Design and Access Statement and Planning Statement For the siting of three 11KW Gaia Wind Turbines at Bullhouse Mill, Millhouse Green

Louise Roberts BSc (Hons) MPlan

Segen Ltd.

City Lab

4-6 Dalton Square

Lancaster

LA1 1PP

01524 590590

louise.roberts@segen.co.uk

RTPI
mediation of space · making of place

1. Application Description

Planning permission for three 11KW Gaia wind turbines mounted on 18m solid masts at Bullhouse Mill is sought to enable the applicants to reduce the carbon emissions and energy bills of their business and home, and to increase their self sufficiency in terms of electricity production.

The site's predicted annual average wind speed at 10m of 5.1m/s is only slightly below the national average wind speed for rural locations of 5.5m/s, meaning this is potentially a good location for wind turbines. This figure is an estimate and represents an average for the 1km square grid in which the property is located. If the proposed location is very exposed, or on a rise, then the actual wind speed may be higher, otherwise it may be slightly lower. In order to better estimate likely annual mean wind speed (AMWS), and from that the estimated annual energy from the proposed wind turbine, correction factors are applied. These include taking into account the turbine height and its distance from and height of the nearest obstacle. Following these corrections, a conservative estimate is that the annual average wind speed will be 4.5m/s.

Using this figure it is estimated that each of the turbines proposed here in this location could generate an estimated output of 25.17MWh of electricity, totalling **75.51MWh** for all three turbines. This would surpass the estimated 40MWh currently used at this site per year. Since excess energy is fed back to the Grid, this proposal will also benefit the wider community. This energy generation represents an annual CO2 saving of approximately 14.29 tonnes of carbon per turbine, totalling **42.87 tonnes** for the three turbines combined. This saving contributes towards regional and sub regional targets for renewable energy generation for 2010 and 2020 as outlined in the Yorkshire and Humber Regional Spatial Strategy.

2. Pre application discussions

Information regarding this proposal was sent to the Local Planning Authority at Barnsley MBC on 26th July 2009. Following this a site visit was carried out with Matthew Woodward. He was generally positive about the proposal and accepted that it was likely that a suitable justification could be put forward to permit this form of development within the Greenbelt. He has requested that a ZVI assessment be undertaken to take account of existing and proposed impact and cumulative impact in relation to other turbines in the area. The ZVI must be included with the formal planning application in order for an accurate assessment of landscape impact to be undertaken.

A Landscape Character and Visual Impact Assessment has been submitted as part of this application, which includes a ZVI map.

3. Site location

Bullhouse Mill is a rural enterprise which comprises the main residential property and a number of warehouse type buildings set within an area of Greenbelt. This application is for three Gaia 11KW wind turbines located in the vicinity of Bullhouse Mill. Turbine A is approximately 100m to the northwest of the farmhouse, Turbine B is 148m to the southwest of the house and Turbine C is located approximately 190m to the west of the house.



Figure 1: Aerial photograph of site with proposed turbine locations shown in red, Bullhouse Mill is to the east of the turbines (Google Earth, 2009)

All three turbines are located within an agricultural field, the boundaries or which are made up of a mixture of dry stone walls, matures trees and some hedges. In order for the turbines to work efficiently, they must be sited a reasonable distance from one another. Turbine A is 170m from B and 172m from C. Turbines B and C are 65m apart.

The maps overleaf in Figures 2 and 3 show the turbines in relation to the wider surrounding area. The closest neighbouring property to the turbines is located approximately 160m to the northwest of Turbine C. To the north of this there are some industrial works and to the northwest is Catshaw Cross Farm. The closest main road to the site is the B6106 to the north of Turbine A, located approximately 150m away at its closest point. There are a number of public rights of way in the vicinity of the site, including footpaths and bridleways. The Penistone Boundary Walk and the Trans Pennine Trail run close to the application site. The River Don flows to the east of Bullhouse Mill.



Figure 2: Map showing proposed turbine locations (in red) in relation to the closest neighbouring property (Google Earth, 2009)

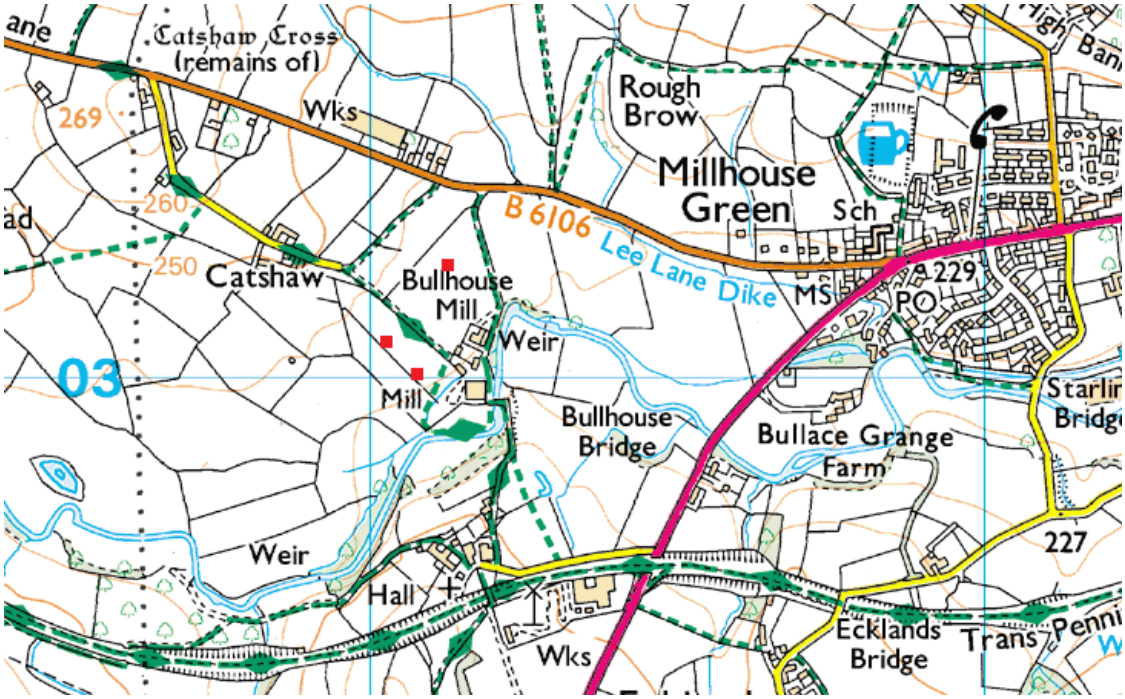


Figure 3: Map showing proposed turbine locations in relation to features on the surrounding landscape (Street Map, 2009)

Figure 4 below shows features in the wider surrounding area to the application site. To the north of the site is a wind farm at Spicer Hill, Royd Moor Wind Farm which has 13 turbines, each of which has a hub height of 35m and a blade tip height of 54m. To the south east of the site there are two large communication towers, and to the southwest of the site there a number of electricity pylons. All of these features add an element of verticality into the landscape which will help to reduce the impact of the proposed turbines on views across the surrounding area.

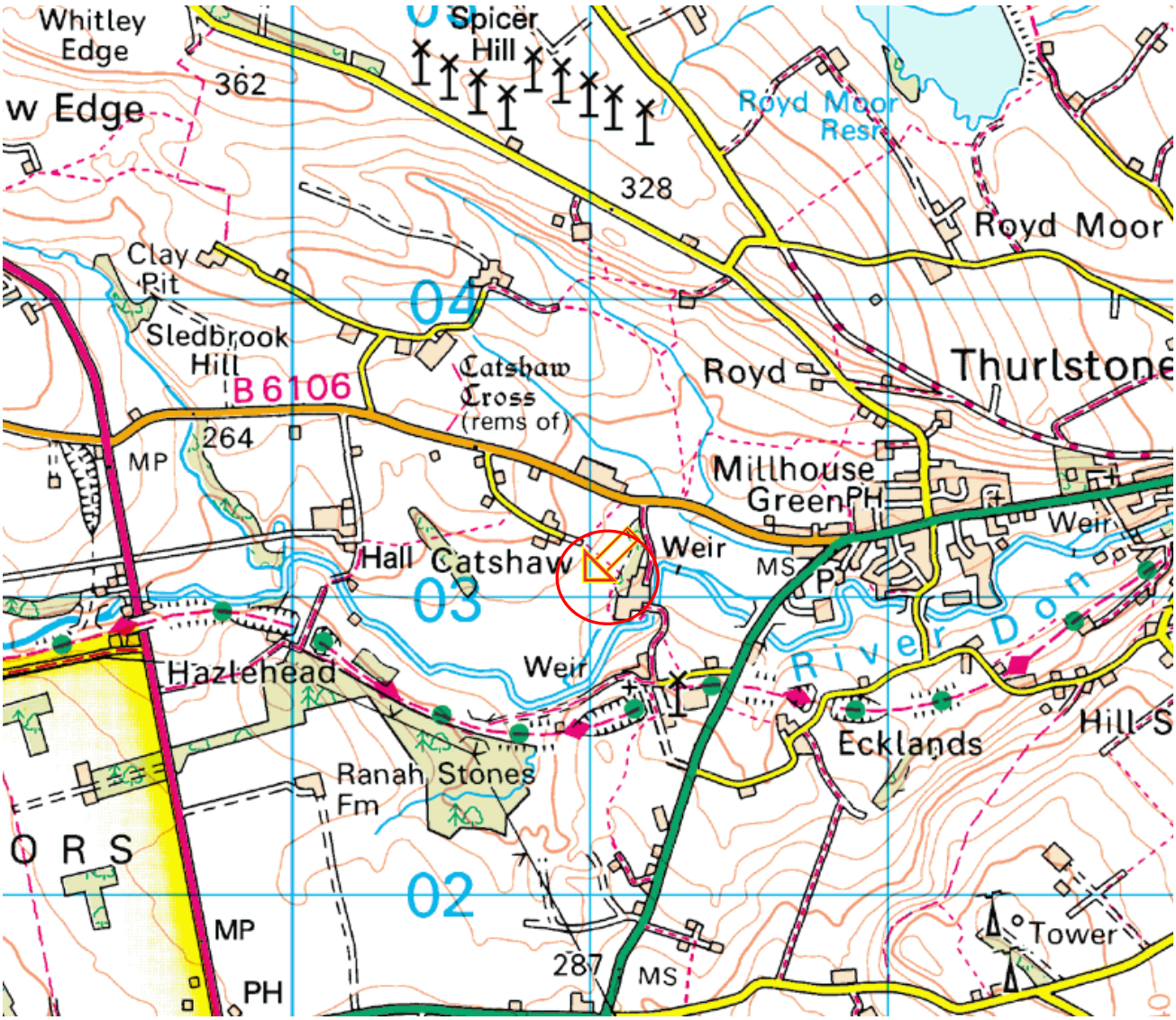


Figure 4: Wider surrounding area of application site (Street Map, 2009)

Figures 5 and 6 below show the wind farm at Royd Moor Farm, and how it relates to the application site



Figure 5: Royd Moor Wind Farm (Google Images, 2009)

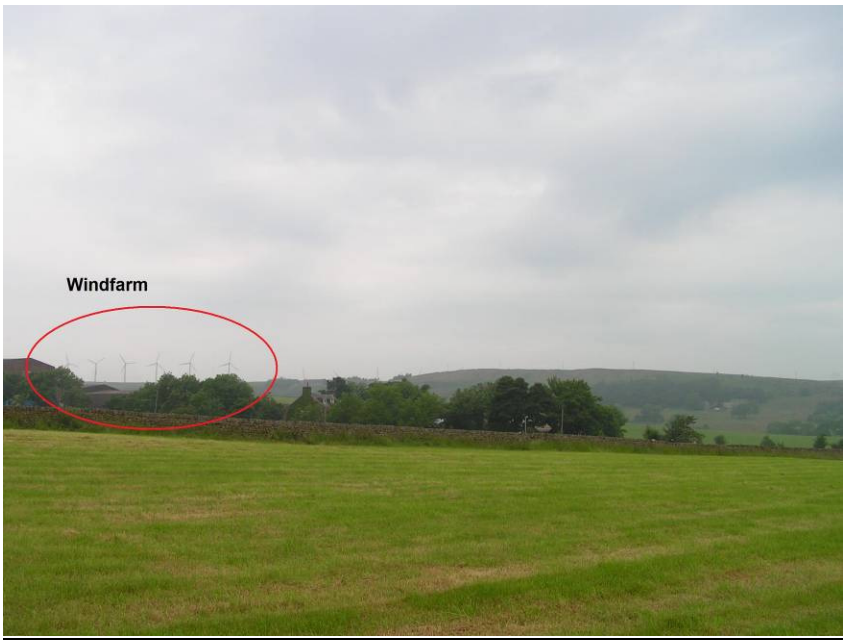


Figure 6: Royd Moor Wind Farm as viewed from the application site

4. Proposal

4.1 Turbine Specification

The installation consists of three 11kw Gaia turbines, mounted on free-standing 18m galvanised steel masts on 5m2 concrete bases. The turbines are of a twin-bladed design and are manufactured as a single composite unit 13m in diameter. All none galvanised elements of the turbine will be coloured pale grey.

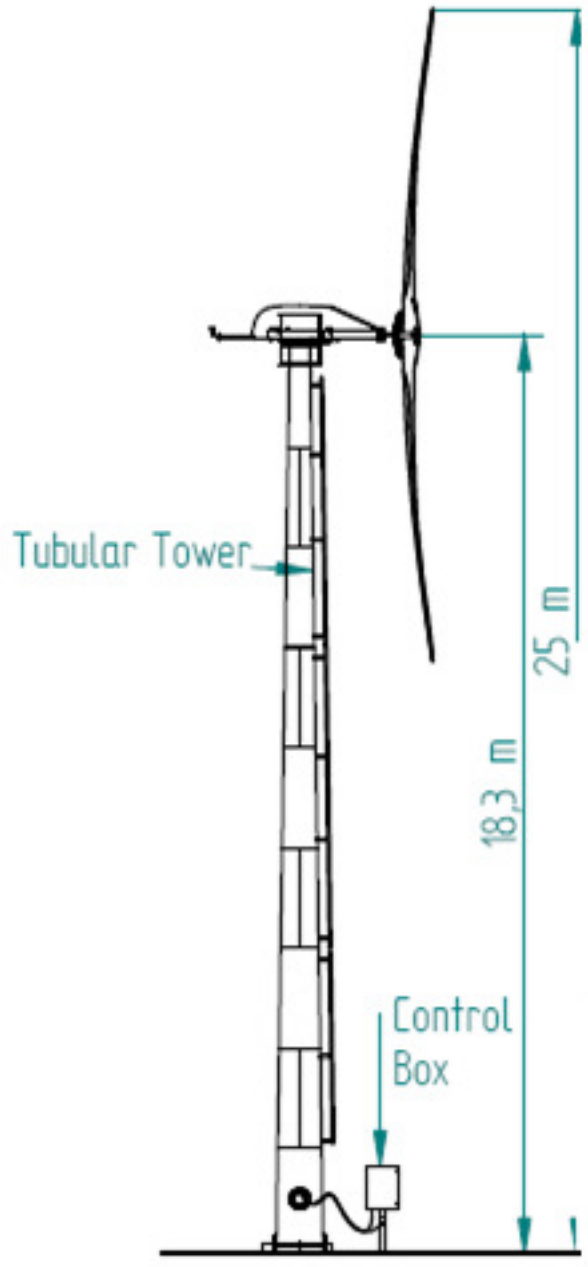


Figure 7: Gaia dimensions and technical specifications

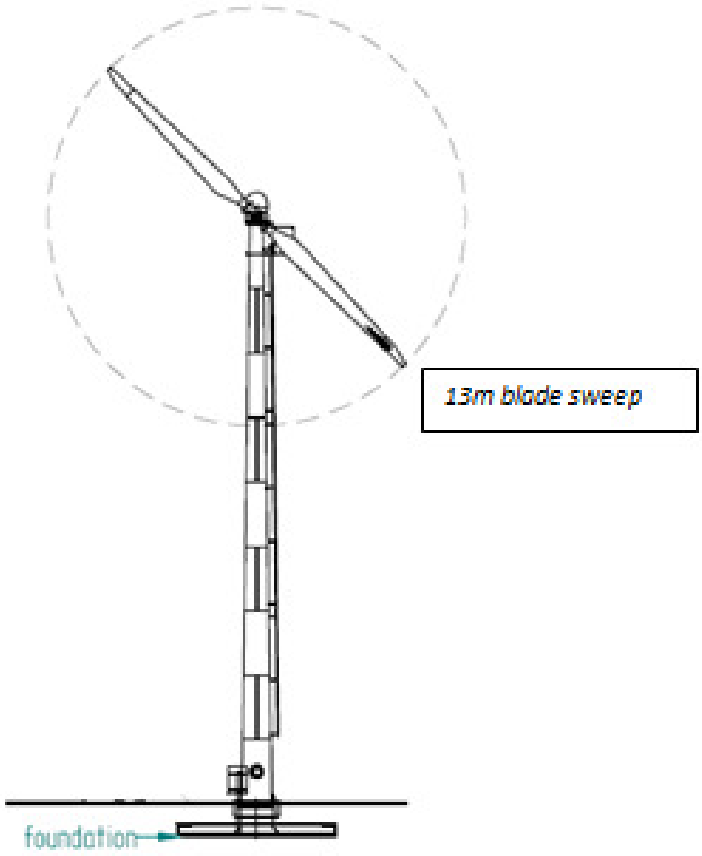


Figure 8: Gaia Dimensions

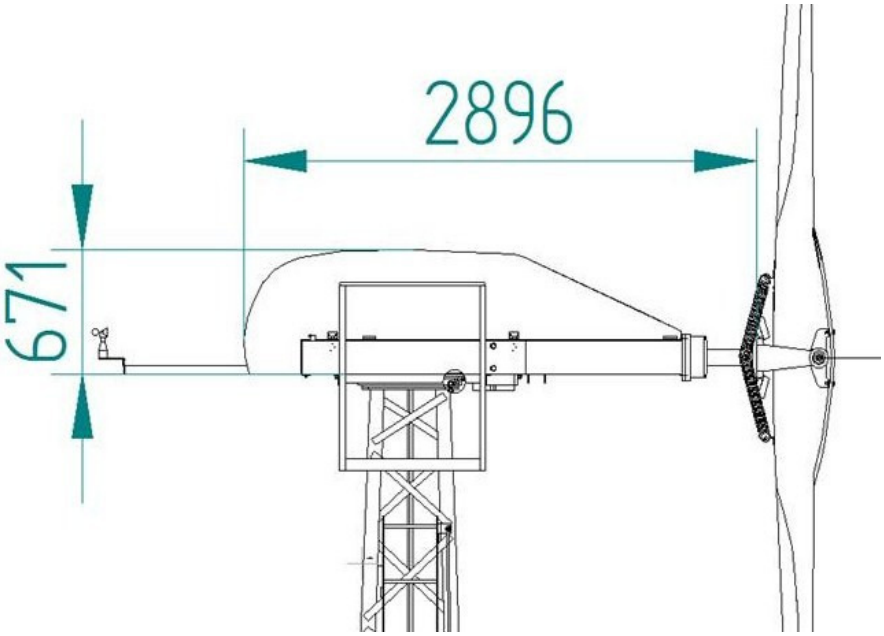


Figure 9: Cross section through the rotor showing the dimensions of the nacelle (mm)

4.2 Wind Turbine Colour

A study/synopsis was undertaken by Segen Ltd. looking at different colours for turbines specifically grey, galvanised, black and green. Following which it is apparent that a grey blend or galvanised appearance is better and looks less obtrusive than green, brown and black against a rural background (trees, hedges, leaves etc) and also against the skyline. The colour has been accepted by all planners Segen Ltd have dealt with on rural, agricultural, farm and domestic sites, all set in different backgrounds. Below are examples of Gaia turbines in pale grey and galvanised colours.



Figure 10: Pale Grey



Galvanised

4.3 Mast Design

Gaia turbines can be installed on either a solid or lattice tower structure. In this case it is our preference to install the turbines on a **solid tower** as this type of mast is considered to blend in more effectively with its rural surroundings and look less industrial than the lattice design.



Figure 11: Solid Tower



Lattice Tower

5. Planning Policy Overview

5.1 National Planning Policy

PPS 22: Planning for Renewable Energy

In 2004 national government issued **'PPS 22 Planning for Renewable Energy'** and it's associated 'Companion Guide'. These two documents provide the national framework within which local planning authorities decide on individual planning applications. The ministerial statement made by Yvette Cooper formalised government support for PPS22, It also encouraged local planning authorities to include in their local development frameworks polices requiring new developments to generate at least 10% of their own energy from on site renewable sources. The Government believes that climate change is the greatest long-term challenge facing the world today. Addressing climate change is therefore the Government's principal concern for sustainable development. Policies and priorities for action, both in the UK and internationally, are set out in the Climate Change Programme and the report of the 2006 Energy Review. PPS 22 sets the objective based criteria that must be applied by local planning authorities in deciding individual planning applications to generate energy from wind.

In particular the following elements of Planning Policy Statement 22 are seen as relevant to this case,

Key Principle V1: Small-scale projects can provide a limited but valuable contribution to overall output of renewable energy and to meet energy needs both locally and nationally. Planning Authorities should not therefore reject planning applications simply because the level of output is small.

Paragraph 11: "Small scale developments should be permitted within sensitive landscape areas such as National Parks, Areas of Outstanding Natural Beauty and Heritage Coasts, providing there is no significant environmental detriment to the area concerned".

Paragraph 18: Local planning authorities and developers should consider the opportunity for incorporating renewable energy projects in all new developments. Small-scale renewable energy schemes utilising technologies such as solar panels, Biomass heating, small-scale wind turbines, photovoltaic cells and combined heat and power schemes can be incorporated both into new developments and some existing buildings. Local planning authorities should specifically encourage such schemes through positively expressed policies in local development documents.

Paragraph 20: Of all renewable technologies, wind turbines are likely to have the greatest visual and landscape effects. **However, in assessing planning applications, local authorities should recognise that the impact of turbines on the landscape will vary according to the size and number of turbines and the type of landscape involved, and that these impacts may be temporary if conditions are attached to planning permissions, which require the future decommissioning of turbines.**

Companion Guide 6.17 For small and medium size projects; in cases where power can be dedicated to on-site uses, economically attractive schemes are a strong possibility. Local Planning Authorities can take a proactive approach to encourage this form of urban wind development.

PPS7: Sustainable Development in Rural Areas

Draws attention to the Government's objectives for the countryside and sets out the key principles of raising the quality of life in rural areas, encouraging more sustainable use of land, and to diversify and promote growth in rural areas.

Paragraph 16 (i) / (iv) Amongst these are promoting good quality, sustainable development that support development that provides for the sensitive exploitation of renewable energy sources in accordance with the policies set out in PPS22.

PPS 1: Delivering Sustainable Development, Planning and Climate Change- Supplement to PPS1.

Sets out how planning should contribute to reducing emissions and stabilising climate change and take into account the unavoidable consequences. It notes that tackling climate change is a key Government priority for the planning system. Core Strategy policies should be designed to promote and not restrict renewable and low-carbon energy and supporting infrastructure. **A proposal that will contribute to the delivery of the Key Planning Objectives set out in this PPS should expect expeditious and sympathetic handling of the planning application.**

Furthermore pg14 states that Planning Authorities should ensure any approach to protecting landscape and townscape is consistent with PPS22 and does not preclude the supply of any type of renewable energy other than the most exceptional circumstances.

PPG2 Greenbelts

Paragraph 1.5: Outlines the five purposes of including land in Green Belts:

- To check the unrestricted sprawl of large built-up areas;
- To prevent neighbouring towns from 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.

Regarding operation development such as a turbine the carrying out of operations and the making of material changes in the use of land are inappropriate development unless they maintain openness and do not conflict with the purposes of including land in the Green Belt. In very special circumstances the development of this nature is acceptable where it can be demonstrated that the benefits of the proposal clearly outweighed the harm.

Paragraph 3.2 notes that very special circumstances to justify inappropriate development will not exist unless the harm by reason of inappropriateness, and any other harm, is clearly outweighed by other considerations. **Paragraph 13 of PPS22** outlines that such considerations may include the wider environmental benefits associated with increased production of energy from renewable sources.

5.2. Regional Policy Overview

The following policies of the Yorkshire and Humber Regional Spatial Strategy are considered particularly relevant to this application:

The Yorkshire and Humber Plan sets out the regions commitment to maximise improvements to energy efficiency and supports increases in renewable energy capacity through a reduction in greenhouse gas emissions and an improvement in energy efficiency. The efficient use of power sources should be maximised by providing for new efficient energy generation infrastructure in keeping with local amenity. The Plan sets out the following regional targets for installed grid-connected renewables for the region in **POLICY ENV5:**

	2010	2021
Humber	124MW	350MW
North Yorkshire	209MW	428MW
South Yorkshire	47MW	160MW
West Yorkshire	88MW	295MW
Offshore	240MW	630MW
Total	**708MW**	**1862MW**

These targets are also split into sub-regional targets. Under the South Yorkshire region the sub-regional targets for Barnsley are shown below:

TABLE 10.2: Indicative local targets for installed grid-connected renewable energy in 2010 and 2021 (MW)

	2010	2021
Barnsley	15	34
Doncaster	11	37
Rotherham	11	36
Sheffield	11	52
South Yorkshire	**47**	**160**

The RSS sets out that annual monitoring of planning permissions and developments against the indicative local authority targets for 2010 and 2021 is essential and that action should be taken accordingly in order to ensure the regional and sub-regional targets are exceeded.

POLICY YH2 - Climate change and resource use: This policy sets out strategies that should help to meet the identified regional and sub-regional targets. These strategies include the increase in renewable energy capacity and carbon capture within each region.

POLICY YH9 – Greenbelts: This policy sets out the role of the greenbelt land in Yorkshire and Humber. This application will not compromise the reasons for inclusion of the area within a greenbelt designation. In fact it will preserve the amenity of the greenbelt by its discrete siting and modest scale.

5.3. Local Policy Overview

The following policies in the Barnsley Unitary Development Plan (UDP) are considered relevant to this application:

As allocated in the **Barnsley UDP Proposals Map**, the application site falls within an area designated as Greenbelt. **Development in the Greenbelt** is covered by a number of policies.

Policy GS7 states that within the Green Belt, subject to the application of Policies GS8 and GS9, development within the greenbelt will not be permitted unless it maintains the openness of, and does not conflict with the purposes of including land in, the greenbelt.

Policy GS8 states that within the Green Belt, the construction of new buildings will not be permitted, except in very special circumstances, unless it is for the following purposes:
A) Agriculture or forestry;
B) Essential facilities for outdoor sport or outdoor recreation, for cemeteries, or for other uses of land which preserve the openness of the Green Belt and which do not conflict with the purposes of including land in it;
C) The replacement of existing dwellings

Policy GS9 states that development within the Green Belt should not by reason of its siting, materials or design result in significant harm to the visual amenity of the Green Belt.

Policy ES12 – Wind Energy Generation states that proposals for wind energy generation will be assessed against the following factors:
A) The effect both cumulatively and individually on the landscape and visual amenity of the area;
B) The impact on residential amenity with particular reference to noise, visual outlook, and shadow flicker and flashing from turbine blades;
C) The provision of satisfactory access to the highway network having regard to visual amenity and the safety of road users and the effect of the proposals on road users including likely distraction to motorists;
D) The effect on wildlife, ecology and archaeology of the immediate area;
E) The effect on agricultural land uses;
F) Electro-magnetic effects;
G) The provision for connection to the electricity transmission and supply system;
H) The effect of shadow flicker or flashing from the turbine blades.

The policy goes on to state that the Council will expect a detailed statement which has regard to these issues to accompany any application for wind power development proposals, where such an appraisal is deemed necessary in view of the implications of the proposal. This Design and Access Statement, together with the ZVI

submitted in support of this application, will show how the proposed turbines at Bullhouse fully comply with the policies above, at local, regional and national level.

6. Alternative technologies

PPS22 encourages developers to consider the opportunity for incorporating renewable energy projects in all development. The most significant source of renewable energy in this part of Barnsley is from wind because the more elevated areas, especially in the western half of the Borough have sufficiently high wind speeds to make the establishment of wind turbines viable. The applicant initially approached Segen to explore the possibility of installing renewable energy technology at the site to help to increase the property's green credentials, by reducing its reliance on unsustainable methods of energy production. This wish is entirely reasonable and wholly in accordance with up to-date national planning policy and government advice. Segen Ltd. supplies various forms of renewable installations including both solar PV systems and domestic wind turbines. Before deciding that a wind turbine was the most appropriate installation, the following technologies were considered: Solar PV panels, solar thermal panels and ground source heat pumps. The reasons for discounting these are detailed below;

Solar PV Panels

Solar panels generate electricity, however in this case they are not a viable option. Although some of the farm buildings have south facing roof slopes, which could be used to house PV panels, a huge amount would be needed to generate as much energy as the proposed turbines. As such solar PV panels are seen as a possible future addition rather than as an alternative to a wind turbine. Another option is free standing solar PV panels mounted on the ground. However, these would take up a large amount of useable farming land, and again a very large number would be needed to generate anywhere near the amount of electricity as the proposed turbine. In addition to this, since several of the buildings are listed, PV panels would not be appropriate at this location. Therefore this is not considered a viable option.

Solar Thermal Panels and Ground Source Heat Pumps

An exhaust air heat pump was installed to provide hot water and space heating for the recently completed new holiday cottage at West Pitt Farm and further installations are under consideration for inclusion in an SWRDP grant application. These types of installation generate hot water for the property, reducing the need to use the boiler. However neither solar thermal panels nor a ground source heat pump can replace or supplement the electricity supply for the property - whereas a wind turbine would. In fact, both these technologies use electricity to pump the water around their systems. These types of installation are therefore suitable in addition to the turbine, but not as an alternative to it. In the future the applicant may consider additional installations such as this to further reduce the property's reliance on grid-supplied energy generated from the burning of fossil fuels.

Wind Turbines

The UK has the best wind resource in Europe. This site has an estimated conservative wind speed of 4.5m/s which equates to 25.17MWh of electricity per year from each turbine, totalling 75.51MWh for all three turbines. This energy generation surpasses the current energy usage at the farm, which is estimated to be 40MWh per year. The excess energy generated by these turbines that is not used on site will be fed back to the grid to benefit the wider community.

In conclusion, turbines and solar PV panels are designed to produce electricity, solar thermal panels and ground source heat pumps produce hot water. They are complementary to electricity generating equipment and not an alternative to a wind turbine. When comparing the potential electricity generated by a wind turbine and solar PV panels it is evident at this site that the installation of wind turbine sis by far the most appropriate installation and that the significant energy generating capacity of the turbines is sufficient in this case to override the additional landscape impact associated with this type of installation.

7. Economic, Social and Environmental benefits of the proposed development

In accordance with PPS22 companion guide the Economic, Social and Environmental benefits of this proposal should be considered as material when determining the application. These proposed wind turbines will use wind energy – this is an abundant natural resource. It is non-polluting, clean and sustainable. The UK has one of Europe's windiest climates and therefore wind energy is an important element in achieving the UK Government's commitment to reduce carbon dioxide emissions to 12.5% below 1990 levels by 2010. More specifically, it is Government policy to achieve 30% of the nation's electrical requirements from renewable sources by 2020; this proposal will help to move towards these targets.

The development will generate electricity for Bullhouse Mill which is a rural enterprise. The applicant is committed to reducing their fuel costs as well as their environmental and carbon footprints. This application is an essential element in achieving this ambition.

The UK has the best wind resource in Europe. This site has a good wind speed from which each 11KW Gaia would produce on average 25.17MWh of electricity per year. The current annual energy consumption of the property is approximately 40MWh. As such, the three turbines will generate energy in excess of current usage, which will be fed back into the Grid during times of low usage, thus providing a wider community benefit, working directly towards the Government's regional and national targets for the supply of energy from sustainable sources as set out in PPS 22 and the Yorkshire and Humber RSS.

The installation will be on agricultural land associated with the industrial units adjoining the site. The turbine will supply energy directly to the printing business operated from these units and as such will support and diversify this existing rural business helping to safeguard its future and the future employment of 35 staff members by reducing energy bills and enabling further green improvements to be made.

8. Siting

Small wind turbines are generally linked with a property and as such are rarely in 'prime wind' sites as sought by commercial power generators. Nevertheless, if care is taken with regard to selection and positioning, a small wind turbine can make a significant contribution to greenhouse gas reduction as well as being an economically attractive proposition for the owner.

A wind speed analysis has established that three small scale wind turbines will be the most appropriate and efficient installation for the site. It is essential that the chosen sites meet both planning and installer requirements so that an efficient and appropriate form of development can be achieved. The site survey explored possible locations and found that the proposed sites are the most appropriate. It is estimated that the

wind speed will be approximately 4.5m/s and that each turbine will produce approximately 25.17MWh per year, surpassing the amount of energy used at the site each year. In amenity terms, the siting of the turbines must be sufficiently remote from all adjoining neighbours to ensure that the residential amenities are not harmed by potential noise or shadow flicker. In this case the chosen sites, which are approximately 160m from the nearest non-associated residential property at their closest point, are sufficient to prevent any adverse impact on any residential dwellings. The closest associated property, which is 100m to the east of the proposed turbine site, is also located a sufficient distance so as not be adversely affected by these factors.

In functional terms, turbines require a sufficient wind speed and a supply of clean turbulence free wind in order for its efficient operation. Proximity to man-made obstacles can have an impact on the effective functioning of the turbine as wind in close proximity to such structures is slower and more turbulent. It is therefore essential to ensure that the turbine is sited a sufficient distance from such structures. The application site was chosen taking this into account and is considered to be as close as is practicable to the site buildings whilst ensuring that it remains efficient and un-obtrusive within the landscape.

9. Impact on the Landscape

In accordance with pre-application advice received from Barnsley MBC, a Landscape Character and Visual Impact Assessment (LCVIA) has been submitted with this application to assess the impact of the proposed turbines on the landscape. The LCVIA, when read in conjunction with this Design and Access Statement, will provide a demonstration of no harm upon the landscape.

10. Precedent

Local searches have shown that there are a number of existing wind turbines in the vicinity of the application site. The most notable of which are those at the Royd Moor Wind Farm, which features 13 large scale wind turbines, shown on page 6 in Figures 5 and 6. The turbines proposed here are much smaller in scale, and whilst be recognise that precedent is not a material planning consideration; we feel that it supports the development of wind energy in this area.

11. Cumulative Impact

This proposal is for three small Gaia turbines. The diagram below indicates the size difference between these installation, a pylon and a large scale wind farm turbine similar to those existing at Spicer Hill



Figure 12: Comparative heights of an 18m Gaia wind turbine

The turbine's mast design which has a slim and slender form, and small scale of the turbines, mean that when viewed from most mid and long distance viewpoints, the turbines will be largely indistinguishable from their surrounds. The cumulative impact of this scheme is therefore low; however this issue is explored further in the LCVIAI assessment.

12. Noise

A site visit was made to identify the most suitable design and location for the turbine. During this visit a note was taken of background noises such as the rustling of trees, agricultural machinery and traffic. The turbine site chosen is approximately 160m at their closest point from other residential neighbours. It is highly unlikely that the noise created by the turbines' mechanisms will be in any way intrusive or harmful to residential amenity.

The selected position of the turbines provides adequate exposure to the prevailing wind and minimises the risk of turbulence. The site has been appropriately specified, designed and located to allow sufficient distance between the wind generator and any existing noise sensitive development so that noise from the wind generator will not be a nuisance or a material consideration in deciding the planning application. In practice turbine noise is often masked by background noise such as wind blowing through crops, farm buildings and the noise of leaves rustling and traffic noise, etc.

Due to its constant and low rotational speed, the Gaia-Wind turbine is amongst the quietest in its class (the aerodynamic noise of a turbine increases exponentially with an increase in the rotational speed). ETSY-R-97 is a Noise Assessment and Rating advice note for Wind Turbine Developments. This Guidance Note recommends that in most the fixed noise limit for night time is 43DB (A) is acceptable. This limit is derived from 35DB (A) sleep disturbance criteria referred to in Planning Policy Guidance Note 24. An allowance of 10DB (A) is made for attenuation through an open window (free-field to internal) and 2dB subtracted to account for us of LA_{90} 10min rather than LAeq 10 min. The Noise Working Group recommends that day time lower fixed limits can be higher than this at 45 DB(A). They also state that considerations should be given to increasing the permissible margin above background where the occupier of the site has some financial involvement in the wind turbines meaning that it can be acceptable to have higher noise readings where the applicant's property is the primary affected residence. The noise data in the table overleaf gives indicative noise levels at various distances from the Gaia base of the turbine. The data is derived from independent measurements made at a site in Denmark.

Comparative Noise Levels

- Tower base conversational speech, 50-60 dB(A)
- 30m from tower car at 100m driving at 40 mph, 55 dB(A)
- 60m from tower living room, 40 dB(A)
- 100m from tower rural night time background, 20-40dB(A)

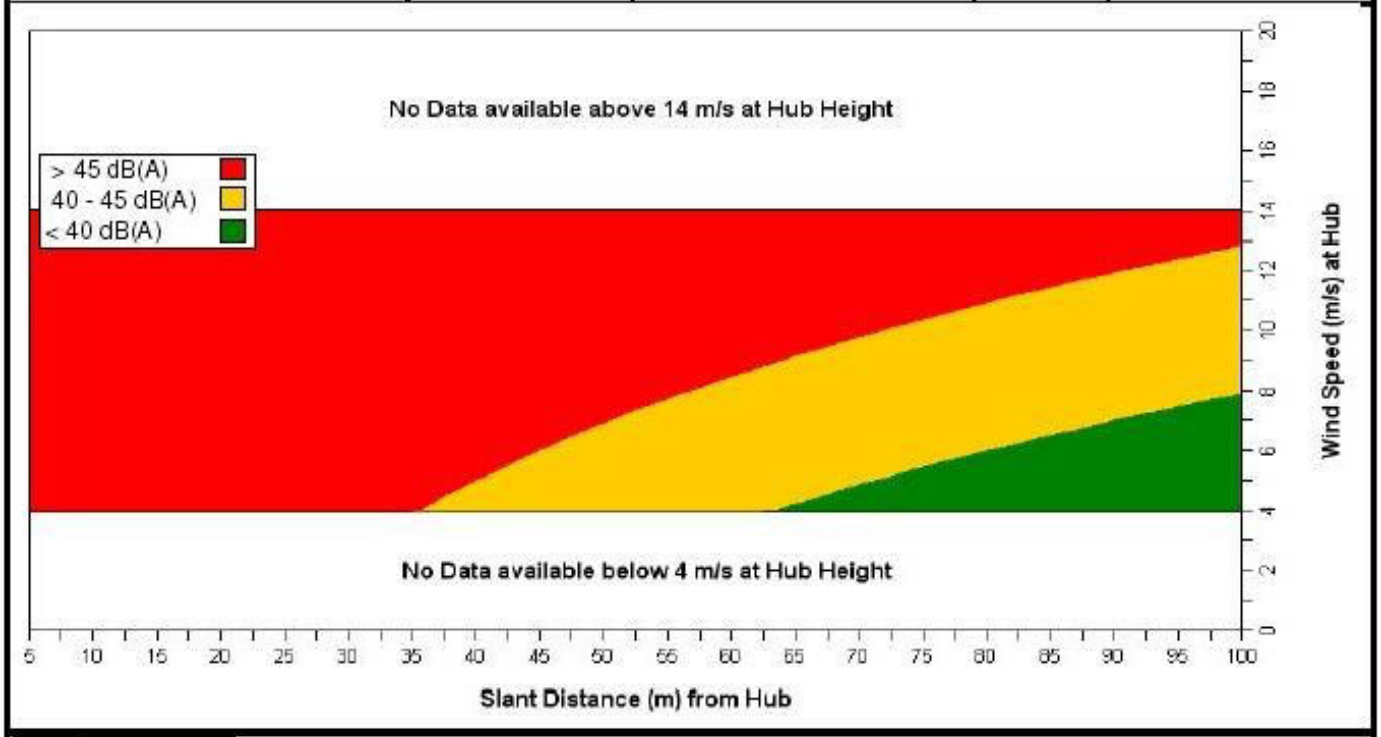
The noise emission report for the Gaia 11k turbine on the next page contains a summary of measurements. The report records noise measurements for the Gaia 11 kW turbine in order to determine the sound level of the turbine. Measurements of the noise emissions from the Gaia turbine were taken on 20/01/2006 between the hours of 12pm and 2:30pm, see table below. As advocated by the Noise Working Group noise emission of the turbine in relation to a neighbour's outdoor sitting area in the open countryside should be no higher than 43 -45 dB (A) at any noise sensitive properties. For a Gaia turbine a maximum sound level of 40 dB (A) is achieved a distance of 108 meters and a maximum of 45 dB (A) at a distance of 59 meters. As you can see from the submitted noise readings at over 300m the noise from the turbine is well below the usual 43 dB (A) night time requirement at noise sensitive premises. In conclusion the noise levels of this wind generator is low and under most operating conditions it is likely that the micro wind generator noise would be completely masked by the background noise from the wind blowing through the trees and buildings and from traffic on the road near the site.

In conclusion, it is very unlikely that the noise created by the turning of the turbine blades will be distinguishable above the noise of wind blowing through the trees or between the nearby farm buildings, or above the noise from the nearby roads. Since the nearest non-associated residential property is a significant distance from the site, it is not considered that there will be any negative impact on residential amenity in terms of noise.

Acoustic Noise Levels

Turbine Make:	Gaia-Wind Ltd	Model:	GW 11

NOISE EMISSION LEVEL				NOISE PENALTY
Sound Power $L_{Wd,8m/s}$	88.1 dB(A)	Noise Slope, SdB (dB/m/s)	1.015	NO



HM: 2064/R1
Melton Mowbray Turbine Test

Tested and Issued by:
Hayes McKenzie Partnership Ltd.
February 2009

Seagen

Figure 13: Gaia noise emissions

Sound pressure level for 11 kW Gaia turbine / hub height 18 m.

m.	dB(A)	m.	dB(A)	m.	dB(A)	m.	dB(A)	m.	dB(A)	m.	dB(A)	m.	dB(A)	m.	dB(A)	m.	dB(A)	m.	dB(A)	m.	dB(A)
1	55,99	26	51,04	51	46,27	76	42,96	101	40,46	126	38,47	151	36,80	176	35,36	201	34,09	226	32,96	251	31,93	276	30,98
2	55,95	27	50,81	52	46,11	77	42,84	102	40,38	127	38,40	152	36,74	177	35,31	202	34,04	227	32,91	252	31,89	277	30,94
3	55,88	28	50,59	53	45,96	78	42,73	103	40,29	128	38,32	153	36,68	178	35,25	203	34,00	228	32,87	253	31,85	278	30,91
4	55,79	29	50,37	54	45,81	79	42,62	104	40,20	129	38,25	154	36,62	179	35,20	204	33,95	229	32,83	254	31,81	279	30,87
5	55,68	30	50,15	55	45,66	80	42,51	105	40,12	130	38,18	155	36,55	180	35,15	205	33,90	230	32,79	255	31,77	280	30,84
6	55,54	31	49,93	56	45,52	81	42,41	106	40,03	131	38,11	156	36,49	181	35,09	206	33,86	231	32,74	256	31,73	281	30,80
7	55,39	32	49,72	57	45,37	82	42,30	107	39,95	132	38,04	157	36,44	182	35,04	207	33,81	232	32,70	257	31,69	282	30,76
8	55,21	33	49,51	58	45,23	83	42,19	108	39,87	133	37,97	158	36,38	183	34,99	208	33,76	233	32,66	258	31,65	283	30,73
9	55,02	34	49,31	59	45,09	84	42,09	109	39,78	134	37,90	159	36,32	184	34,94	209	33,72	234	32,62	259	31,61	284	30,69
10	54,82	35	49,10	60	44,95	85	41,99	110	39,70	135	37,84	160	36,26	185	34,89	210	33,67	235	32,57	260	31,58	285	30,66
11	54,61	36	48,90	61	44,81	86	41,88	111	39,62	136	37,77	161	36,20	186	34,83	211	33,62	236	32,53	261	31,54	286	30,62
12	54,39	37	48,71	62	44,68	87	41,78	112	39,54	137	37,70	162	36,14	187	34,78	212	33,58	237	32,49	262	31,50	287	30,59
13	54,16	38	48,51	63	44,54	88	41,68	113	39,46	138	37,63	163	36,09	188	34,73	213	33,53	238	32,45	263	31,46	288	30,55
14	53,93	39	48,33	64	44,41	89	41,58	114	39,38	139	37,57	164	36,03	189	34,68	214	33,49	239	32,41	264	31,42	289	30,52
15	53,69	40	48,14	65	44,28	90	41,49	115	39,30	140	37,50	165	35,97	190	34,63	215	33,44	240	32,37	265	31,39	290	30,48
16	53,45	41	47,95	66	44,16	91	41,39	116	39,22	141	37,43	166	35,91	191	34,58	216	33,40	241	32,33	266	31,35	291	30,45
17	53,20	42	47,77	67	44,03	92	41,29	117	39,14	142	37,37	167	35,86	192	34,53	217	33,35	242	32,29	267	31,31	292	30,41
18	52,96	43	47,60	68	43,90	93	41,20	118	39,07	143	37,30	168	35,80	193	34,48	218	33,31	243	32,25	268	31,27	293	30,38
19	52,71	44	47,42	69	43,78	94	41,10	119	38,99	144	37,24	169	35,74	194	34,43	219	33,26	244	32,21	269	31,24	294	30,34
20	52,47	45	47,25	70	43,66	95	41,01	120	38,91	145	37,18	170	35,69	195	34,38	220	33,22	245	32,16	270	31,20	295	30,31
21	52,23	46	47,08	71	43,54	96	40,92	121	38,84	146	37,11	171	35,63	196	34,33	221	33,17	246	32,12	271	31,16	296	30,28
22	51,98	47	46,91	72	43,42	97	40,82	122	38,76	147	37,05	172	35,58	197	34,29	222	33,13	247	32,08	272	31,13	297	30,24
23	51,74	48	46,75	73	43,30	98	40,73	123	38,69	148	36,99	173	35,52	198	34,24	223	33,09	248	32,04	273	31,09	298	30,21
24	51,51	49	46,59	74	43,18	99	40,64	124	38,61	149	36,92	174	35,47	199	34,19	224	33,04	249	32,01	274	31,05	299	30,17
25	51,27	50	46,43	75	43,07	100	40,55	125	38,54	150	36,86	175	35,41	200	34,14	225	33,00	250	31,97	275	31,02	300	30,14

The Sound pressure level (dB(A)) for a specified distance (m) is calculated as follows:

d = 30 m. Distance from bottom of turbine to microphone
h = 18 m. Hub height
l = distance to turbine

$\Delta L = \sqrt{l^2 h^2}$ Air absorption

α_a 0,005 dB/m Damping coefficient

L_{pa} = Sound pressure level for a given distance

$L_{pa} = L_{WA,ref} - 10 \times \log \times (l^2 + h^2) - 8dB - \Delta L_a$

Measuring performed by:: Milja & Levnedsmiddelkontrollen
Boghvedevej 34
8900 Randers

Segen

13. Shadow flicker

Shadow flicker can cause a problem to nearby properties early in the morning or late in the evening. It is caused by the rotating blades interrupting the light from sun when the turbine is between you and the sun. This occurs early in the morning to the west of the turbine and late in the evening to the east of turbine. The effect is likely to be worse on sunny days in winter than in summer, as in summer the sun is much higher for longer and therefore the shadow is more local to the actual turbine. It is generally accepted that some degree of shadow flicker is acceptable, but that limits should be imposed to restrict the number of hours per year for which any one property is affected. There are no specific rules on this, but a 30 hour per year maximum has been suggested as reasonable in Germany and this seems to be generally accepted. Expected shadow flicker is difficult to predict however some general rules and guidance can be applied. Assuming an 18m tower and 13m diameter blades at the latitude of London, the following guidelines may be used to ensure a low risk of adverse affects.

No property with a window facing the turbine should be within 36m of the turbine location from due east, through north, to due west.

Care should be taken to ensure that any property within 72m at a direction from 120 degrees west to 120 degrees east of the turbine location does not have a light sensitive outlook towards the turbine, e.g. a west facing conservatory or patio where the occupant might be expected to sit out on a sunny evening.

Properties greater than 85m are unlikely to be seriously affected, since the duration of any shadow flicker will be reduced, and its severity will be lower since the shadows from the blades will become more diffuse. In this case the separation distances between the turbines and the applicant's property is well in excess of the recommendations above. Due to the large separation distance between the turbine and nearby properties, shadow flicker in this case is not considered to adversely affect residential amenity.

14. Electro-magnetic Interference and Aviation

PPS 22, section 8.64 states that "Provided careful attention is paid to siting, wind turbines should not cause any significant problems of electromagnetic interference".

The proposed wind turbine uses a permanent magnet brushless alternator and thereby avoids one main source of potential electromagnetic interference, worn brushes. The other common source of electromagnetic interference is the switching circuitry used in the controller and inverter to adjust the turbine's loading. This equipment will be fully tested to ensure full compliance with industry standards.

Scattering of signal is a phenomenon that very occasionally may affect large utility sale turbines. It is not considered to be relevant to turbines as small as those proposed in this case. Furthermore between the years of 2008 and 2012 the government is planning to update the UK's transmission network and provide digital viewing for all. Once this takes place, television signal interference will no longer be of concern as digital signals will not be subject to electromagnetic interference.

Due the presence of communications masts in the vicinity of the application site, Ofcom have been consulted on this proposal. Information regarding the proposal was sent to Ofcom for their comments on 2nd September 2009. On 3rd September a response was received from Ofcom stating that they have no objections to the turbines in their proposed position. They have passed on the information to both the Joint Radio Company (JRC) and to CSS Spectrum Management Services for their comments. On 22nd September a response was received from CSS stating that they too have no objections to the scheme. JRC responded on 2nd October 2009 and they too have no objections.

In line with Government guidance, and after checks with the BWEA, both the MoD (Ministry of Defence) and CAA (Civil Aviation Authority) have been consulted on this proposal. A response from CAA was received on 7th October 2009 and raised no objections to the scheme. The MoD response is awaited.

All responses received will be forwarded to the planning officer after validation and allocation of this application.

15. Public Rights of Way

The map below shows public rights of way in the vicinity of the application site.

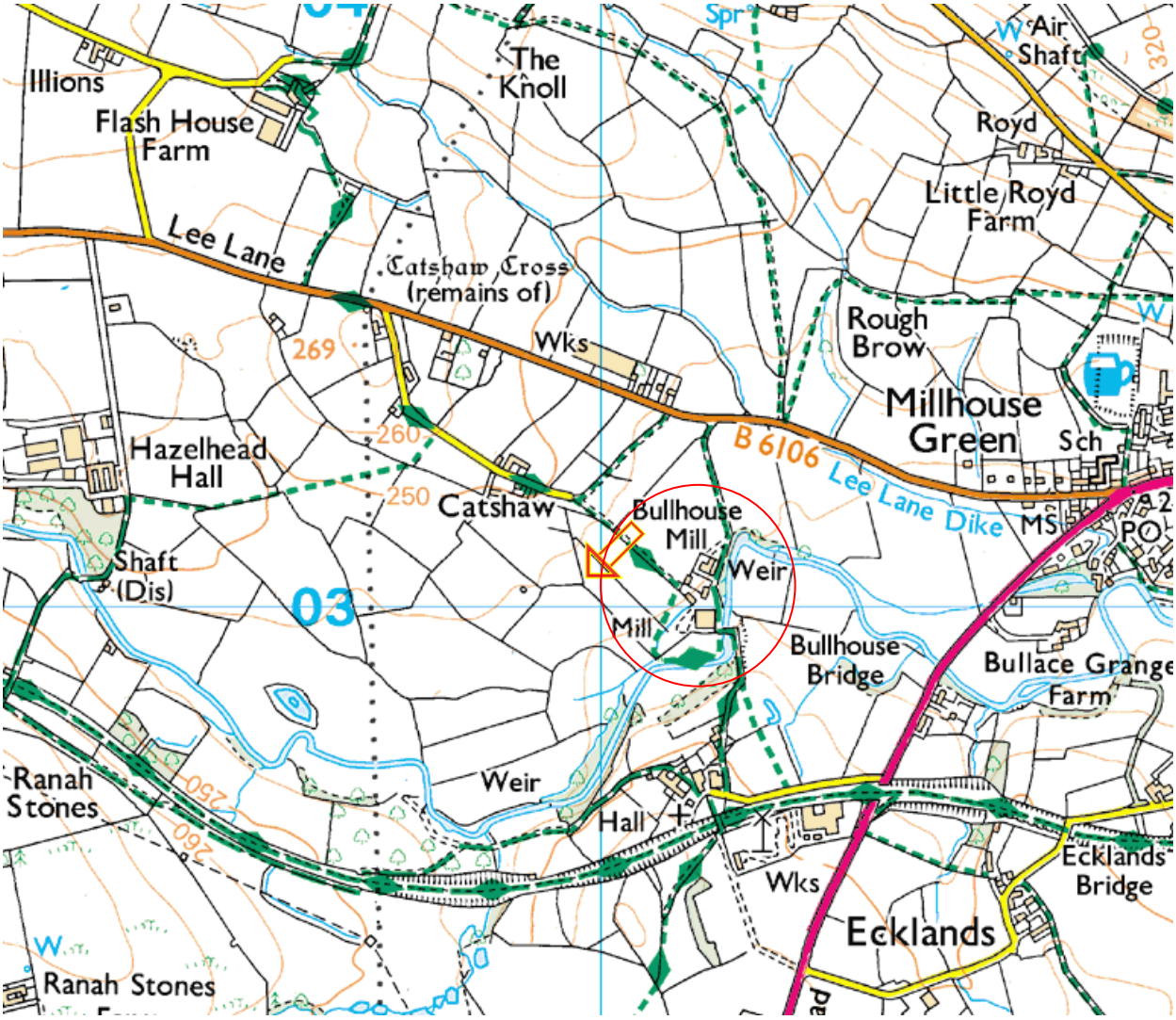


Figure 124: Map showing Public Rights of Way in vicinity of the site (Street map, 2009)

The Penistone Boundary Walk runs roughly south to northwest and cuts across the application site between Turbine A and Turbine B and C. At its closest point, this pathway is approximately 75m from Turbine A. The Trans Pennine Trail runs east to west to the south of the site, located approximately 400m to the south of Turbine B. There are other footpaths in the area, however none are closer than those previously mentioned. Guidance from the Highways Agency states that turbines should be sited at a distance of at least the height of the tip of the turbine plus 10%. In the case of the Gaia turbines proposed here, that equates to 27.28m, which this scheme fully complies with.

A bridleway runs north to south up to the B6106 to the east of the proposed turbines, approximately 105m from Turbine A. Recent British Horse Society recommends that turbine be sited 4 times the overall height of the turbine away from bridleways the turbine siting accords with this guidance. Furthermore the Gaia turbine is one of the quietest in its class and due to its mechanism which is manufactured as a single composite unit, it does not make jerky or sudden movements which have the potential to scare animals. In terms of shadow flicker and blade sweep, there is no evidence that turbine movement is any more distracting to horses than movements by traffic which horses are likely to encounter.

Due to the small scale and slender design of these turbines, coupled with the separation distances between the turbines and the PROWs mentioned above, it is not considered that the proposed turbines will have an adverse impact on the use and enjoyment of these paths and bridleways. The LCVIA assessment will explore this point further.

16. Access

Access to the site will be gained via the existing road network and site accesses. The components will be moved into position by mini-digger. It is likely that works to install the turbines will be carried out in the summer months when the land is sufficiently firm to transport the turbines to the site without the need to create any temporary access tracks. Excavations for the foundation and cable trenches will be carried out by mini-digger. All excavations, protection, cable laying, builders work, holes through existing walls etc. will be carried out in accordance with relevant health and safety requirements.

Excavations for the foundation and cable trenches will be carried out by a small, tracked mini-digger and surplus soil will be removed. All excavations, protection, cable laying, builders' works, holes through existing walls, etc., will be carried out in accordance with relevant health and safety requirements and good construction practice and the safe use of tools and equipment. Care will be taken to ensure that tree roots are not interfered with. If roots are encountered then hand dig techniques will be used to ensure they are not damaged and that the viability of the hedgerow and trees are protected.

Gaia and the electrical component suppliers provide detailed instructions for the safe sequencing and carrying out of the installation and commissioning works. These will be followed in detail and include the fixing of notices etc. to the completed work for its continued safe use. Prior approval will be obtained from the existing energy supplier to make the final grid connections. During the course of the works protection to excavations, working

areas etc. will be provided in accordance with good construction practice. Once the work is complete no special protection to the installation is required.

17. Ecology and Conservation

As highlighted through PPS22, the greatest threat to all living species is climate change resulting from carbon emissions. Whilst there is little data available on the risk to wildlife by small wind turbines and the Gaia small turbine specifically, it is too easy to impose requirements appropriate to industrial scale machines.

The land immediately surrounding the application site for the proposed turbines is rural / agricultural. From the initial site survey no features of unique wildlife interest have been identified in the immediate vicinity of the site of the wind turbines and there are no adjacent sites that are designated as having any local, regional, national or international ecological interest. Local Authority searches and searches with English nature have confirmed this.

Birds

Figure 15 below shows that the nearest Important Bird Area to the application site, the Peak District Moors, is located 7 miles away. At this distance, it is very unlikely that the turbines will have an impact on the feeding or migratory routes of birds from this area.

Site Name	Description	Grid Reference	Miles
PEAK DISTRICT MOORS	The southernmost extent of a habitat typical of northern British uplands. Dwarf shrubs dominate the open moorland and mire habitats, with adjacent unenclosed pasture and grassland. The Eastern Moors block is included in the site.	SK120960	7
SOUTH PENNINE MOORS	Several huge upland blocks comprising heather moorland and blanket peatland habitats, which fall within the broader South Pennine Moors Natural Area.	SD950460	34
THORNE AND HATFIELD MOORS	These two moors lying to the east and north- east of Doncaster, are the largest remaining areas of lowland peatbog in England. Much peat extraction has already taken place.	SE705060	35
LOWER DERWENT VALLEY	A mosaic of neutral alluvial flood meadows, fens, swamps Alnus carr and freshwater habitats lying adjacent to the River Derwent, Pocklington Canal and Thornton Beck. The unimproved flood-meadows are amongst the most important in Europe	SE703446	45
LAUGHTON FOREST	A small mixed forest, mainly pine, in the NW corner of Lincolshire. Areas of unimproved acid grassland and heathland contain characteristic communities. Scotton and Laughton forest ponds support plant species of acid fen/mire.	SK855995	45

Figure 15: Important Bird Areas (IBAs) close to the proposed site

The British Wind Energy Association Website (http://www.bwea.com) states that, “Experience and careful monitoring by independent experts shows that birds are unlikely to be damaged by the moving blades of micro wind generators”. More information about this can be found from BWEA Best Practice Guidelines and the Royal Society for the Protection of Birds, whose view is that, "Climate change is the most significant, long-term threat to biodiversity worldwide. To help meet this threat, the RSPB also strongly supports moves to increase energy efficiency, reduce energy demand and supply more of our energy needs from renewable sources, including

wind power, provided they do not harm birds or their habitats." Studies of birds increasingly show that the risk from wind turbines to most species is very low, far greater risk exists from overhead cables and moving cars. The RSPB have installed a small wind turbine at their visitor centre at Rainham Marshes and are reported to be considering turbines for other sites including turbines for a site near to Carlisle. The RSPB position on wind turbine installations is illustrated here: http://www.rspb.org.uk/news/details.asp?id=tcm:9-213213.

Water Courses/Hydrology

The local hydrology including main rivers, private watercourses or Ground Water Protection Zones will not be materially affected by the installation of the concrete pad to support the micro wind generator. The area around the concrete base of the turbine will also be unaffected by the wind turbine. There are no impacts predicted on any ground living mammals or any plants or invertebrates. Any grass sods removed during excavation of the foundations for the $5m^2$ concrete base will be removed and set aside prior to excavation and then replaced on completion of the base. Any surplus soil will also be deposited and levelled on site, the whole site being left in a fully reinstated condition.

Bats

General advice from the Bat Conservation Trust and the Wildlife Trust regarding domestic scale installations and other similar turbine applications states is that it is good practice for the siting of turbines to avoid close proximity to buildings that could be used as roosts, or groups of mature trees, hedgerows and water bodies such as ponds and lakes, which could be used as foraging and commuting routes. They recommend siting of domestic scale turbines 50m away from any such feature. This advice is backed up by English Nature in their 2009 publication Technical Advice note TON051. It is recognised that whilst there are some trees in proximity to the proposed development site, they are quite sporadic in nature, and do not form a coppice as are usually associated with bats. It is also material that the Advice in TON051 makes no differentiation between large scale wind farm development and small micro generation development. In view of the scale of the turbines and the separation distances involved the potential impact of the development on bat populations is considered to be low.

Furthermore guidance published by the BWEA 2001 in conjunction with English Nature, RSPB and WWWF-UK indicates that bats species in the UK are unlikely to come into contact with blades during their normal movements. There is no published evidence of turbines of this size interfering with echo location calls or causing injuries as a result of atmospheric pressure drops at wind turbine blades, and these problems are more commonly associated with large megawatt generators or wind farms and not micro generators as proposed in this location. Bats have been observed to avoid rotors on wind turbines with echo-location, and the risk of Barotrauma, which is lung damage resulting from low pressure areas behind the rotor, is low. Towards providing more data on the relationship between bats and the small turbines, a study is underway in Nottinghamshire that is being monitored by licensed Ecologists and English Nature. No bat casualties or other casualties have been observed from a turbine positioned 25m from a bat foraging route.

Many nature conservation bodies now support the use of small scale renewables installation including domestic turbines, for example the National Trust believe, "...there is great potential in developing renewable energy, for both electricity and heat, at a more local and small scale, in households, businesses and communities."

http://www.nationaltrust.org.uk/main/w-microgen-policy_from_practice.pdf. English Nature also, "...support the development of renewable energy schemes (including wind, biomass and energy from waste projects) where these have appropriate standards for environmental protection, will not damage wildlife and natural features, and will contribute to achieving sustainability as well as emissions reduction targets".

Taking the above into account, the proposed construction and operation of the wind turbines can be carried out without having any adverse impact on existing ecological or hydrological features or assets of value. As such the proposal does not conflict with local or national planning policy concerning this matter. The installation of the turbines will not only contribute to a reduction in carbon dioxide, but will also help to maintain the integrity of the landscape and therefore conserve the local ecology of the area.

18. Health and Safety

The site is located within a field so no issues with safety have been identified. Training for the safe use of the equipment will be provided to the end user. All the components are designed for a trouble free long life with minimum maintenance. An annual inspection of the turbine head is required to comply with the warranty requirements and to ensure efficient operation.

Experience indicates that properly designed and maintained wind generators are 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 the operation of the machines. There has been no example of injury to a member of the public. The minimum desirable distance between wind turbines 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 wind turbine to the tip of the blade) plus 10% is often used as a safe separation distance. The wind turbine erected in accordance with manufacturer's instructions is a stable and safe structure. In accordance with good practice the proposed location has been chosen to achieve a setback of at least fall over distance from nearby roads, buildings, paths and public footpaths and bridleways.

19. Heritage

Local searches have identified that there are a number of listed buildings to the south east of the application site. These include Bullhouse Hall, Bullhouse 1 and 2 Manchester Road, Bullhouse Lodge, and a number of outbuildings in the vicinity of these properties. These buildings are located approximately 280m from the closest turbine, Turbine B. Between the buildings and the application site there is a large amount of screening in the shape of a line and cluster of mature trees. Due to the separation distance involved between the turbines and the buildings, the tree screening and the slender design and small scale of the turbines, the setting of the listed buildings are unlikely to be adversely effected by their installation. The location of these buildings is shown in Figure 16 overleaf.

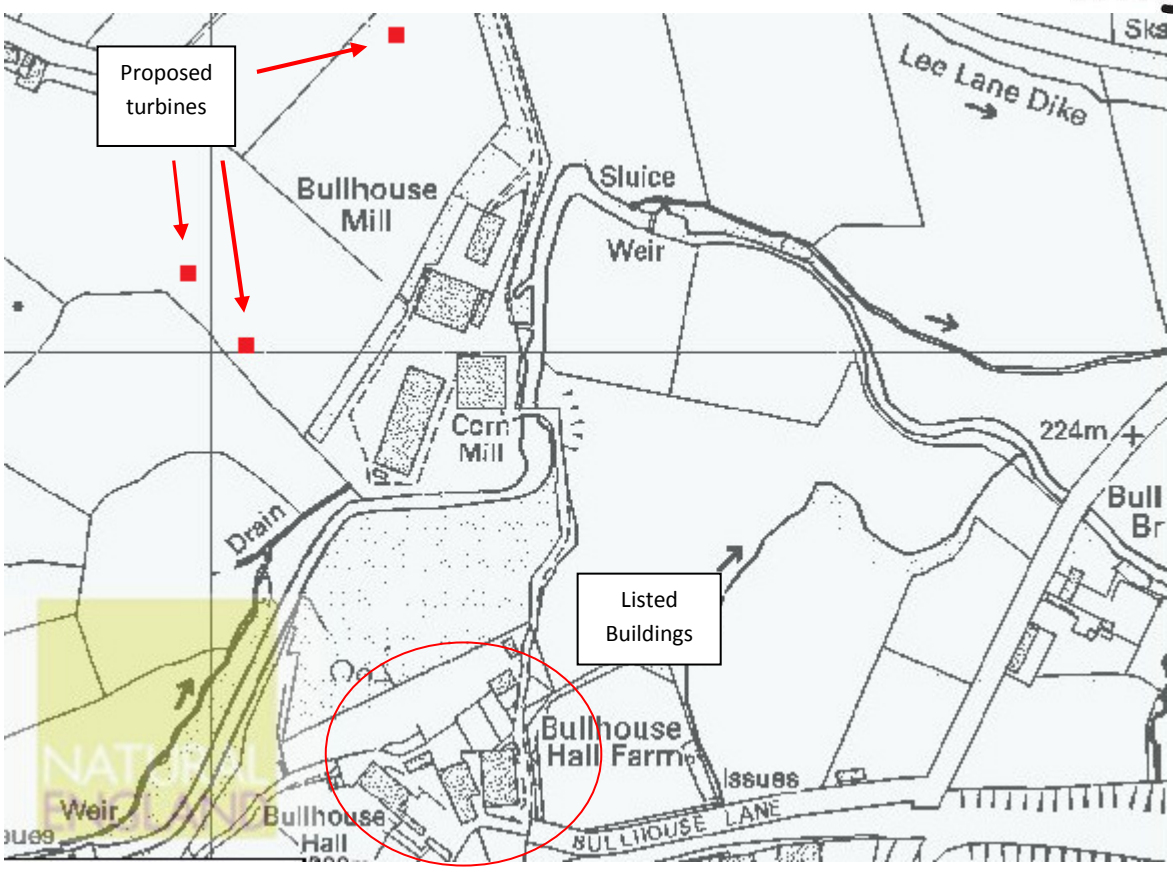


Figure 16: Listed Buildings close to the application site (Nature on the Map, 2009)

Figure 18 overleaf shows a 1km radius around the application site. Searches have identified that there is a scheduled monument to the northwest of the application site. This is the remains of Catshaw Cross, show by an orange circle in Figure 18.

Catshaw Cross, only known as the Boundary and Wayside Cross is a Saxon cross thought to date back from 900AD. During its lifetime the cross has been moved several times and the base is the only part which is thought to be original. Due to the separation distance involved between this monument and the turbines, it is not considered that its setting will be adversely affected by the installation of the turbines.



Figure 137: Catshaw Cross (Google Images, 2009)

There are no other scheduled monuments, ancient battlefields or features of historic interest in the vicinity of the application site.

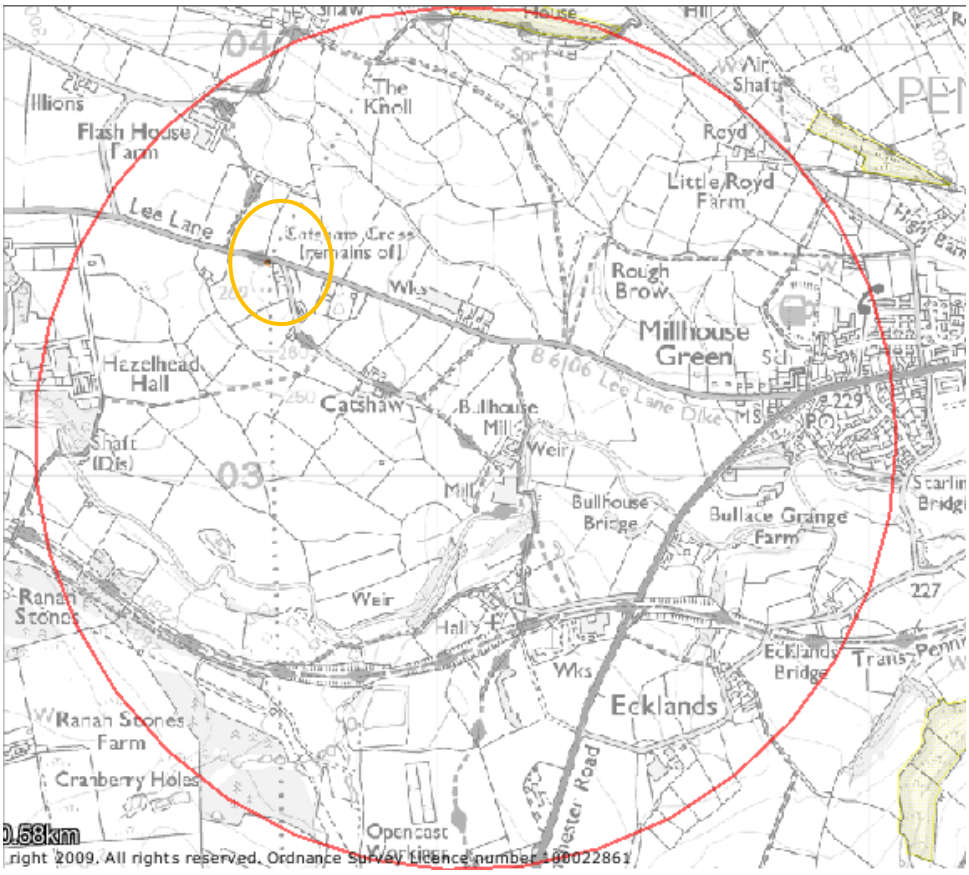


Figure 18: 1km radius around the site

Notwithstanding the above, the applicant is concerned to assist the local planning authority to meet the ambitions of PPS16: Planning and Archaeology. Therefore, during the excavation of the void for the base of the wind turbine, should any building foundations, artefacts or other unusual finds be made, these will be notified to the relevant local authority archaeologist. The proposed wind turbine will not materially affect any built or cultural heritage assets. The measures to be taken as part of the construction of the proposed wind turbine will ensure that any unknown archaeological assets are identified and recorded; as such the proposal does not conflict with local or national planning policy concerning this matter.

20. Driver Distraction

Drivers are faced with a number of varied and competing distractions during a normal journey, including advertising hoardings which are deliberately designed to attract attention. At all times drivers are required to take reasonable care to ensure their own and others safety. The companion guide for PPS22 states that wind turbines should not be treated any differently from other distractions a driver must face and should not be considered a particularly hazardous.

In this case due to the location, at a considerable distance from the road, and due to the scale and siting of the turbines, driver distraction is not considered to be a material consideration.

21. Decommissioning

The design of the wind turbines and the choice of location have been consciously made to facilitate ease of dismantling of the equipment and restoration of the site at the end of its useful life – 20/25 years. Annual maintenance will be required; measures will be taken to ensure this is carried out in accordance with health and safety requirements and to protect the safety and security of the public.

Neither the applicant or Segen Ltd. have objection to the imposition of a planning condition requiring removal of the turbines at the end of its operational life and reinstatement of the land to its former condition.

22. Conclusion

The site for the proposed wind turbines has been chosen carefully to ensure that it can be absorbed by the local landscape and is largely indistinguishable in the landscape from most mid and distant view points. Where it is distinguishable from close vantage points, from the road to the north and from other public rights of way, the design, scale, form and appearance has been selected to ensure that the construction and operation on the proposed site will not be intrusive on the landscape, and are far outweighed by the economic, social and environmental benefits of the proposal outlined above. In addition, this proposal should be viewed as a piece of modern farming technology in a largely agricultural area that will, in the long term, help to maintain the viability of the landscape by reducing carbon emissions. When taken along with the demonstration of no harm, it is considered that this development is appropriate for the location and purpose for which it is intended.

The Landscape Character and Visual Impact Assessment submitted as part of this application should be read in conjunction with this Planning and Design and Access Statement.