



DESIGN AND ACCESS STATEMENT

FOR

Proposed Renewable Energy System

AT

Cheese Bottom Farm

Cheese Bottom

Thurgoland

Sheffield

Yorkshire

S35 7AH

01st February 2013

PREPARED BY

Windcrop Limited

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Reference: Design and access statement

Date: 01st February 2013

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If planning officers would like to visit a similar installed turbine locally to take readings on sound levels or to gain a good firsthand appreciation of the scale of the turbine, it would be possible to arrange this.

Project Overview

The development will provide Cheese Bottom Farm with a suitable method of generating a renewable, sustainable and efficient electrical energy supply using a single micro wind turbine. The turbine to be installed is economically viable, robust and quiet by design and extremely efficient. The turbine will be mounted on a 15m tower and will be grid connected to a Single Phase supply.

Site Description

Installation location:	Cheese Bottom Farm Cheese Bottom Thurgoland Sheffield Yorkshire S35 7AH
OS grid reference:	Turbine 1, X – 428178, Y – 401301
Estimated Annual Mean Wind Speed:	5.3 m/s
Expected annual energy:	9.72 MWh
Expected annual carbon saving:	5.22 tonnes
Nearest neighbour:	104m approximately from proposed location – ‘Valley House’
Nearest public road:	96m approximately from proposed location – B6462
Description:	Turbine 1 will be located within the field immediately to the northeast of Cheese Bottom Farm.

The development comprises a single micro scale wind turbine. The proposed site has been chosen to minimise any visual impact and/or noise disturbance. Crime prevention measures do not appear to be relevant to this development.

The height of the tower has been selected to ensure that it is the required height to capture the wind energy on this site whilst keeping any impact to a minimum. The turbine has been designed for low noise operation and minimal visual impact.

The tower is a matt grey colour galvanised to BSEN1461 while the turbine housing and blades have an anti-erosion coating in white. These characteristics will help it blend in with both the sky and the rural background at the location.

Wind energy is an abundant natural resource. It is non-polluting, clean and sustainable. The UK has one of Europe’s windiest climates and wind energy will be an important element in achieving the targets contained in the government’s UK Low Carbon Transition Plan published in Summer 2009. The overall target is to reduce carbon dioxide emissions to 34% below 1990 levels by 2020. More specifically, it is Government policy to achieve 30% of the nation’s electricity requirements from renewable sources by 2020.

The Quiet Revolution supplied HY5-AD5.6 wind turbine will be Micro-generation Certification Scheme (MCS) approved. The turbine is CE marked and approved for sale in the UK.

System Specification

Wind turbine:	Quiet Revolution HY5-AD5.6 (QR-H5)
Rated power:	5kW @ 12m/s (26.0mph)
Hub height (ground to centre of hub):	14.97 m
Rotor diameter:	5.6 m
Tower type:	Tapered free standing tower (steel) & Helical Pile Foundation
Turbine finish:	All exposed parts pot galvanised, painted in Matt White
Blade finish:	Glass Fibre Reinforced Composite, anti-corrosion coating in Matt White
Tower finish:	Matt Grey galvanised to BSEN1461
Rotor speed:	240 rpm nominal – maximum 280 rpm
Tip speed:	70.3m /sec nominal – maximum 82.1 m/sec
Rotor orientation:	Downwind, self-regulating
Rotor swept area:	24.63 m ²
Number of blades:	3
Power regulation:	Variable pitch system (mechanical) & G59 compliant inverter
Electrical connection:	Single phase

The Quiet Revolution supplied HY5-AD5.6 is the product name for the turbine model. Throughout this document it is abbreviated to QR-H5.

Supporting Planning Statement – National Policy considerations.

Wind energy is an abundant natural resource. It is non-polluting, clean and sustainable. The UK has one of Europe's windiest climates and wind energy is expected to be an important element in achieving the targets contained in the government's UK Low Carbon Transition Plan published in Summer 2009. The overall target is to reduce carbon dioxide emissions to 34% below 1990 levels by 2020. In 2008 the UK agreed to achieve 15% of our national energy consumption from renewable energy by 2020, from a starting point of just 1.3% in 2005. More specifically, it is Government policy to achieve 30% of the nation's electricity requirements from renewable sources by 2020. The Committee on Climate Change were asked by the new Coalition Government to review these targets and concluded in September 2010 that they should remain at their previously agreed levels.

The National Planning Policy Framework

The National Planning Policy Framework (NPPF), published on 27 March 2012 sets out national planning policies for England and how these are expected to be applied. It includes a presumption in favour of sustainable development and support for the delivery of renewable energy.

Paragraph 98 of the NPPF sets the policy context for energy development and includes the following statement:

'When determining planning applications, local planning authorities should:

- *Not require applicants for energy development to demonstrate the overall need for renewable or low carbon energy and also recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and*
- *Approve the application¹⁸ if its impacts are (or can be) made acceptable.*

18 Unless material considerations indicate otherwise'

The NPPF replaces Planning Policy Statement 22 (PPPS 22) *Renewable Energy*, but for the time being, the Companion Guide to PPS 22 remains extant.

The following extracts from the Companion Guide cover the key issues that need to be considered when siting wind turbines, and provides more detailed guidance to applicants and local planning authorities alike:

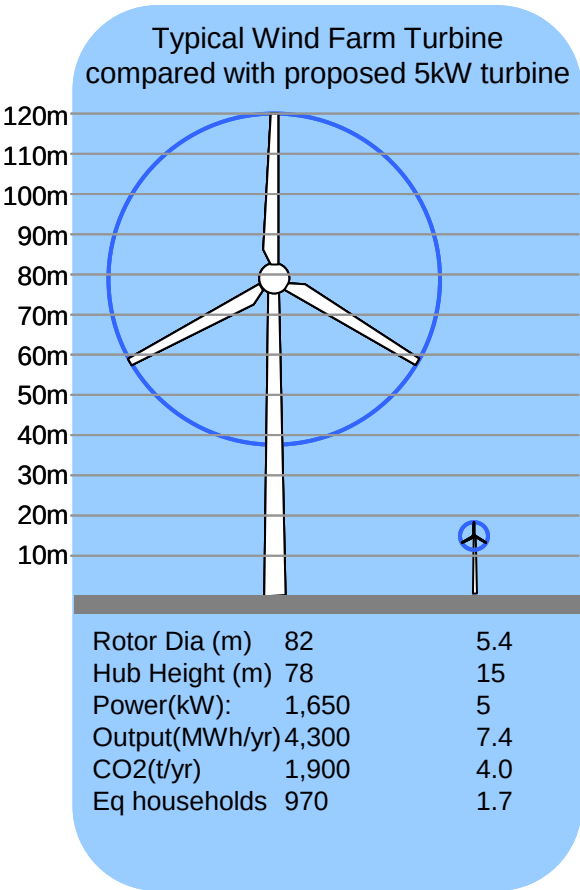
- **Noise:** The Technical Annex (paragraph 41) states that noise levels from wind turbines are generally low and, under most operating conditions, it is likely that turbine noise would be completely masked by wind-generated background noise.
- **Visual and Landscape Impact:** The impact of turbines on the landscape will vary according to the size and number of turbines, the capacity of the landscape to absorb change, and the duration of any consent. Conditions may be attached to planning permissions which require the future decommissioning of turbines.
- **Safety:** The Technical Annex identifies little or no risk arising to the public and states that properly designed and maintained generators are a safe technology.
- **Ecology:** The Technical Annex (paragraph 58) states that the impact of a wind farm on local ecology should be minimal. A common concern has been the risk of bird strike; more recently, an additional concern around the risk of harm to bats has emerged.

- **Electro-magnetic Production and Interference:** The Technical Annex (paragraph 64) states that provided careful attention is paid to siting, wind turbines should not cause any significant problems of electrical interference. Scattering of signal is a phenomenon that arises very occasionally and effects on radio or television transmitters can usually be resolved through careful siting, in consultation with the relevant bodies.
- **Specialist Consultation:** It may be necessary to consult specialist bodies, including users of telecommunications systems, local utility companies, or emergency services on occasions.
- **Shadow Flicker:** Shadow flicker is a rare event which sometimes can occur when the shadow of the turbines blades play on nearby buildings at certain times of day and days of the year. It most commonly would affect nearby buildings to the east or west of the turbine at dusk and dawn. However this is not a problem normally found with small wind turbines and the siting of this installation eliminates any risk of shadow flicker on neighbouring buildings. The Technical Annex (paragraph 76) states that turbines should be positioned at least 10x the diameter of the rotor blades away from the nearest dwelling to prevent the possibility of shadow flicker.
- **Icing:** The build-up of ice on turbine blades is unlikely to be a problem. For ice to build up on wind turbines particular weather conditions are required that in England occur for less than one day per year.

Siting and scale

It has been normal practice to site utility scale wind turbines on elevated and exposed ground in order to achieve the highest possible energy capture and optimise the economics of the project. This has led to considerable opposition to wind power projects wherever they have been proposed. It is important to appreciate that the proposed turbine is of a completely different scale to the now familiar utility scale giants, which may have tower heights of 100m and rotor diameters of 80m or more.

By way of comparison, the proposed installation sits on a 15 metre mast with a rotor diameter of 5.6 metres and is closer in scale to a typical telegraph or power transmission pole, which forms a familiar aspect of our rural landscape. The diagram below demonstrates this contrast.



Validation Requirements

In preparing this section of the documentation, validation requirements have been reviewed and information is provided in all relevant categories.

- **Economic Statement:**

The wind turbine is expected to generate an average of 9.72 MWh of electricity each year, equivalent to a saving of 5.22 tonnes of carbon dioxide. This yield data has been calculated from the Small Wind Turbine Yield Calculator, jointly developed by the Carbon Trust and Renewable UK (formerly BWEA) and which is widely recognised as the most accurate yield forecast tool available. In particular it has addressed many of the issues of overoptimistic yield forecasts from earlier tools which did not take account of local geographic conditions.

This installed capacity will also help to contribute towards regional targets for renewable energy generation included in the UK Low Carbon Transition Plan.

- **Biodiversity:**

A site check has been made using the Multi Agency Geographic Information for the Countryside Interactive Map (MAGIC), managed by Natural England on behalf of DEFRA. The search identified no protected habitat areas within a 2Km radius of the site:

In addition, the search identified thirteen ancient woodlands (AW) that are all located over 500m from the proposed site. A full list of sensitivities, including locations and distances to the turbine, are included in the Planning Distance Calculations document.

We conclude that the proposed development does not present a risk to protected species that may be associated with the woodlands, due to the small size of the turbine and the intervening distance between the proposed development and the designated sites.

We have considered evidence relating to both collision and displacement risk during both the construction and operational phases.

Evidence of collision risk relates principally to much larger scale turbines, and highlights offshore wind farms located in proximity to migration routes as presenting the most significant risk. Whilst SPA species may move to moorland or other suitable habitat areas at distances of 2 Km or more, recent studies have found little evidence for differences in population trends between operational wind farms and reference sites. This is consistent with Natural England's Guidance note TIN 069, which states 'At present there is little evidence that wind farms in England have a significant impact on birds'. When coupled to the small scale of the proposed turbine, with a blade sweep area of approximately 25 square metres, this suggests that direct collision is very unlikely to occur.

Early evidence indicated that some species are harmed when wind farms are built as a result of displacement, but a more recent analysis of breeding bird populations found little evidence for consistent population declines in golden plover and wheatear due to disturbance or avoidance behaviour. The findings are published in the Journal of Applied Ecology <http://www.journalofappliedecology.org/view/0/editorschoice492.html>.

Installation of a Windcrop turbine is typically carried out over a 24-48 hour period, and the 'footprint' is very small, so that any disturbance would in any event be of very limited duration.

We conclude that the proposed development does not present a risk to important bird populations or the integrity of the SPA.

The proposed site has also been assessed in accordance with guidelines for the siting of small wind turbines, prepared by an established independent ecological consultant, so as to minimise risks to protected species. The site assessment considers features which may be used by bats and/ or birds, and takes account of the available guidance in relation to the siting of small wind turbines. These features comprise trees, hedgerows, ponds and waterways, including permanently wet ditches. A micro turbine on or close to any hedgerow or linear feature may increase the likelihood of an effect on bat populations as many species of bats follow linear features when travelling between foraging sites and a roost.

Particular attention has been paid to ensuring that the site is an appropriate distance from potential foraging habitats and roost sites. Bats roost in a wide range of buildings and all buildings except those constructed from non-traditional, modern or pre-fabricated materials, are considered as potential bat roosts. Large mature trees (girth greater than 300cm) are also potentially suitable as roost sites.

The relationship to connective woody habitat is also taken into consideration because these may offer roosting and foraging opportunities; likewise fresh water features are often attractive to foraging bats. Isolated or fragmented habitat features are less likely to be used by bats as they provide little cover or foraging potential.

In addition, this assessment of the potential of risk to bats takes account of a study recently published by Stirling University titled ***“Experimental evidence for the effect of small wind turbine proximity and operation on bird and bat activity”***. Their summary findings include the following:

- *Bird activity was not apparently affected by small wind turbines proximity or operation.*
- *Bat activity was reduced by small wind turbine operation, especially at shorter distances to small wind turbines.*
- *These findings support recommendations to site small wind turbines at least 20m from potentially valuable bat habitat.*

The full paper can be found on the following link:

<http://www.sbes.stir.ac.uk/research/ecology/micro-turbines.html>

On this particular site, the closest potential foraging feature is located over 71m from the turbine. This is outside the report’s findings of situating turbines at least 20m from such features. We conclude that the turbine will not have an adverse impact on bat and bird populations in the vicinity of the development site.

There are no veteran trees or buildings that are likely to be attractive as bat roosts located within 50m of the site. No trees, hedgerows or scrub will be affected by the installation and the piling and cabling procedures are normally completed within a day (installation procedures are explained more fully under ‘Below Ground Environmental Impact’). Hence the turbine is not expected to disturb any ground dwelling fauna and the risk of harm to protected species is considered minimal.

- **Landscape and visual impact:**

The site is not situated in an Area of Outstanding Natural Beauty. Care has been taken to minimise the landscape and visual impact, and views from adjacent receptors have been considered. Images of the site and surrounding area are provided at Appendix C and a visualisation of the turbine viewed from approximately 144 metres is provided at Appendix D.

Other viewpoint photos are included and further consideration of landscape and visual impact assessment is provided in a separate Addendum to this Design and Access Statement. We conclude that the development will not have an unacceptable impact on landscape or visual amenity.

- **Heritage Statement:**

A site check has been made using the MAGIC interactive map to identify any relevant archaeological sites, scheduled ancient monuments and historic parks and gardens, a copy of which is enclosed. None were identified within 1.5km of the site.

In addition, the search identified two scheduled monuments, of which both are located, more than 1.5Km of the proposed site:

Wortley Top Forge (Ref No 1018262) is located approximately 1.65Km to the southeast of the proposed development at its closest point.

Low Forge (Ref No 1020626) is situated approximately 1.98Km to the southeast of the proposed development at its closest point.

We conclude that the development will not impact the monuments, due to the distance and the intervening landscape features and topography between the proposed site and monument locations.

A listed building search has been conducted using the online search engine maintained by English Heritage, with the following results;

Title	Type	Location	Grade
FORMER STABLE RANGE APPROXIMATELY 10 METRES WEST OF HUTHWAITE FARMHOUSE	Listing	FORMER STABLE RANGE APPROXIMATELY 10 METRES WEST OF HUTHWAITE FARMHOUSE, HUTHWAITE LANE, Thurgoland, Barnsley	II
FARM BUILDING AT NORTH END OF FARMYARD AT HUTHWAITE FARM	Listing	FARM BUILDING AT NORTH END OF FARMYARD AT HUTHWAITE FARM, HUTHWAITE LANE, Thurgoland, Barnsley	II
ROPER HOUSE	Listing	ROPER HOUSE, ROPER HOUSE LANE, Thurgoland, Barnsley	II
FARMBUILDING APPROXIMATELY 3 METRES SOUTH WEST OF HUTHWAITE FARMHOUSE	Listing	FARMBUILDING APPROXIMATELY 3 METRES SOUTH WEST OF HUTHWAITE FARMHOUSE, HUTHWAITE LANE, Thurgoland, Barnsley	II
PULE HILL HALL AND ADJOINING BUILDING TO LEFT	Listing	PULE HILL HALL AND ADJOINING BUILDING TO LEFT, RAG LANE, Thurgoland, Barnsley	II
STABLE RANGE IMMEDIATELY SOUTH WEST OF ROPER HOUSE	Listing	STABLE RANGE IMMEDIATELY SOUTH WEST OF ROPER HOUSE, ROPER HOUSE LANE, Thurgoland, Barnsley	II
HOLY TRINITY CHURCH	Listing	HOLY TRINITY CHURCH, HALIFAX ROAD, Thurgoland, Barnsley	II
THURGOLAND BRIDGE	Listing	THURGOLAND BRIDGE, THURGOLAND BANK, THURGOLAND, Thurgoland, Barnsley	II
HUTHWAITE HALL	Listing	HUTHWAITE HALL, HUTHWAITE LANE, Thurgoland, Barnsley	II*
BREW HOUSE; HUTHWAITE FARMHOUSE GARAGE; OLD BREWHOUSE	Listing	BREW HOUSE, HUTHWAITE LANE, Thurgoland, Barnsley	II

The search identified ten listed buildings (LB) within a 1Km radius of the proposed installation. Only the Grade II* and LB up to a distance of 730 metres will appear in the Design and Access Statement, as the other LB's are all over 821 metres away from the proposed site. A full list of the others will be in the planning distance calculations document, with their location and distance to the proposed site location. Further information on these sites can be provided if required.

Roper House and Stable Range immediately to the southwest (Grade II – LB's) are both situated approximately 288 metres to the east southeast of the proposed development. Undulating rough pasture/fields, trees of various sizes and established hedging are in the intervening area between the proposed site and the listing location. Below is an extract from the English Heritage listing details for the above property, and also an aerial image is provided.

4/89 Roper House II

House. Dated 1742 Rendered. Welsh slate roof, stone slates to rear wing. Two storeys. Three bays with lower rear wing. Symmetrical facade. Quoins. Central doorway with quoined surround and joggled lintel with keystone inscribed: "1742". 3-light flat-faced mullion window to left and right, both floors and a 2-light window above door. Stone brackets to gutter (probably C19). Gable copings on moulded kneelers. Ashlar gable stacks.

4/90 Stable range immediately south-west of Roper House GV II

Stable range. Mid C18, altered. Rendered. Corrugated metal roof. Three internal bays. Outshut to right has two single-light windows and an arched doorway to its left return. Two entrances each with quoined surround and deep lintel and a 3rd (part-blocked) in a lean-to addition to the left. Doorway at high level (probably later). Gable copings on cut kneelers. Rear: C20 window openings.



Thurgoland Bridge (Grade II – LB) is located approximately 613 metres to the northwest of the proposed development. Various rough pasture fields, trees of various sizes and Cheese Bottom are in the intervening area between the proposed site and the listing location. Below is an extract from the English Heritage listing details for the above property, and also an aerial image is provided.

4/92 Thurgoland Bridge II

Bridge. Early to mid C19. Deeply-coursed tooled sandstone except west end which is rock-faced stone. One segmental arch flanked by square piers. Similar piers at each end. Band at base of parapet which has triangular coping raised over the piers.



Holy Trinity Church (Grade II – LB) is situated approximately 715 metres to the southeast of the proposed development. Various fields, trees of various sizes, existing buildings and Roper House Lane are in the intervening area between the proposed site and the listing location. Below is an extract from the English Heritage listing details for the above property, and also an aerial image is provided.

4/101 Holy Trinity Church II

Parish Church. 1870, additions 1932. Designed by G.E.Street with alterations by Sir Charles Nicholson. Nave with south aisle and north porch, chancel has south transept and north organ chamber and vestry. Ashlar with ashlar dressings and slate roofs with ashlar coped gables. Chamfered plinth, shallow buttresses. West front has central stepped buttress with flanking single 2 light lancets with geometrical tracery and transoms. Above the gable has a bellcote. North front has projecting gabled porch with pointed opening and to the left 3 tall plate tracery 2 light pointed windows. Beyond a projecting double gabled organ chamber, that to the right with 2 lancets, that to the left with a large cross-mullion window and behind a tall stack with set-offs. Beyond a low flat roofed, single storey, vestry addition. Chancel east wall has a 3 light

tracery with hood mould. Projecting south transept has to east 2 circular windows with asped tracery. South wall has a single pointed arched opening containing 3 graduated lancets. South aisle has 3 pairs of small lancets, and to the east a taller 2 light window. INTERIOR. Has 3 bay south arcade with pointed chamfered arches and circular piers. A double chamfered, pointed chancel arch, and 2 bay chancel arcades on eitherside, chancel has low stone screen and tall wooden side screens. Blind arcading and reredos to chancel east wall, and to south a piscina and sedilia. Bronze and iron altar rail, contemporary choir stalls and-pews. Fine stone pulpit with black marble shafts, and fine bowl and stem front, with a row of lancets and 3 rows of roses, both typical of Street. Contemporary wooden roofs.



Pule Hill Hall and adjoining building to left (Garde II – LB) is situated approximately 730 metres to the northeast of the proposed development. Various fields, existing buildings, trees of various sizes, the B6462 and the A629 are in the intervening area between the proposed site and the listing location. Below is an extract from the English Heritage listing details for the above property, and also an aerial image is provided.

4/88 Pule Hill Hall 18th March 1968 and adjoining building to left II House and adjoining cottage.

Probably late C18, altered, restored late C20; cottage dated 1671, with C18 alterations. Rendered rear, coursed dressed stone to garden front. Concrete tile roof, stone slates to cottage. Two storeys. Each of 3 bays. House: garden front: central doorway, possibly altered, blocked openings to each side. Plaque with shield support and helm, and a 3-light flat-faced mullion window to 1st floor (altered or reset). Square 2-storey added bay to each side with large ground-floor windows and 3-light window to 1st floor as before, possibly reset. Plain elevation to cottage. Concrete gable copings on cut kneelers. Brick end stacks. Rear: 2 bays of flat-faced mullion windows of 3 and 2 lights to left with inserted doorway between. Round-arched staircase window and a further 2-light window to right. Cottage, on left, has moulded

doorway to right with inscribed lintel: "TA 1671" One 3-light window with chamfered mullions to each floor. Other openings probably inserted, except a 2-light double-chamfere & window (mullion removed) to 1st floor left. Central rendered stack.



Huthwaite Hall (Grade II* - LB) is located approximately 868 metres to the south southeast of the proposed development. Various fields, established hedging, trees of various sizes, existing agricultural buildings and Roper House Lane are in the intervening area between the proposed site and the listing location. Below is an extract from the English Heritage listing details for the above property, and also an aerial image is provided.

*4/83 Huthwaite Hall GV II**

Large house. 1748. By John Carr. Coursed squared stone. Welsh slate roof. Three storeys, five bays. Symmetrical facade. Quoins. Central doorway with moulded architrave and triangular pediment. Ground-floor windows have Gibbs surround and 12-pane sashes. Deep band over ground floor. 12-pane sashes to 1st floor each with moulded architrave, pulvinated frieze and cornice, the central window having swept architrave. Sill band. Shorter 2nd floor with square 6-pane sashes and moulded architraves. Modillion eaves cornice. Ashlar gable copings on moulded kneelers. Good ashlar gable stacks each with moulded string course and cornice. Rear: central round-arched staircase window to 1st and 2nd floors.



We conclude that the small scale of the development will be unlikely to cause an unacceptable adverse effect on the above Listed Buildings, due to the distance and the intervening landscape features and the topography between the proposed site and the listing locations.

- **Noise Impact Assessment:**

The turbine manufacturer has commissioned an independent noise report as part of the accreditation procedures required to enable the equipment to qualify for the Feed-In Tariff (FiT) scheme introduced on 1 April 2010; see Appendix B for further details.

The assessment of noise immission in relation to background noise levels for wind systems is established in the ETSU-R-97 process but this is not appropriate for small wind systems due to the cost of a site specific measurement of background noise in relation to wind speed. A methodology has been developed (see Appendix B) that avoids the need for a site specific ETSU-R-97 assessment by taking an assumed curve for background noise against wind speed that is set at a very low level. This leads to relatively high minimum siting distances compared with both the MCS noise methodology and the ETSU-R-97 methodology but avoids the need for a specific survey where the distances are large.

In this assessment, acceptability criteria have been assumed of +3dB above background noise at the neighbouring façade and +5dB above background at the nearest amenity boundary.

- **Assessment of Noise Levels at Neighbouring Properties**

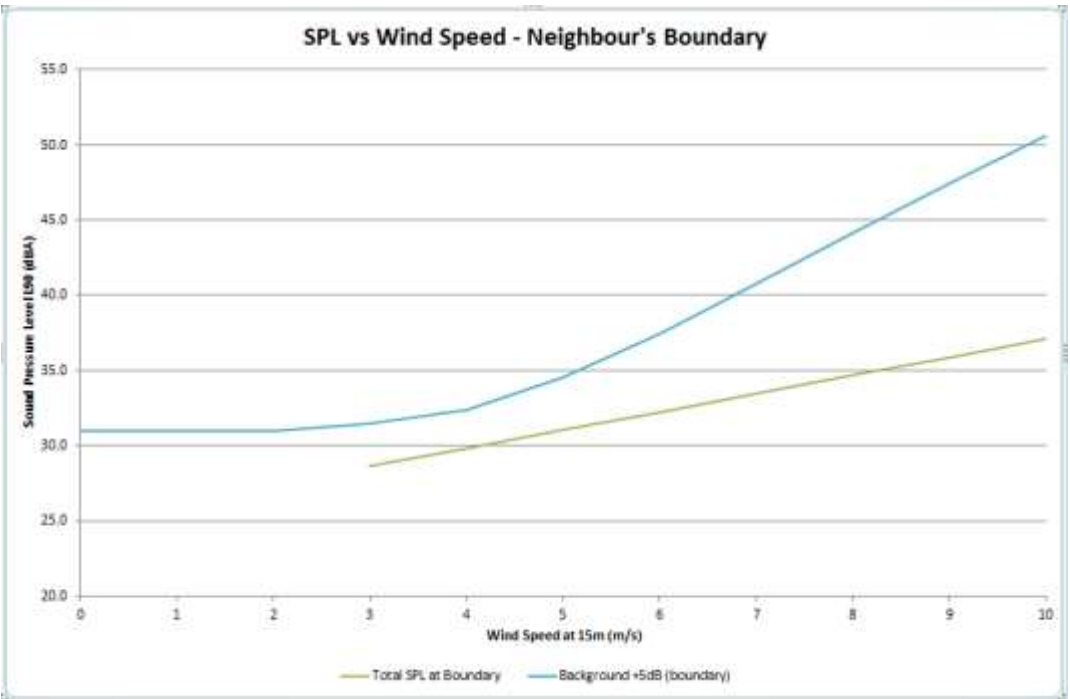
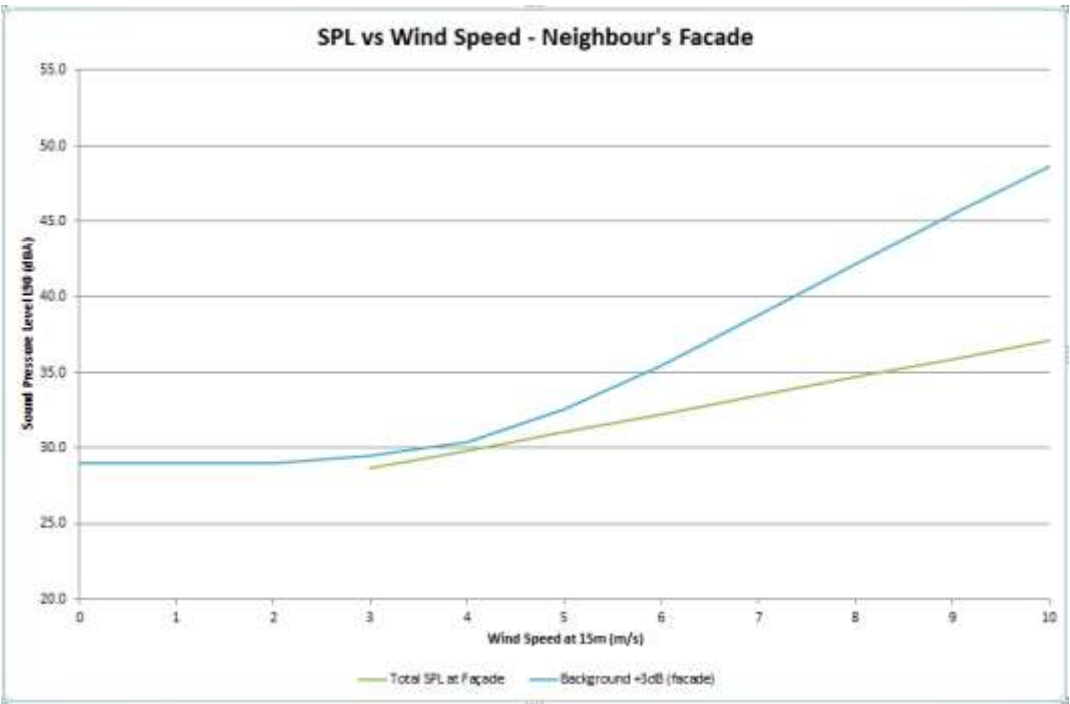
The distance to the amenity (garden) boundary of the nearest neighbour, Valley House is approximately 104 metres to the southwest of the installation; the distance to the façade is 104 metres.

Base BS4142 Background Noise 26 dB(A)

Turbine 1

Distance to Neighbour's Façade 104 m

Distance to Neighbour's Boundary 104 m



In the graphs above, the blue line indicates the acceptable noise level with wind speed and the green line indicates the turbine noise level. The turbine does not operate below wind speeds of 3m/s.

At this particular site, undulating ground (rough pasture) and a small hill with trees of various sizes are situated between the turbine location and the neighbour. In addition, we have recently carried out a number of noise surveys on sites with similar characteristics. The lowest BS4142 Leq reading we have had is 28dB with an average result of 31dB. As such, the assumed level of 26dB is very conservative and a separate site noise survey is not considered necessary to support this assumption. This leads us to conclude that the neighbouring property of Valley House will not be adversely affected.

- **Below Ground Environmental Impact:**

A helical pile foundation system is used in place of traditional concrete foundations. The mast is mounted on a tripod which is located by three helical piles. These are inserted by rotation and are normally drilled to a depth of 3-4m. Each 'foot' rests on a pad, excavated to a depth of approximately 250mm and measuring approximately 600 x 500 mm. The piles are approximately 3m apart and can be removed by the same method, leaving no residual structure. Helical piles do minimal damage to the ground and any ground dwelling animals, as well as being easily retracted on decommissioning of the turbine. No concrete is used and any stage during installation.

The connection cable is buried 600mm deep in a 150-175mm wide trench (x cable length). A Ditchwitch 'pedestrian trencher' RT24 is used to cut and backfill the trench. The trenching is completed as a single operation, taking no more than a day. Disturbance to ground vegetation is therefore minimal and temporary in nature. As a result, restoration of the site following decommissioning is very low impact and existing flora in the area adjoining the site will be retained.

No ancillary structures or buildings are required to house electrical equipment or controllers, which will be mounted to the mast base. The cable to feed the generated power to the nearest building will be buried in accordance with BS7671:2008.

- **Shadow Flicker:**

Turbines should be positioned at least 10x the diameter of the rotor blades away from the nearest dwelling to prevent the possibility of shadow flicker. The nearest dwelling is approximately 104 metres from the proposed installation, which is outside the recommended calculation of 56 metres for the selected turbine.

- **Flood Risk Assessment, Foul Sewage and Utilities Assessment, Surface Water Drainage:**

Considering each of these and the nature of the proposal, it is concluded that these are not applicable to the project because the turbine will not create or use any extra water. No sewage will be generated from the site and surface water drainage will be unaffected.

- **Land Contamination Statement:**

The proposed site is a small area of rough pasture to the northeast of the farm yard and is not known to be contaminated. The installation will not result in contamination and on decommissioning the helical piles will simply be unscrewed leaving no residual material.

- **Lighting Assessment:**

No external lighting is to be installed on or around the turbine.

- **Parking Provision:**

No dedicated parking or other access provision will be required for the turbine.

- **Transport Assessment/Travel plan:**

The installation process will generate minimal traffic, involving one day on site to insert the foundation helical piles and erect the turbine.

Following installation, access will be required for routine maintenance only. Access will be via the existing entrance to the field, which would also provide good access for any emergency services in the unlikely event they were required.

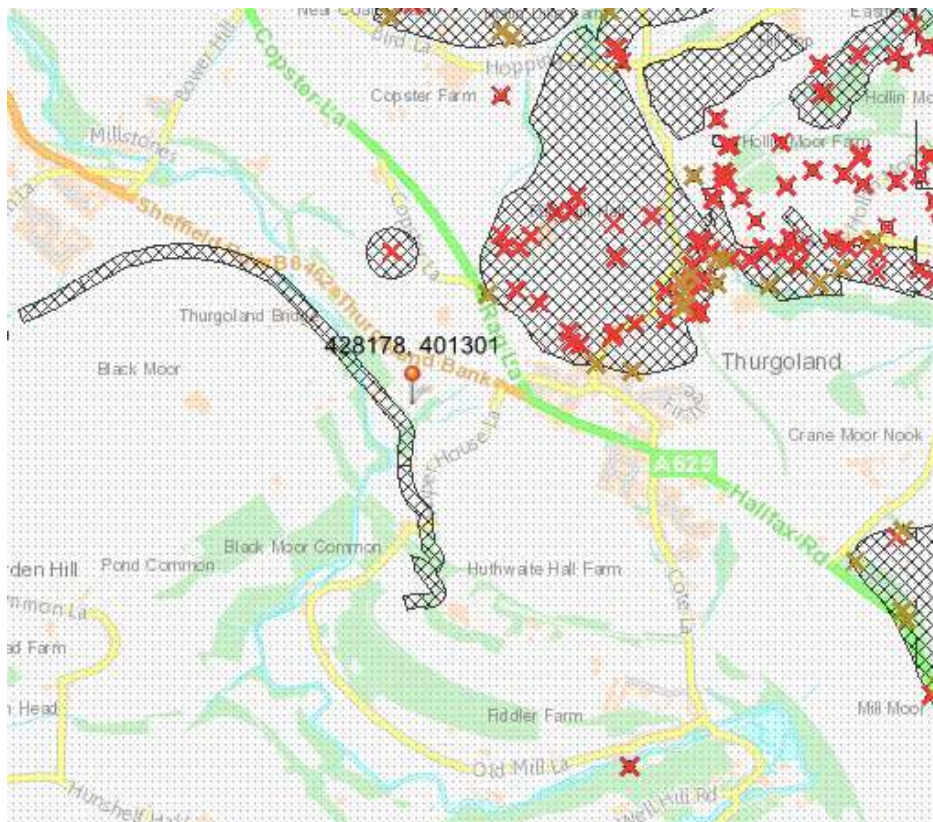
- **Radar Safeguarding**

Whilst the construction of the blades utilised in our turbines is of a composite non-reflective material, we have been advised that there is a small potential for radar interference if the system is installed within line of sight of a radar station.

We have assessed the turbine location for the possibility of interference, utilising information provided by the MOD giving their radar coverage at 15 metres height. This resulted in no line of sight being available to any MOD radar station, but it is the responsibility of the authority to consult the relevant safeguarding organisations if there is a requirement to do so.

- **Coal Mining Risk Assessment**

The Coal Authority's interactive map viewer has been accessed to ascertain whether a coal mining risk assessment is required for this particular site. The map below indicates that this location is situated in a "Coal Mining Reporting Area" but is not situated in a "Development High Risk Area". We have been advised by The Coal Authority that in this situation, a coal mining risk assessment is not required.



- **Green Belt**

The site is located within the Barnsley Green Belt shown on the UDP Proposals Map and defined in Policy CSP34 of the Barnsley Core Strategy (September 2011), which seeks to preserve the extent of the adopted Green Belt in the District.

National planning policy for the Green Belt is set out under Section 9 of the National Planning Policy Framework, published March 2012.

Paragraph 79 states:

“The fundamental aim of Green Belt policy is to prevent urban sprawl by keeping land permanently open; the essential characteristics of Green Belts are their openness and permanence.”

Paragraph 80 states:

“The Green Belt serves five purposes;

- *To check the unrestricted sprawl of large built-up areas*
- *To prevent neighbouring towns merging into one another*
- *To assist in safeguarding the countryside from encroachment*
- *To preserve the setting and special character of historic towns; and*
- *To assist in urban regeneration, by encouraging the recycling of derelict and other urban land.”*

Paragraph 91 states:

“When located in the Green Belt, elements of many renewable energy projects will comprise inappropriate development. In such cases, developers will need to demonstrate very special circumstances if projects are to proceed. Such very special circumstances may include the wider environmental benefits associated with increased production of energy from renewable sources.”

There is no automatic policy presumption against renewable energy development. In Barnsley, where the majority of open land is designated as Green Belt, the judgement as to whether the installation of one small scale turbines at this location comprises inappropriate development rests, in the first place on policy considerations.

Small scale renewable energy development does not conflict with the five stated purposes of the Green Belt, which are concerned with preventing the coalescence of urban areas, and the maintenance of open areas between settlements. Indeed, the proposed installation shares common characteristics with some forms of development that are identified as Green Belt Policy exceptions (Paragraph 90 refers), such as mineral extraction and engineering operations,

because the development is time limited and does not set a precedent for any long term change in the character and function of the Green Belt.

However, where it is deemed that a wind turbine proposal does comprise inappropriate development, in accordance with paragraph 91 of the NPPF, wider environmental benefits associated with the increased production of energy from renewable sources may contribute very special circumstances. The following assesses the impact of the proposed development on the openness of the Green Belt and quantifies the environmental and economic benefits associated with the proposal.

- **Impact on Openness**

The siting of this turbine is fundamentally different from the siting of a utility scale wind farm. Whereas wind farms must be sited in open countryside and in areas where there are no adjacent dwellings, this turbine is located in proximity to the farm, because it connects directly to the home and agricultural enterprise. For this reason the turbine is viewed in association with the agricultural enterprise. At this site, the distance from the turbine to the farm buildings and connection point is around 100m.

The scale of a Windcrop turbine is also fundamentally different to that of a utility scale Wind Farm. Government policy encourages small scale energy generation infrastructure, and recent changes to permitted development rights mean that turbines up to 11.1m in height are now an ordinary feature of a working property in an open rural landscape. The Windcrop turbine is mounted on a slender 15m mast and the narrow bladed head unit has been designed to minimise its visual impact.

The character of the much of the Barnsley Green Belt in this area is the product of a complex interaction between man and the environment. This legacy is apparent at this current site, where almost any given viewpoint is framed by either, low voltage power lines, high voltage power lines, a sewage treatment plant and / or working farm buildings.

Furthermore, as illustrated in the landscape assessment in this DAS, due to the undulating topography of the site, the turbine is hidden from many surrounding viewpoints and being situated on the lea of a hill, the turbine is almost always viewed entirely beneath the skyline.

Notwithstanding these considerations, which appear to indicate that this Green Belt location is appropriate, very special circumstances exist that outweigh any potential harm to the character of the Green Belt.

Very Special Circumstances

- **Carbon savings and Energy Generation**

The UK Carbon Transition Plan (2009) aims to reduce carbon dioxide (CO₂) emissions to 34% below 1990 levels by 2020. The government's Renewable Energy Strategy (2009) aims for 15% of all energy coming from renewables by 2020, with around 30% of electricity from renewables including 2% from small-scale generation.

Over the next few years, spare capacity in the electricity supply network is set to fall from 14% to 4% over the next three years, and fuel bills are projected to rise. By 2015, most of our nuclear capacity and around 40% of our coal generation will close. At the same time, we are rapidly running out of gas (we currently rely on gas for almost half our electricity); by 2020, around 70-80% of it will be imported from the Middle East, Russia and Norway. To meet future demand and maintain security of supply, future energy generation projections include ambitious targets for renewable energy. For example, they assume that a million homes will have solar panels and that onshore wind power will provide four times as much power as it does today. Small scale onshore turbines are projected to make a significant contribution towards meeting future demand.

Windcrop turbines are highly effective, with an installed capacity of 5kW. They generate 8000–10,000kWh a year depending on wind speed, providing the landowner with a worthwhile source of free electricity without a prohibitive upfront cost. They are affordable, flexible, low impact and quick and simple to set up and commission, and the time from initial enquiry to installation can be as little as four months, and installation itself takes just one or two days. The mast can be raised and lowered with a hydraulic winch, making it easy to service the system.

Small wind can make a significant contribution to meeting the government's targets. According to the Department of Energy and Climate Change, each Windcrop turbine saves 450g of CO₂ per kWh generated, or 4.5 tonnes of CO₂ every year.

- **Local Benefits**

This proposal will provide direct benefits to the property owner and will result in a carbon neutral secure energy supply providing free electricity for 20 years. At 5m/s wind speed the turbine will generate 7,511kWh of electricity per annum, rising to 10,997kWh when wind speeds average 6m/s. The cost saving to the farmer from this turbine is forecast to be at least £500 per year. Such savings made can make the difference between a business succeeding or failing, and by helping to maintain viable businesses and employment, the benefits extend to the wider community.

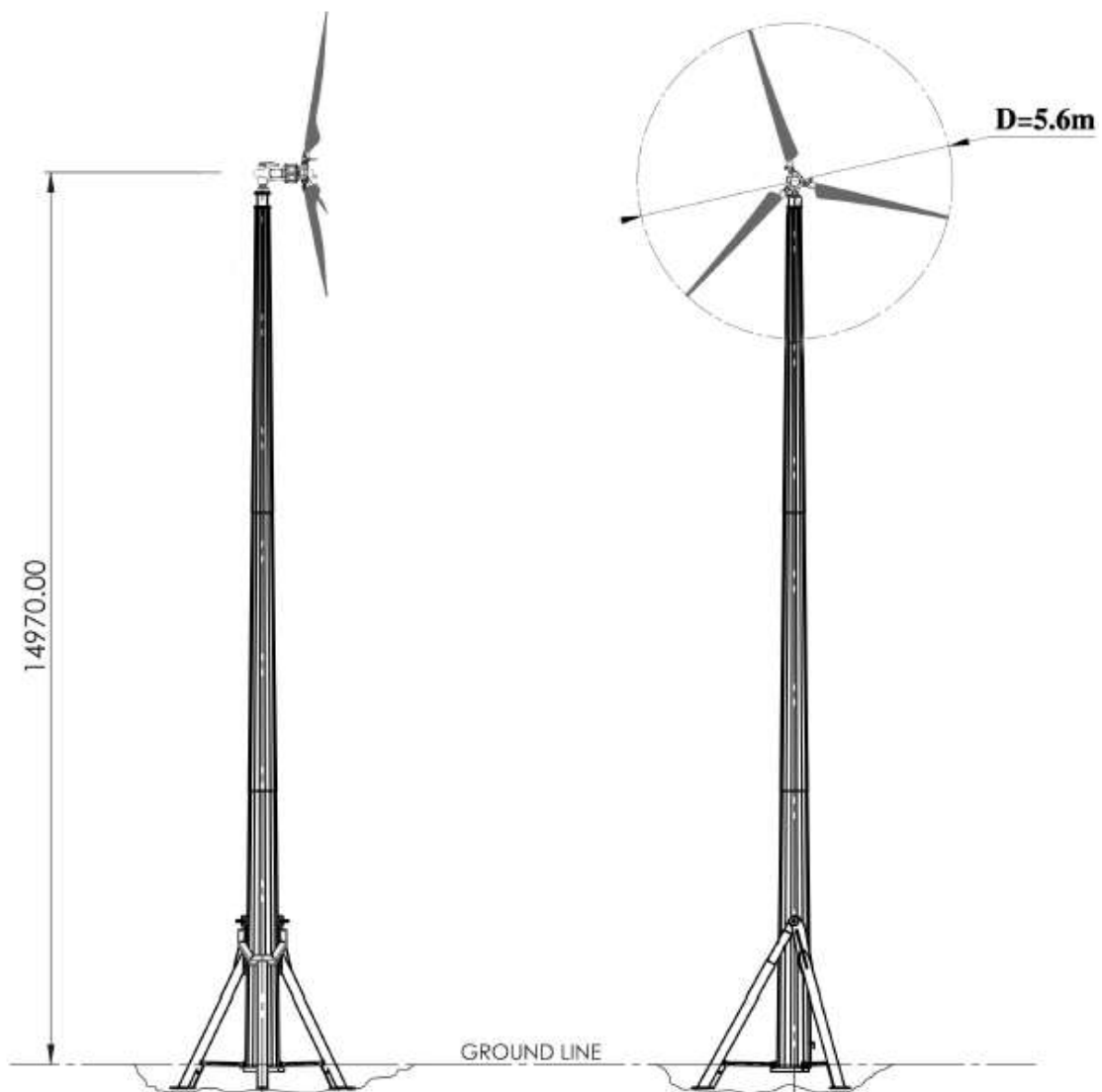
In view of the above it is considered that through a combination of siting and local physical and landscape characteristics, the proposed development will have little or no impact on the openness of the Green Belt. Notwithstanding this, very special circumstances that include carbon savings and economic benefits to the rural economy outweigh any harm caused to the openness of the Green Belt by the proposed single micro-turbine.

Appendix A – Schematics

The diagrams below are representative of the system proposed to be installed.

The 15m tower is supported by a patented tripod system which is located on three helical piles, each of 4m depth. This type of foundation system has the advantage of being more environmentally sensitive than a large concrete block and easier to remove to reinstate the site in future.

Windcrop is a Micro-generation Certified Scheme (MCS) accredited installer and an ISO9001 certified organisation - the works will be completed by our own installation.





Side View of Turbine



Front view of Turbine

Appendix B - Acoustic Impact Assessment for Windcrop Micro Wind System Installations

Introduction

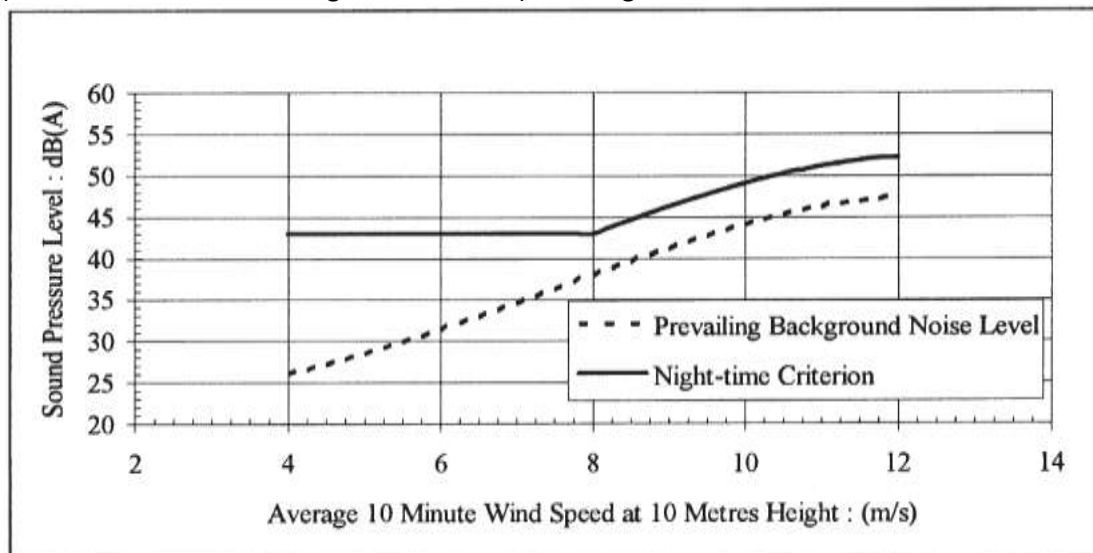
A process has been defined as part of the Micro-generation Certification Scheme installer standard. However experience of applying this process in planning applications has shown that it is not acceptable to Environmental Health Officers as it takes no account of site specific characteristics and generates siting distances that are seen as too close to neighbouring properties.

RenewableUK has therefore been working proactively with Environmental Health Officers and the CIEH to develop a practicable and clear method of presenting the expected impact that sets the noise generated by the wind system in the context of the local background noise levels. This document sets out the methodology that has been developed and its application in impact assessment.

ETSU-R-97

In the impact assessment of large wind farms, a specific methodology was developed to overcome the problem of relating noise generation to background noise and this is now generally in use. The ETSU-R-97 assessment approach takes into account not only the noise levels at noise sensitive locations but also sets these against the expected background noise levels for the normally experience range of site wind speeds.

Under the ETSU-R-97 methodology, the site background noise is measured against wind speed over a period of months and this is then compared against the expected noise immission from the wind turbines. The acceptance criteria are set as being below the higher of either 43dB (the ETSU recommended night time criteria) or background +5dB. This is shown below:



There are two key problems that make the use of this approach difficult in assessing micro wind systems. Firstly, to undertake this type of testing for a small system is considered disproportionate to the scale of development. Acquiring sufficient data to generate a representative curve across the full range of wind speeds takes several months and requires the installation and operation of an anemometer and sound meter for this period. Secondly, the threshold levels for acceptance under ETSU-R-97 have been regarded as being too lax by Environmental Health Officers in a typical quiet rural setting and it is assumed that in setting levels for large wind developments, a less rigorous threshold has been set in light of the

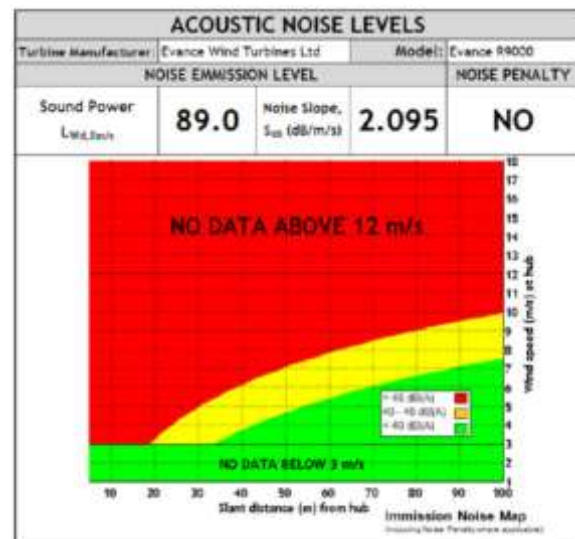
strategic significance of large renewable energy developments. It has therefore been necessary to develop a methodology that overcomes these issues.

Basis of Methodology

The approach that has been developed is based on taking an assumed curve of background noise vs wind speed that is sufficiently cautious that interested parties can feel confident that any real world site would be found to have a higher level of background noise if it were measured. Such a curve has been proposed, based on the best data available for a very quiet rural site. This data was generated as part of the original ETSU-R-97 development and is the best available from the very limited sources. More information on the proposed assumed background noise curve is given below.

In order to assess the noise impact of the installation of one or more wind systems onto a site, it is necessary to generate a noise immission curve for the system. All MCS certified systems have their noise emission measured under strictly controlled conditions and independently certified by an accredited certification body.

The full test reports for all MCS certified systems are available but the test output for a typical system is summarised in a standard form as shown to the right.



The contour plot is not relevant here as this is used by the MCS approach, but the Sound Power at 8m/s and the Noise Slope enable a noise immission curve to be calculated for any distance from the wind system(s).

It is worth noting that the noise emission levels are calculated as an uncertainty corrected L_{wA} of the noise measurements made and as such represents an elevated level for noise generation whilst the background noise data is L_{90} the bottom 10th centile data and as such this approach introduces a large level of additional caution to the comparison.

To quantify this, the declared 8m/s noise emission at 89.0dB(A) is 2.2dB(A) higher than the measured mean noise level of 86.8dB(A) in order to allow for an uncertainty U_c of 1.37dB. Taking the L_{90} Background noise represents a reduction of 2dB to the mean giving a total combined correction of 4.4dB.

Working with the linear data fit from the MCS test report for this system provides a line of noise emission from the system against wind speed as follows:

Wind Speed at 15m (m/s)	3	4	5	6	6.67	7	8	9	10
Sound Power, dB(A)	78.5	80.6	82.7	84.8	86.2	86.9	89.0	91.1	93.2

The sound energy in the propagation direction of the sound is inversely proportional to the increasing surface area the sound propagates through and can be expressed as:

$$L_p = L_w + 10 \log[(Q/4\pi)(1/r_1^2 + 1/r_2^2 + \dots + 1/r_n^2) + 4/R] \quad (1)$$

or modified for a single source:

$$L_p = L_w + 10 \log(Q/(4\pi r^2) + 4/R) \quad (1b)$$

where

L_p = sound pressure level (dB)

L_w = sound power level source in decibel (dB)

Q = directivity coefficient (1 uniform spherical, 2 uniform half spherical (single reflecting surface), 4 uniform radiation over 1/4 sphere (two reflecting surfaces, corner))

r = distance from source (m)

R = room constant (m²)

With uniform spherical radiation (1) can be modified to express the sound pressure level from a single sound source as:

$$L_p = L_w + 10 \log(1/(4\pi r^2))$$
$$= L_w - 10 \log(4\pi r^2) \quad (2)$$

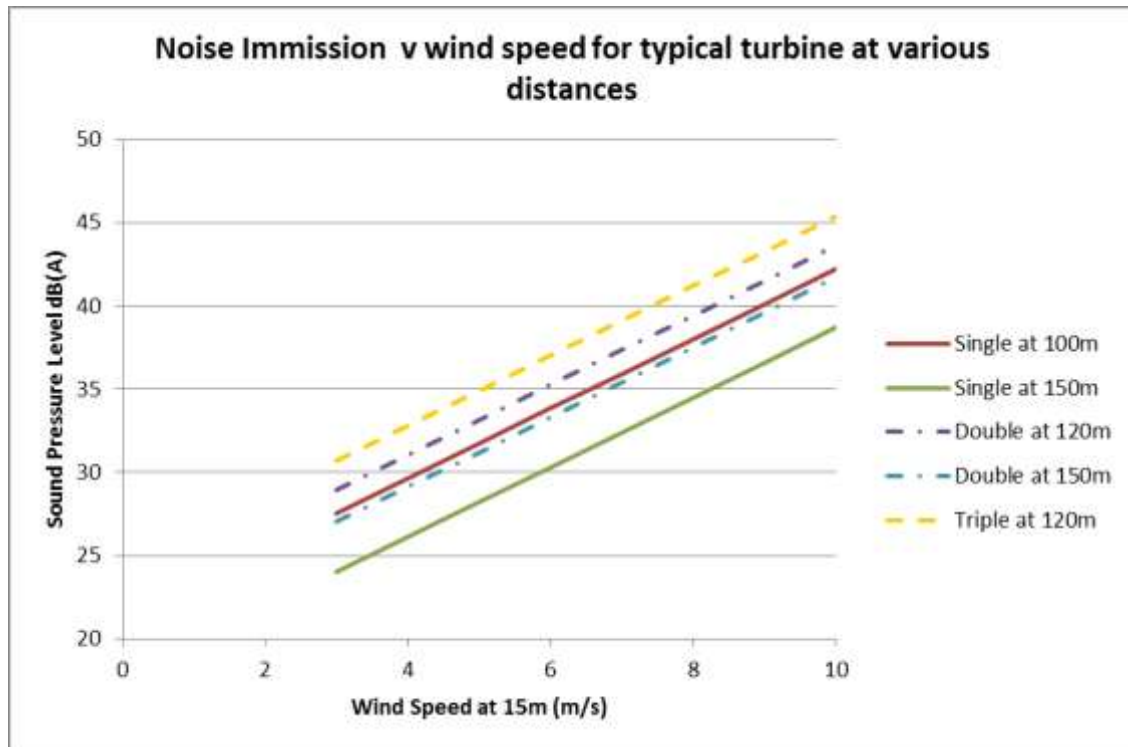
Since $Q = 1$ and $R \approx \infty$

(2) can also be expressed as:

$$L_p = L_w - 20 \log(r) + K' \quad (2b)$$

where $K' = -11$ (single sound source and spherical radiation)

This provides a set of curves for noise immission at a range of sample distances for a single turbine and for twin and triple installations as follows:

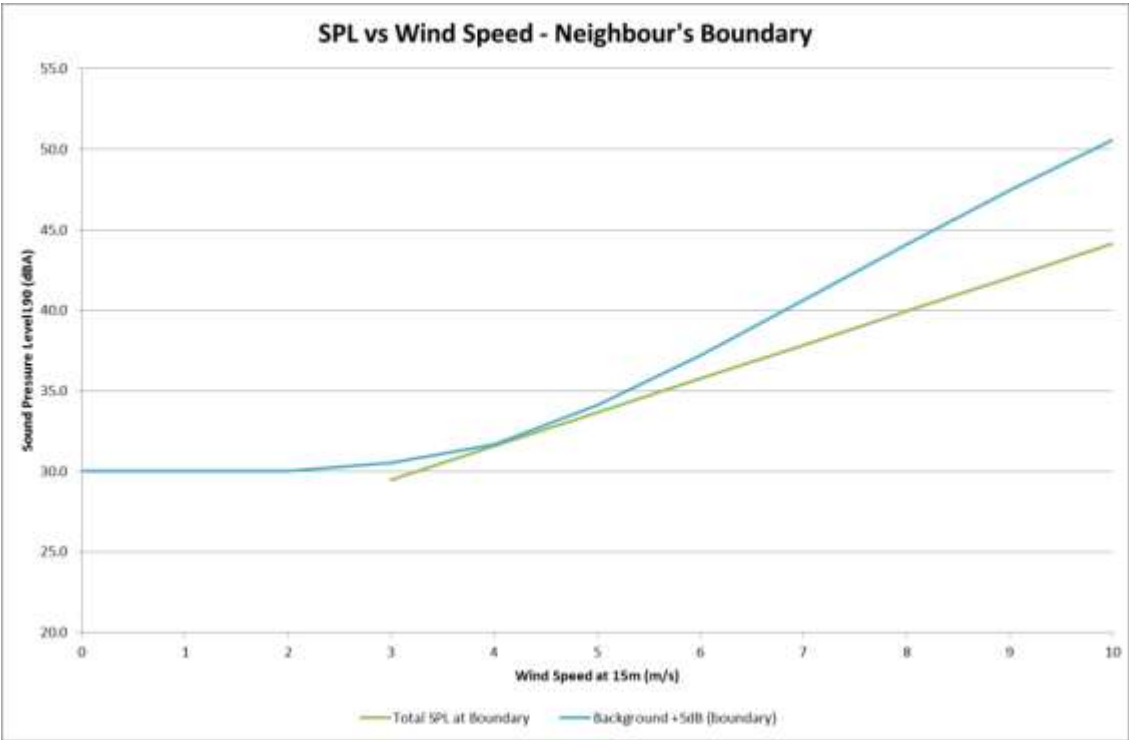
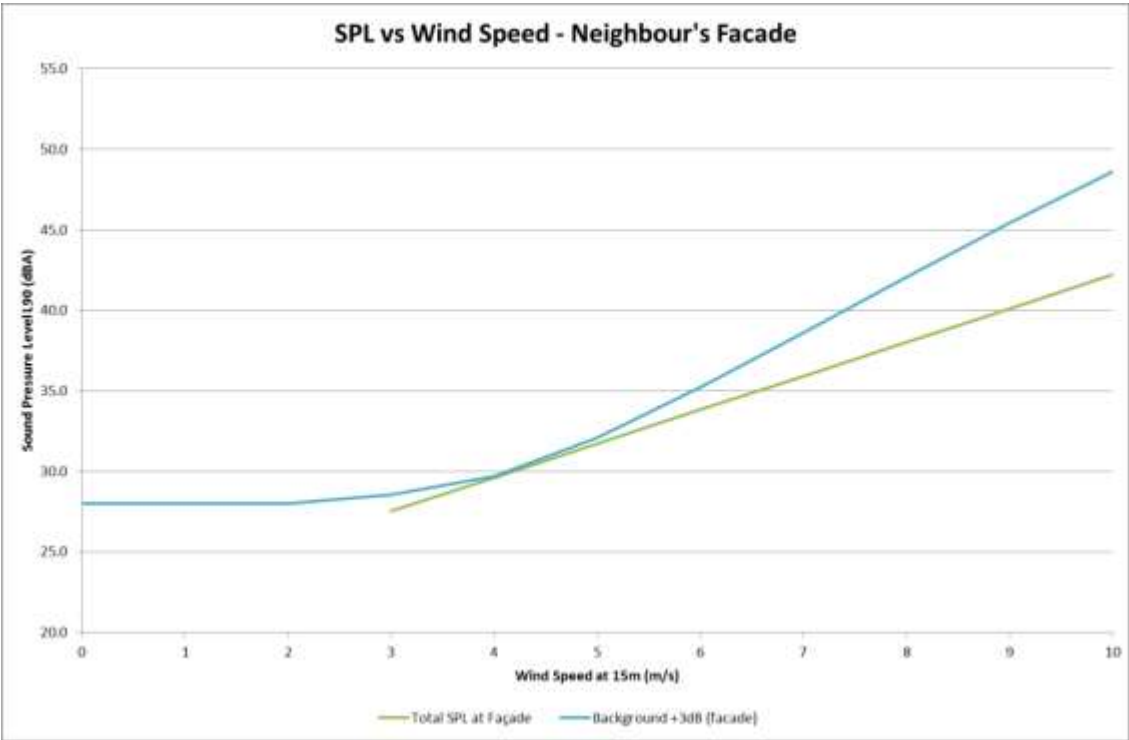


Immission Level against Background Noise Levels

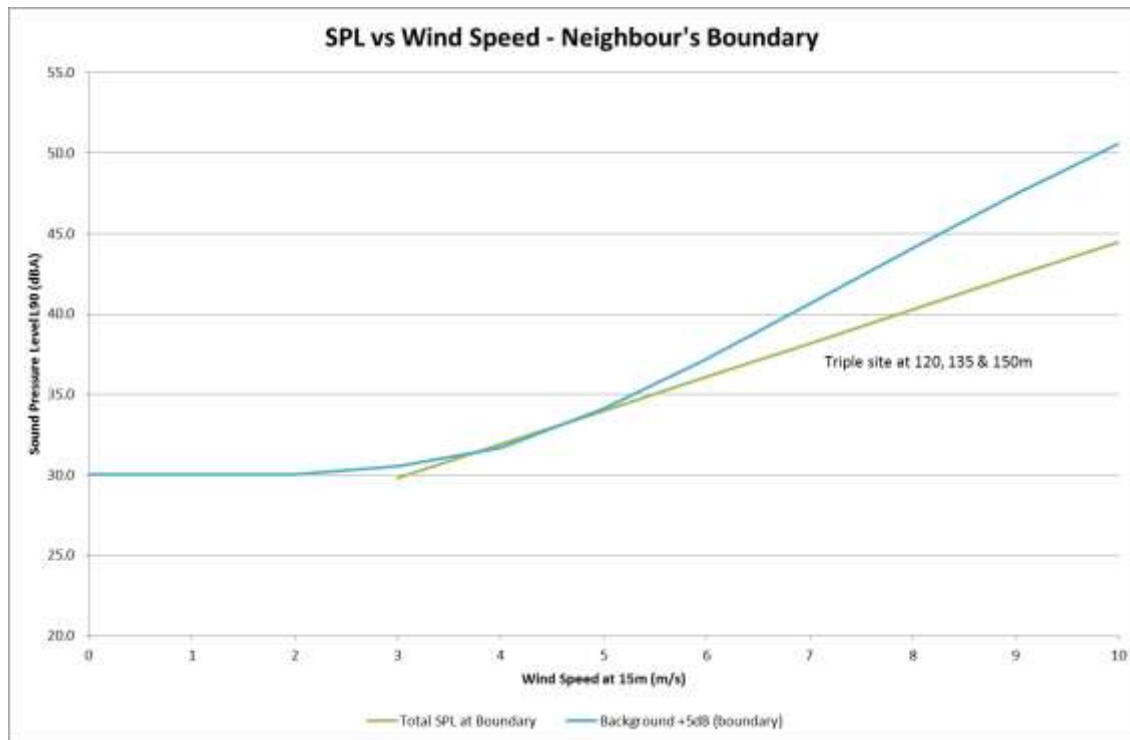
Taking the sound power immitted at the noise sensitive location against wind speed and comparing it with typical background noise minimum levels for a very low noise, rural site provides a clear indication of the relative noise levels.

Having discussed acceptability criteria with a number of local authorities it has been agreed that the noise immission should be no more than +3dB above background at the façade of a neighbouring property and no more than +5dB above background at the amenity boundary of a neighbouring property.

Taking an example property, and proposing to install a wind system at a distance of 80m to the amenity boundary and 100m to the façade it can be shown that these are the effective minimum siting distances for a single Evance R9000 turbine in order to meet the acceptability criteria above.



A similar approach to the combined effect of two or more wind systems can be taken to provide a site specific assessment. For example, in the case of a neighbour to a proposed site for three turbines where the turbines are 120, 135 and 150m from the boundary, the assessment would look as below:



This shows that the noise impact on the neighbour would just exceed the acceptability criteria of no more than 5dB above background.

Higher Background Noise Level Sites

All the assessment above is based on the assumption that the site is a very quiet rural one with a baseline background noise when there is no wind of 25dB. There are many sites where there are higher background noise levels, possibly due to close proximity to a major road or due to proximity to another noise source such as an industrial or farming site.

The methodology therefore needs to allow an adjustment to the assumed background curve in such cases. In order to do this, Windcrop either carries out a standard BS4142 background noise assessment under still conditions or provides evidence from other sources of elevated background noise levels. This is then used to elevate the noise curve as follows:

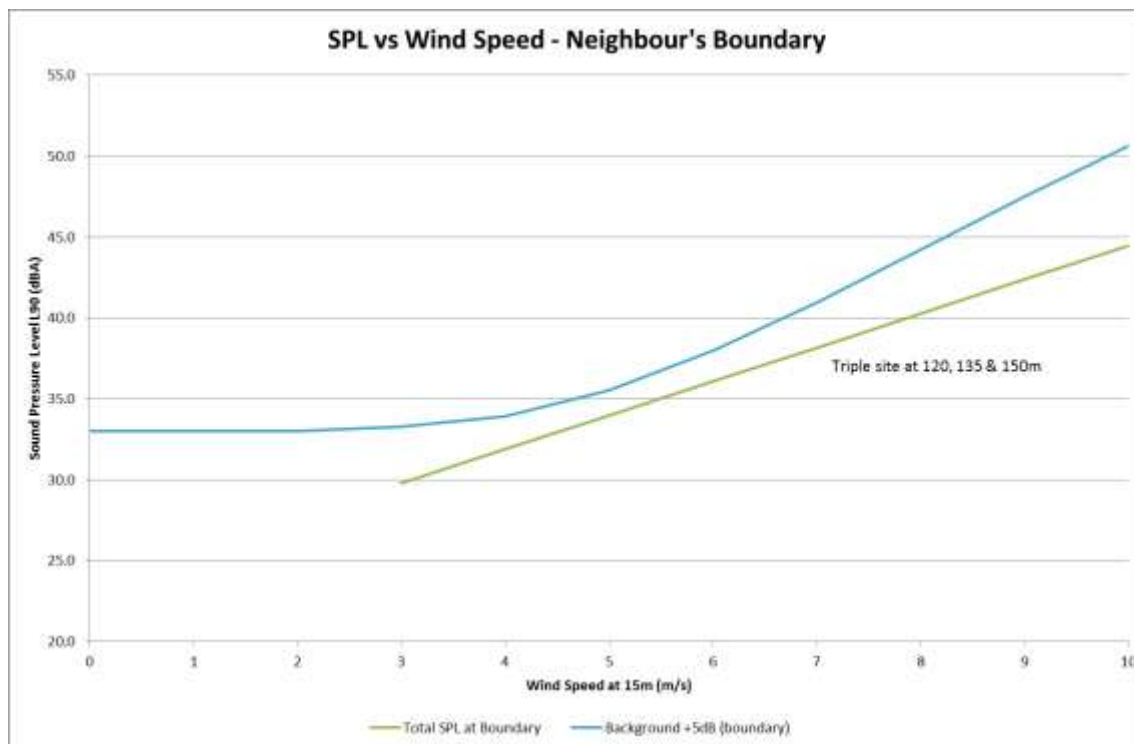
Wind Speed at 15m	0	1	2	3	4	5	6	7	8	9	10
Agreed Lowest Rural Background	25.0	25.0	25.0	25.5	26.7	29.1	32.2	35.6	39.1	42.4	45.6
ETSU wind component				16.3	21.8	27.0	31.3	35.2	38.9	42.4	45.6
25dB Background	25	25	25	25	25	25	25	25	25	25	25
Sum	25.0	25.0	25.0	25.5	26.7	29.1	32.2	35.6	39.1	42.4	45.6

By substituting the actual measured background noise for the assumed 25dB level the table can be recalculated as follows:

Wind Speed at 15m	0	1	2	3	4	5	6	7	8	9	10
Agreed Lowest Rural Background	25.0	25.0	25.0	25.5	26.7	29.1	32.2	35.6	39.1	42.4	45.6
ETSU wind component				16.3	21.8	27.0	31.3	35.2	38.9	42.4	45.6
28dB Background	28	28	28	28	28	28	28	28	28	28	28
Sum	28.0	28.0	28.0	28.3	28.9	30.5	33.0	36.0	39.3	42.5	45.6

As can be seen this has little effect at the higher wind speeds but does increase the acceptable level at lower wind speeds.

If we look back at the example above of a triple site that was not acceptable on a 25dB background site, if a BS4142 assessment were carried out and showed a 28dB minimum background level, the graph would be re-plotted as follows:



This site would then be acceptable provided the BS4142 site assessment supported the use of the elevated baseline noise level.

Conclusion

This methodology provides a safe and clearly traceable methodology that enables all interested parties including neighbours to assess the noise impact of micro wind systems. Windcrop are continuing to generate data to further support the assumptions made and it is hoped that these will enable future refinements to this approach to be agreed but in the meantime this methodology is recommended.

Annex 1 – Generation of Assumed Minimum Background Noise Levels

In the absence of relevant local data on rural background noise vs wind speed, data has been sought from all available sources. However there is very limited data available and the best source found is the work carried out to support the original ETSU-R-97 methodology.

This provides three data sets and the curve fit to the L90 sound pressure levels due to background noise. The first (ref A3) is for all data, the second (A5) is night time only and the third (A7) is for wind directions in the South to West only. In considering the data sets, the A3 which is a full 24 data set has been used as this shows a 25dB base noise level at low wind speeds and this is representative of sites in our region and the A5 data set is clearly short of valid data in the higher wind speeds leading to an unrepresentative curve shape.

Taking the curve fit provided this gives a base level data set for L₉₀ background noise. However it is clear that the curve fit does not extrapolate to zero wind speed and so the curve is adjusted to 25.0dB at these wind speeds as follows:

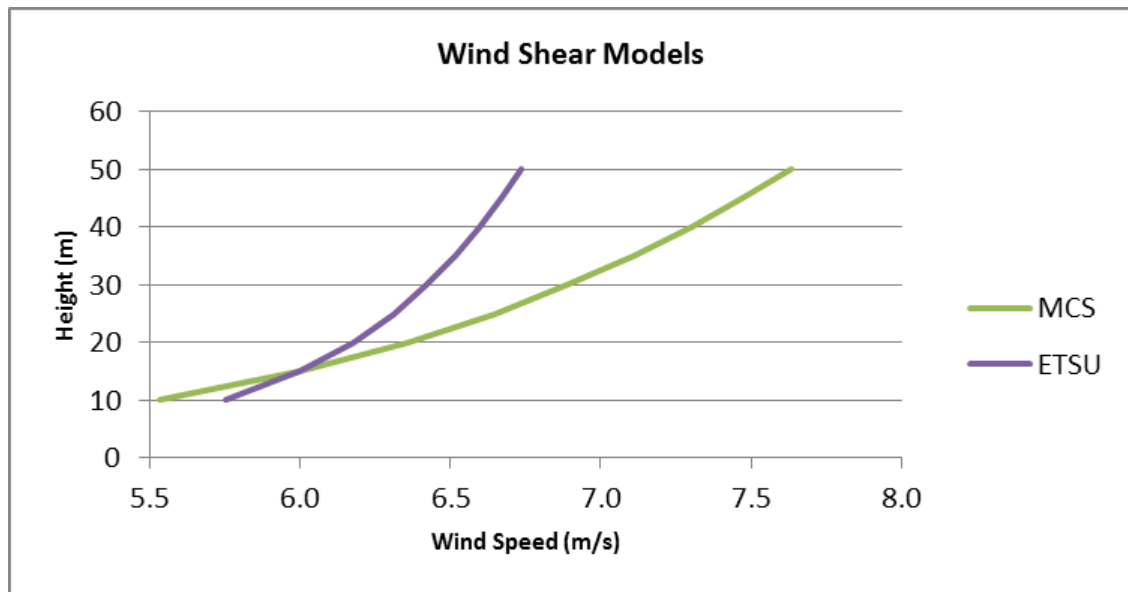
Wind Speed (m/s)	0	1	2	3	4	5	6	7	8	9	10
L90	38.8	31.1	27.0	25.6	26.0	27.7	30.1	33.0	36.1	39.2	42.2
					v ⁵	v ⁴	v ³	v ²	v	n	
curve fit factors:					-1.62E ⁻⁴	9.16E ⁻³	-2.11E ⁻¹	2.3753	-9.8803	38.818	
A3 Derived (30m)	25.0	25.0	25.0	25.6	26.0	27.7	30.1	33.0	36.1	39.2	42.2

This is however the background noise levels against the prevailing wind speed measured at 30m. The data needed is to compare against noise generated by a turbine at 15m hub height and so the wind speeds need to be corrected. This is done by reference to a correction factor generated by modelling the reduction in wind speed with height or wind shear. The methodology to do this contained in the MCS process is not appropriate as this deliberately overestimates wind shear in order to generate cautious (ie low) wind speeds at lower heights for the purpose of estimating energy generation. For this purpose we need to take the opposite approach and assume a small reduction in order to generate the lowest background noise levels.

This has been done by using the BS standard method as recommended in the ETSU-R-97 standard and using a very low terrain factor of 0.0008. This is the factor for completely bare open land or water and is the minimum possible. The correction comparison is as follows:

	Height (m)	MCS	BS
Correction to 15m from:	10	1.08	1.04
	15	1.00	1.00
	20	0.94	0.97
	25	0.90	0.95
	30	0.87	0.93
	35	0.84	0.92
	40	0.82	0.91

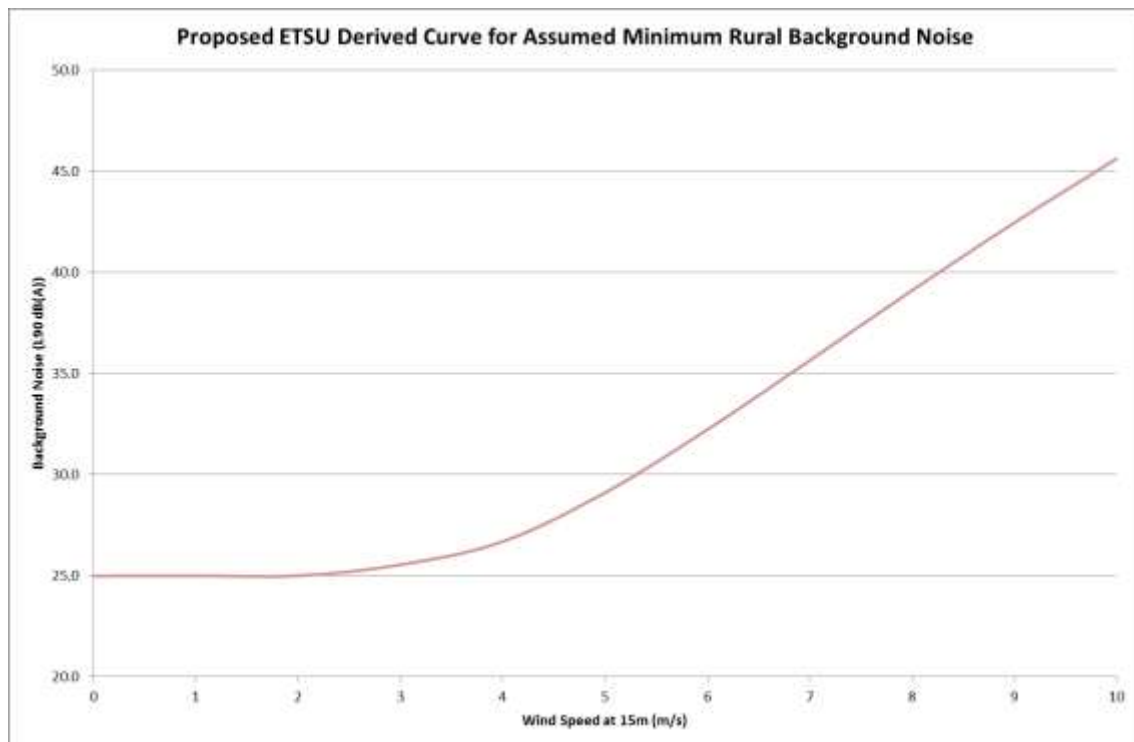
This shown graphically as the increase in wind speed from a 6m/s wind measured at 15m with increasing height to 50m:



Taking this height correction means that when we measure a 6m/s wind at 15m, the wind at 30m is actually 6.4m/s and so the background level is adjusted upward as follows:

Wind Speed at 15m	0	1	2	3	4	5	6	7	8	9	10
Wind Speed at 30m	0.00	1.12	2.24	3.37	4.49	5.61	6.73	7.86	8.98	10.10	11.22
A3 derived at 15m wind speed	25.0	25.0	25.0	25.5	26.7	29.1	32.2	35.6	39.1	42.5	45.6

This is the curve that has been used as the baseline curve for all assessments:

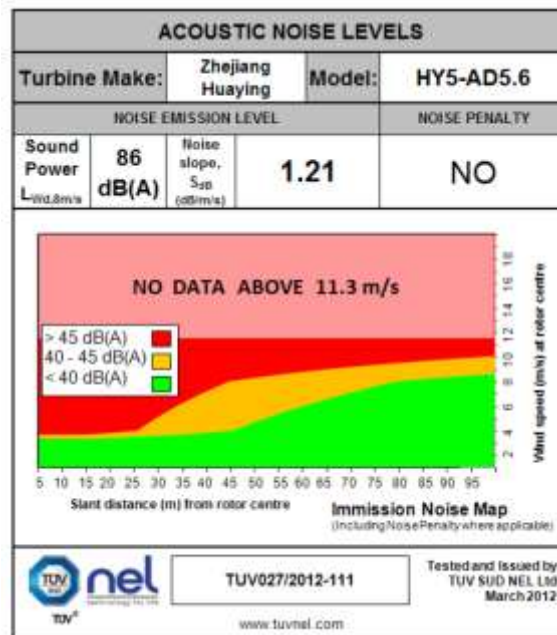


Annex 2 – MCS MIS3003 Noise Level Assessment:

Please note:

The MCS assessment process is not site specific other than in relation to the prevailing wind speed on the site. This Appendix provides the relevant distance assessments as required under MIS3003 but is not proposed to be used as a part of the evidence base for this application.

Quiet Revolution H5



Distance vs Sound Power			
		8m/s Sound Power	86dB
		Slope	1.21
		Immission Threshold:	45dB
		Turbine	
Wind Speed at Hub	V90 Wind Speed	Sound Power (8m/s)	distance
5.3	9.116	90.4	73.9

Appendix C - Site photographs

View north from turbine 1.



View east from turbine 1.



View south from turbine 1.



View west from turbine 1.



Panoramic view: north east south from turbine 1.



Panoramic view: south west north from turbine 1.



Viewpoints 1 to 5



Viewpoint 1: from the field to the northwest on the other side of the B6462, looking southeast. Trees and undulating ground are in the intervening area.



Viewpoint 2: from the footpath in the wooded area to the south looking north. Approximate distance is 296 metres.



Viewpoint 3: from Roper House Lane to the southeast looking northwest. A small wooded area and undulating ground is in the intervening area. Approximate distance is 305 metres.



Viewpoint 4: from the wooded area to the northwest looking southeast. There is no view from this area. Approximate distance is 203 metres.



Viewpoint 5: from the farm track at the neighbour's façade to the southwest looking northeast. A wooded area on a hill is in the intervening area. There is no view from the nearest neighbour. Approximate distance is 104 metres.



Appendix D – Visualisation

