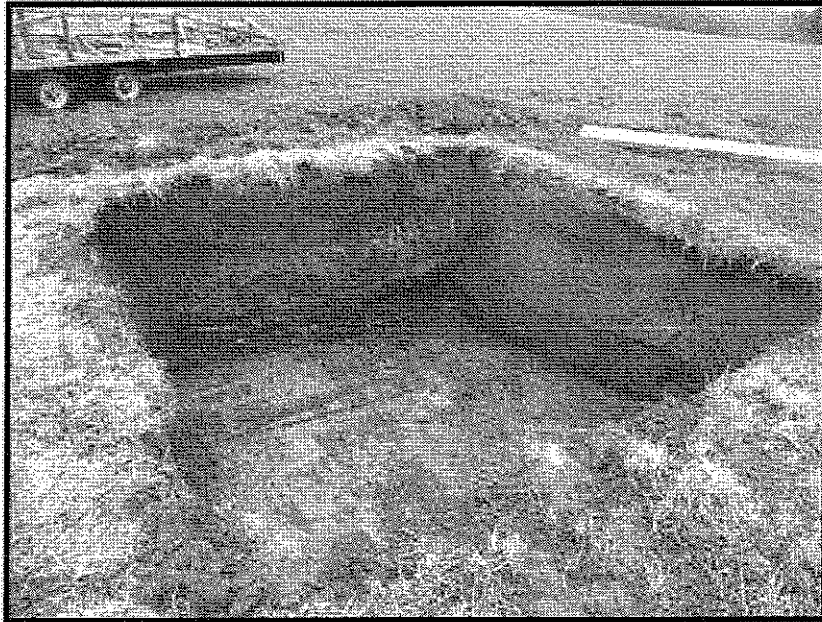
There are no features within your search area.

Less Favoured Areas (England)

Reference	Type
D	DISADVANTAGED



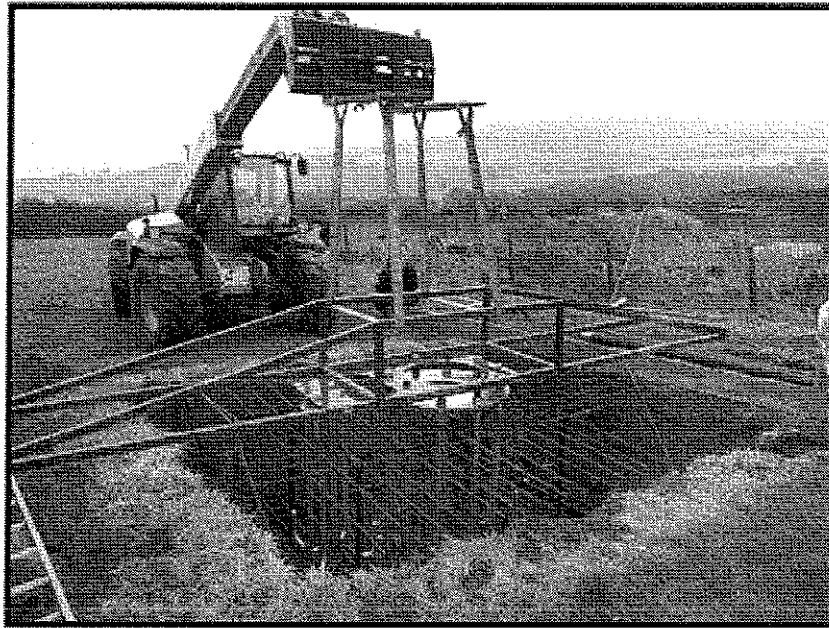
APPENDIX 7 – PHOTOGRAPHS / PHOTO MONTAGE



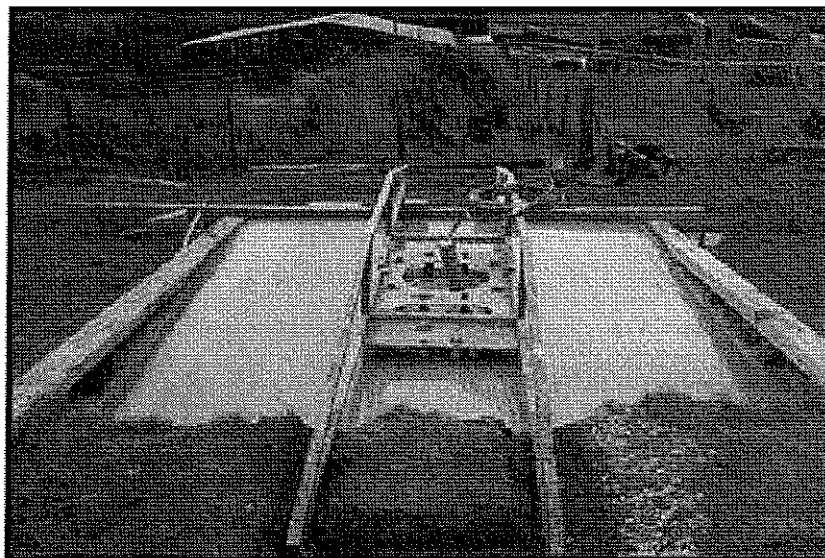
Typical Foundation excavation



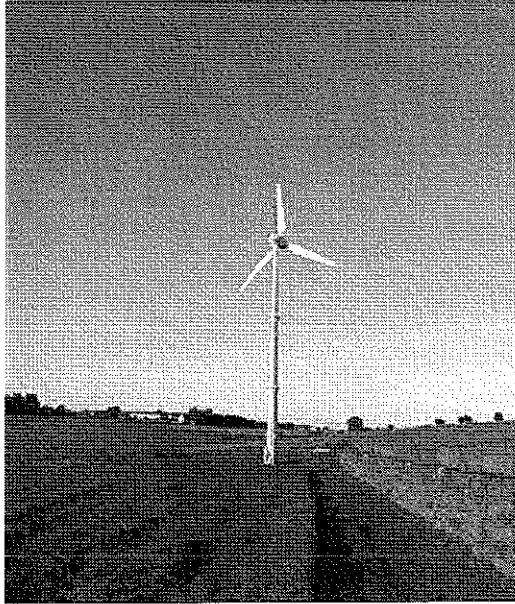
Typical reinforcement bars



Example reinforcement lowered into foundations.



Example completed foundations



Typical Evoco 10KW Turbine images