

West Ancroft Wind Farm

Design and Access Statement

March 2009



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Ovenden Moor Wind Farm Proposed Repower

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1 Introduction

This Design and Access Statement (DAS) accompanies the planning application that has been made to Berwick-upon-Tweed Borough Council for consent to construct, operate and decommission a wind farm, known as West Ancroft Wind Farm. The applicant for this consent is E.ON Climate & Renewables.

Section 42 of the Planning and Compulsory Purchase Act 2004 requires for a DAS to accompany the application. The statements should cover design concepts and principles and access issues which are associated with the application.

The statement is an opportunity to demonstrate that the sought planning application has been completed using an integrated approach to deliver an inclusive design, and address a range of access requirements throughout the design process.

The need for good design is recognised and the Planning Statement accompanying this application identifies the design policies set out in national and regional planning guidance, the structure plan and the local plan that are relevant to this application.

The proposed West Ancroft Wind Farm is located to the east of the A698 and the west of the A1 approximately 8km south of Berwick-upon-Tweed with the centre of the wind farm located at National Grid Reference (NGR) 397745, 644850. The site comprises a mosaic of agricultural fields currently used for arable crops and grazing with clusters of woodlands and a network of access tracks and field drainage ditches.

The planning application is for the construction, operation and decommissioning of eight 3-bladed, horizontal axis wind turbines and associated infrastructure (including an anemometer and onsite substation). The turbines will be limited to a maximum tip height of 115m above ground level and each turbine will have a rotor diameter of no more than 93m. This will allow for turbines with individual generating capacities of between 2 and 2.5MW and, dependant on the final choice of turbine, will give a combined installed capacity for the site of between 16 and 20MW.

2 Design Principles

2.1

Wind Farm Design Criteria

The proposed development comprises the construction and operation of eight wind turbines, together with the construction of access tracks, crane hard standings, a temporary construction compound, an underground cable network linking the turbines to a substation and an anemometry mast.

The layout of a wind farm depends on a range of technical, economic and environmental constraints including:

- Ground conditions - must be suitable for the installation of wind turbines, access tracks and cables e.g. avoidance of areas of unstable ground or areas of deep peat;
- Local topography can affect wind flow across the site and therefore can detrimentally affect turbine performance. Site topography must be carefully considered in the layout design process to ensure any detrimental effects are minimised;
- Buildings and other obstructions can create turbulence in the air flow and reduce turbine performance;
- Turbines must be separated by specific distances both perpendicular to, and in line with, the prevailing wind direction to minimise turbulent interaction between the wind turbines (i.e. wake effect) which can reduce turbine performance. Spacing requirements vary between turbine manufacturers and are also subject to wind conditions;
- Wind turbines have to be located at a distance sufficiently far from houses to protect local noise amenity and ensure shadow flicker impacts are minimised;
- The implications of locating turbines near environmentally sensitive features and areas (ecology, archaeology, hydrology etc.) need to be carefully considered;
- Landscape and visual design considerations also need to be taken into account;
- Whilst the wind turbines and their associated infrastructure typically occupy no more than 5% of a site, the existing use of the land is considered in the layout of tracks and turbines. For example, existing track lines are used where practicable;
- Available spare capacity of the local electricity grid to take power from the wind farm can dictate the overall size of scheme;
- In addition, planning guidance and discussion with statutory and non-statutory consultees, the local communities and the landowners influence the evolution of the design; and
- The design of West Ancroft Wind Farm has been planned in order to ensure maximum energy capture. The turbines are spaced far enough away from each other to ensure that they are each utilising their own energy thus increasing the overall output.

The planned layout for the proposed wind farm has evolved in response to a number of environmental and technical constraints, landscape design considerations; and as a result of feedback from key stakeholders, consultees and the public. Figure 1 illustrates the onsite and near site constraints that have been considered in the design of the wind farm.

A summary of the design review process is given in Table 1 below.

Table 1: Design Iterations

Iteration	Potential Adverse Impact Addressed	Detail of Change	Resulting Layout
Scoping Layout		Starting Point: Ten turbines with a rotor diameter of up to 92m and a hub height of up to 80m giving a maximum height of no more than 125m. Turbines located to maximise generation potential.	Layout 1
Design Review 1	Detailed constraints mapping identified various features across the site, including the	The mapping identified that the repositioning of Turbine 1 was required in order to minimise the	Layout 2

Iteration	Potential Adverse Impact Addressed	Detail of Change	Resulting Layout
	Cuddy Plantation in the centre of the site and the access track running south of the site from West Ancroft.	impact on the woodland and accommodate for the 100m separation distance. The repositioning of Turbine 3 was required in order to accommodate for the separation distance required away from tracks.	
Design Review 2	Initial noise modelling suggested greater separation required from neighbouring dwellings.	In order to achieve the reduction in noise levels and greater separation distance from neighbouring dwellings, the site design was reduced to 9 turbines.	Layout 3
Design Review 3	Detailed assessments found that various localities across the site could be potential habitats for various ecological species. This included the identification of a barn in the centre of the site, providing habitat for roosting bats. It also included hedgerows to the south of the site, which provide potential habitat for breeding birds. A minimum stand-off distance of 50m has been applied to hedgerows and 200m applied to other bat habitats.	Repositioning of turbine 6 and 7 was required to minimise the impact on ecological activity from turbines. This will limit the impact on the disturbance and impact on notable species associated with these features.	Layout 4
Design Review 4	Following the initial landscape and visual assessments and consultation with stakeholders it was identified that the most south western turbine was a visual impact from key viewpoints.	The visual impact was reduced by the removal of the most south western turbine resulting in a revision to the site design. Furthermore, following the public exhibitions on the 19 th and 20 th November 2008, and subsequent consultation with Berwick-upon-Tweed Borough Council, the tip height was reduced from 125m to 115m.	Layout 5
Design Review 5	Following the public exhibitions further consultation identified an Orange Radiocommunications link traversing the site. Modifications suggested by Berwick-upon-Tweed Borough Council were considered but could not be accommodated due to technical constraints.	To meet the radiocommunications link recommended stand-off distance and provide sufficient separation between the turbines, the locations of turbines 1,4,5,7 and 8 were fine tuned. Finishing Point: Eight turbines with a rotor diameter of 93m and a hub height of 68.5m giving a maximum height of 115m.	Final Layout

The proposed layout, including the associated infrastructure is shown on Figure 2.

2.1.1

Wind Turbines

The towers will be tubular steel towers. Research¹ has shown that tubular turbine towers reduce visual clutter and are simpler in appearance. The turbines would be finished in a matt pale grey or white colour so that they appear recessive when viewed against the sky. This finish would incorporate an anti-reflective agent.

A diagram illustrating the structure of a typical wind turbine is shown as Figure 3.

The rotor assembly will rotate at approximately 10 to 20 revolutions per minute, generating power for all wind speeds between about 3 ms⁻¹ and 25 ms⁻¹ (approximately 6-56 mph). At wind speeds greater than 25 ms⁻¹ (56 mph), the turbines will automatically shut down for self-protection.

¹ Stevenson and Griffiths (1994); *The Visual Impact of Windfarms: Lessons from the UK Experience*

The final choice of turbine will be made based on an assessment of the most suitable machine available at the time of procurement. The assessment will be made following a number of design principles, including the following:

- Ability of the turbine to maximise power output based on the wind regime at the site, i.e. how well suited the power curve of the turbine is to the wind frequency distribution recorded on site;
- A turbine design will be chosen which houses the turbine transformers within the base of the tower or within the nacelle of the turbine; and
- Availability of the turbine will also affect the final choice of turbines.

In addition, one of the key considerations will be to ensure the site will be able to fully comply with all of the planning conditions and other site specific environmental constraints and considerations once operational.

2.1.2

Access Tracks

The onsite access track layout has been designed to utilise existing tracks where possible and where new sections of access track are required, these have been designed to minimise potential impacts on ecology and hydrology.

The access tracks will be constructed of locally extracted aggregate and will be 5m in width along the majority of sections but widening to 13m at bends to allow for the safe delivery of turbine components. Once the wind farm has been commissioned the access tracks will be dressed back to 3m width and the margins will be re-vegetated.

2.1.3

Grid Connection and Onsite Substation

Each turbine will be connected to the onsite substation via underground cables that will run alongside the edge of the access tracks.

The location of the proposed substation and control building is shown on Figure 2. The substation and control building will be a single storey building measuring approximately 10m x 15m. The design of the control building will be sympathetic to the local area and will be agreed with the local planning authority prior to construction.

Electricity from the wind farm will be exported underground from the onsite substation. The responsibility for the grid connection, including the location, design and type (underground or overhead) falls to the local Distribution Network Operator (DNO). The wind farm will be connected to the grid via underground cables running along the edge of the existing track to the substation located within the west side of the site and connected to a local grid connection point.

The use of underground cabling will help minimise the overall visual effects of the wind farm scheme.

2.1.4

Anemometry Mast

A permanent anemometry mast may be required throughout the operational life of the wind farm in order to measure meteorological conditions. The anemometer mast will be 70m high and be constructed from lattice steel. It is important the mast is located 'upwind' of the turbines to minimise affects of turbulence from the turbines hence its proposed location in the south west part of the site.

2.2

The Role of the Environmental Impact Assessment in Wind Farm Design

2.2.1

The proposed wind farm represents a 'Schedule 2' development and therefore an Environmental Impact Assessment (EIA) has been undertaken as defined under Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999.

2.2.2

A number of individual technical assessments have been undertaken:

- Landscape and Visual,
- Noise,
- Ecology,
- Ornithology,
- Ground Conditions,
- Water Resources,

- Archaeology and Cultural Heritage,
- Traffic, Transport and Access.
- Existing Infrastructure, Telecommunications, Television broadcasting, Aviation and Military Interests,
- Shadow Flicker, and
- Socio-Economics.

The landscape and visual impact assessment (LVIA) of wind energy proposals assesses important issues for consideration when planning new developments. This proposal has been subject to a detailed LVIA and the following design principles have been considered:

- Develop the most suitable repower design, designed to respond to the local landscape character and provide acceptable design solution in terms of scale, layout and visual composition;
- Achieve a simplistic, balanced, and logical image that will attempt to achieve positive visual composition; and
- Minimise adverse landscape and visual effects on views from the local communities and transport routes.

The siting and layout of the proposed turbines was considered as part of an iterative design process aimed at minimising potential landscape and visual effects associated with the proposed development. This involved the examination of the existing character of the landscape in the application site and its surroundings to establish a baseline against which to judge the design of the development as well as a number of other environmental and practical constraints.

The overall conclusion of the LVIA is that the proposed wind farm would not be incompatible with the local landscape character and the proposal would not result in the screening of the existing broad, long distance views.

Noise assessments that were carried out in accordance with ETSU-R-97 The Rating and Assessment of Noise from Wind Farms indicate that for a majority of dwellings neighbouring the proposed development, wind turbine noise will meet the Noise Criteria. Minor exceedences are predicted at three of the dwellings under very specific wind speeds and directions. Noise emissions from modern turbines can be controlled to an extent during specific wind conditions and it is considered appropriate a suitable planning condition be imposed to ensure the wind farm is operated within the agreed noise limits at all times.

Careful site design has resulted in minimal effects on features of ecology interest. Any identified impacts on habitats and vegetation will be minimised through the use of mitigation measures. The proposed wind farm will result in a permanent loss of a relatively small area of arable land, hedgerow habitat and plantation woodland. A hedgerow planting scheme is proposed to compensate for any loss. E.ON instructed the production of a Habitat Enhancement Report by Baker Shepherd Gillespie and the British Trust for Conservation Volunteers. The habitat Enhancement plan seeks to protect the existing ecological interest of the site, where feasible. Furthermore, the proposed measures will be designed to increase the ecological value of the site without increasing the risk of an impact occurring during operation.

The proposed hedgerow reinstatement, enhancement and management provide an opportunity to create and reinforce linear habitat features within the site. Additional wetland areas, bat boxes, bird boxes and crop management are also part of the enhancement package for the proposed site. The implementation of the plan will result in the local countryside and landscaping around the proposed development repaired, restored and improved.

The proposed development will result in adverse impacts on ornithology, however these impacts are only considered to be significant at the site level. The use of mitigation measures, such as habitat creation and management, provision of nest boxes and barn owl boxes has reduced the impact on some species. In the case of the barn owl the impacts are predicted to be positive with the application of mitigation and compensation measures.

Consultations with the Environment Agency, Coal Authority and The Environmental Health and Enforcement Unit at Berwick-upon-Tweed Borough Council have been undertaken in relation to the ground conditions and water resources assessments. Construction, maintenance and decommissioning activities will be carried out in accordance with industry best practice and site-

specific operational procedures that will incorporate relevant guidance, best practice and pollution prevention and clear-up measures.

The associated infrastructure with the proposed development has been identified to have visual impact on a number of cultural heritage features including Scheduled Monuments and listed buildings. This assessment was based upon features within 5km of the proposed West Ancroft Wind Farm. The design of the site has accounted for identified archaeology features within the site boundary. In advance of construction, onsite investigations will be carried out to ensure that any unrecorded archaeological remains are recorded. The overall significance of impact of the development upon archaeology and cultural heritage has been considered as being moderate to adverse.

Some negative effects are anticipated as a result of construction traffic along the access route. Consideration has been given to the effect the increase traffic flow would have on Severance, Driver Delay, Pedestrian Delay, Pedestrian Amenity, Fear and Intimidation, and Accidents and Safety, and all impacts upon these issues are considered Not Significant with the exception of a potentially significant impact on pedestrian fear and intimidation of the eight days on which concrete is delivered to site.

A traffic management plan will be developed and agreed with the relevant stakeholders in order to control and mitigate impacts associated with vehicles movements.

The turbine layout has evolved to take account of the radiocommunication and other infrastructure across the site and avoid negative impacts.

A shadow flicker assessment concluded that shadow flicker may be experienced at a small number of properties surrounding the site. Whilst no adverse health effects will occur, there is potential for shadow flicker to cause a nuisance. The wind farm will be fitted with a shadow flicker control system in order to mitigate any nuisance caused.

The construction phase of the development has the potential to create jobs and a skills base in the region. There will be minimal impact on the regional tourism and on-site Public Rights of Way (PRoW) during the operational phase of the wind farm.

3 Involvement and Consultation

Consultation has been undertaken with organisations and individuals with an interest in the features or elements potentially affected by the wind farm and with members of the public resident in the area through a series of public exhibitions and events. Consultation commenced in the early stages of the project and continued throughout the EIA process to establish survey requirements, agree assessment methodologies, to request data and to discuss concerns and opinions.

3.1.1 Table 2 outlines the formal consultations that have been undertaken during the EIA process.

Table 2: Summary of Consultations

Organisation	Discipline	Date
English Nature	Ecology	December 2005
Civil Aviation Authority (CAA)	Aviation Interests	January and March 2007
Natural England	Ecology and Ornithology	January 2008
Northumberland County Council	Scoping Opinion	January 2008
English Heritage	Archaeology and Cultural Heritage	January 2008
Defence Estates (MoD)	Aviation Interests	January 2008
Berwick-upon-Tweed Borough Council	Scoping Opinion and ongoing discussions throughout the EIA process	August 2007 to Present
Northumberland Wildlife Trust Badger Group	Ecology	January and November 2008
Northumberland County Council	Archaeology and Cultural Heritage	March 2008
Environment Agency	Water Resources	August 2008
The Environmental health and Enforcement Unit - Berwick-upon-Tweed Borough Council	Water Resources	June 2008
Northumberland Bat Group	Ecology and Ornithology	29 October 2008
Exploring Your Environment	Ecology and Ornithology	3 November 2008
Northumberland and Tyneside Bird Group	Ornithology	8 November 2008
Coal Authority	Water Resources	12 November 2008
Northumberland National Park	Archaeology and Cultural Heritage	No response
National Trust	Archaeology and Cultural Heritage	5 November 2008
Northumberland Heritage Coast	Archaeology and Cultural Heritage	No response
Northumberland Estates	Archaeology and Cultural Heritage	10 November 2008
National Air Traffic Services	Radiocommunications	No response
OFCOM	Radiocommunications	12 June 2008
Orange	Radiocommunications	25 June 2008
CSS Spectrum Management Services Ltd.	Radiocommunications	20 June 2008
Joint Radio Company	Radiocommunications	13 June 2008

Details and findings of the consultations have been incorporated into each of the technical assessments in the Environmental Statement. For example, the outcome of discussion held with local wildlife groups were included in the ecology assessment, and details of the outcomes

of the consultations held with radiocommunication operators have been integrated into radiocommunications chapter

Two public exhibitions were undertaken to present the proposed West Ancroft Wind Farm on the 19th and 20th of November 2008. The exhibitions were well attended with more than 150 visitors. Furthermore the area surrounding the site was identified as being sparsely populated and therefore the Project Developer and Community Liaison Officer (CLO) took extra steps to reach out to local stakeholders. The CLO was instructed to explore the area of the wind farm area to consult with local residents. In addition the Project Developer undertook home visits to a number of residents in the immediate around the wind farm site to discuss concerns.

All comments received during the public exhibitions, or in writing thereafter, helped inform the final layout of the proposed wind farm as detailed in Section 2.1, Table 1. Key issues raised during the exhibition included the landscape and visual impacts and noise impacts. Since the exhibition, further design reviews were held, as detailed in Table 1.

4 Access

There will be a need to temporarily divert the public right of way that bisects the site in an east west direction during the construction phase of the development to comply with health and safety requirements. The public right of way will be reinstated following the commissioning of the wind farm.

The proposed access route for delivery vehicles from the A1 is via the B6354 that runs across the western part of the site. A new access point will be created from the B6354 into the site.

The main transport effects will be associated with the movements of commercial Heavy Goods Vehicles (HGVs) and abnormal loads to and from the site during the construction phase of the development. Once the wind farm is operational, it is envisaged that the amount of traffic associated with the scheme would be minimal, comprising service and maintenance visits. Occasional visits may also be made to the site for more extensive maintenance /repairs or for management /compliance purposes.

A traffic management plan (TMP) will be prepared by the developer in accordance with the requirements of the Highways Agency, the relevant local highways officers, the local Constabularies, the Department for Transport, and other relevant stakeholders if required. The TMP will contain details of access route, identify any points along the access route that require engineering works (e.g. the removal of street furniture), likely traffic numbers, delivery timings, and signage and escort requirements. The TMP may also detail additional measures to ensure impacts from traffic movements are minimised where possible, for example provision of road sweepers and /or wheel wash facilities.

The onsite access track layout has been designed to utilise existing tracks where possible and where new sections of access track are required, these have been designed to minimise environmental impact. The following design criteria and mitigation measures were applied to the access track layout to mitigate potential impacts:

- 5m width to accommodate crane and delivery vehicle requirement;
- 13m width at bends to facilitate turning requirements of the delivery vehicles for the larger components;
- regular passing places and turning areas;
- tracks to be non-metalled and constructed from locally sourced aggregate;
- tracks to be flush with the ground level;
- tracks to be located more than 30m from watercourses where possible;
- watercourse crossings to be kept to a minimum;
- track margins to be vegetated to reduce potential sediment-laden run-off; and
- tracks to be convex in cross section to encourage water to flow to the track margins and avoid 'pooling' water.

The exact design requirements for the access tracks will be established following the results of the geotechnical site investigation.

Once the wind farm has been commissioned the access to the site will be reduced from 5m to 3m wide with the edges dressed back and the margins will be re-vegetated.

5 Climate Change Targets

The proposed development of West Ancroft Wind Farm will contribute to the national target of 20% of electricity generated from renewable sources. Table 3 demonstrates that the Northumberland Region has a target of renewable energy of 221MW by 2010. If approved, the proposed West Ancroft Wind Farm could account for up to 20MW, a significant contribution to the Northumberland target.

Table 3 North East Region Renewable Energy Targets and Capacities

Region	RSS by (MW)	Target 2010	Installed Capacity (MW)	Consented Capacity Awaiting Construction (MW)	Capacity in Planning Awaiting Determination (MW)
Northumberland	212		9.9	34	264
Tyne and Wear	22		13.7	14.5	5
County Durham	82		22.9	132.7	36
Tees Valley	138		58.3	100	0
Total	454		104.8	281.2	305

Sources: BWEA: Yes2wind, BERR REStats, North East Regional Spatial Strategy

The amount of energy generated by the proposed West Ancroft Wind Farm has been calculated using an estimated capacity factor of 28%. This equates to an annual output for a development of between 39,244,800 KWh and 49,056,000 KWh per year or 39.2 TWh and 49.1 TWh per year for a 16MW and 20MW scheme respectively. The average annual household electricity consumption is 4700 KWh (BERR, 2008).

Therefore the West Ancroft Wind Farm could generate sufficient electricity for the domestic needs of up to 10,500 households.

6 Conclusion

The proposed development comprises the construction and operation of eight wind turbines, together with the construction of access tracks, crane hardstandings, a temporary construction compound, and underground network linking the turbines to a substation and an anemometry mast.

The proposed wind farm presents a 'Schedule 2' development and therefore an EIA has been undertaken as defined under Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999.

Possible significant environmental effects of the proposed wind farm have been collected, evaluated, and taken into account in the design of the scheme. A number of design iterations have taken place in response to environmental factors identified during the EIA process. Furthermore consultation has been undertaken with organisations with an interest in the features or elements potentially affected by the wind farm and with members of the public resident in the area through a series of public exhibitions and events.

Access for the delivery of vehicles to the proposed site will be from the A1 via the B6354. A Traffic Management Plan will be prepared if required, containing details of the access route. The onsite access track layout has been designed to utilise existing tracks where possible, and where new access tracks have been required, these have been designed to minimise environmental impact.

One public right of way will need to be temporarily diverted during the construction phase of the development to comply with health and safety requirements. This diversion will be the route of the public right of way will revert to its original route following the commissioning of the wind farm.

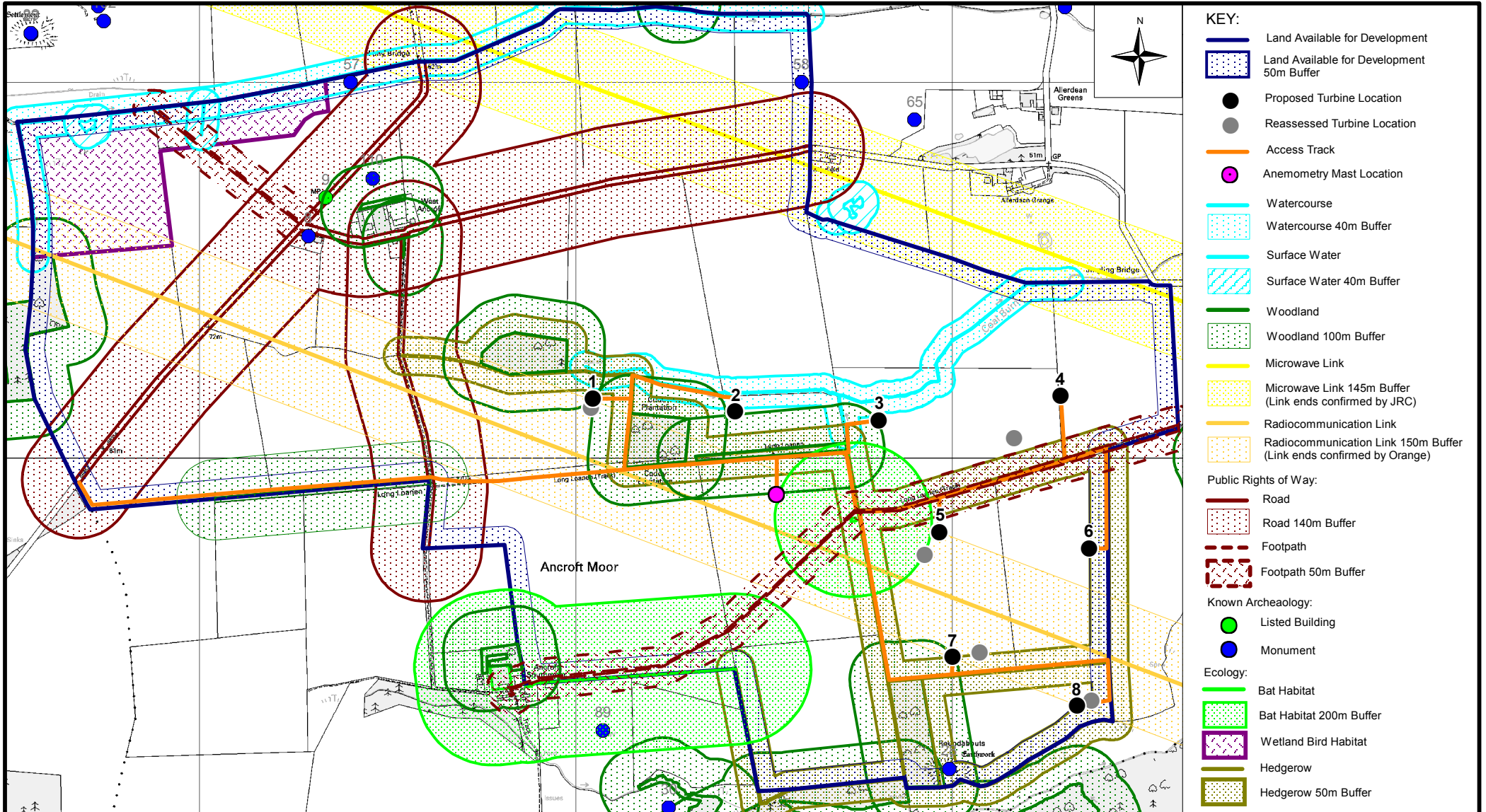


FIGURE 1
CONSTRAINTS PLAN

FABER MAUNSELL | AECOM

WEST ANCROFT WIND FARM

Design: APR

Drawn: APR

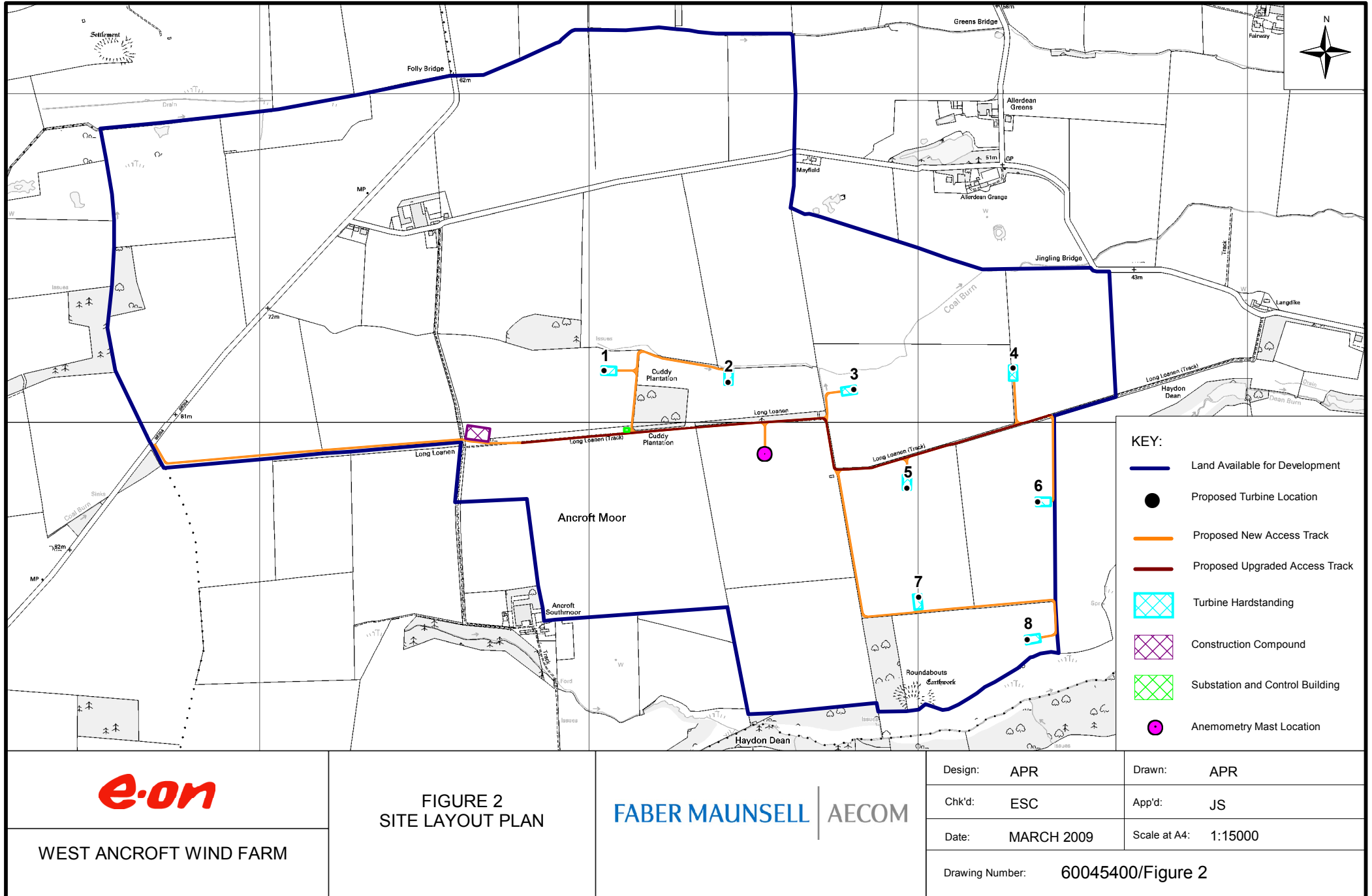
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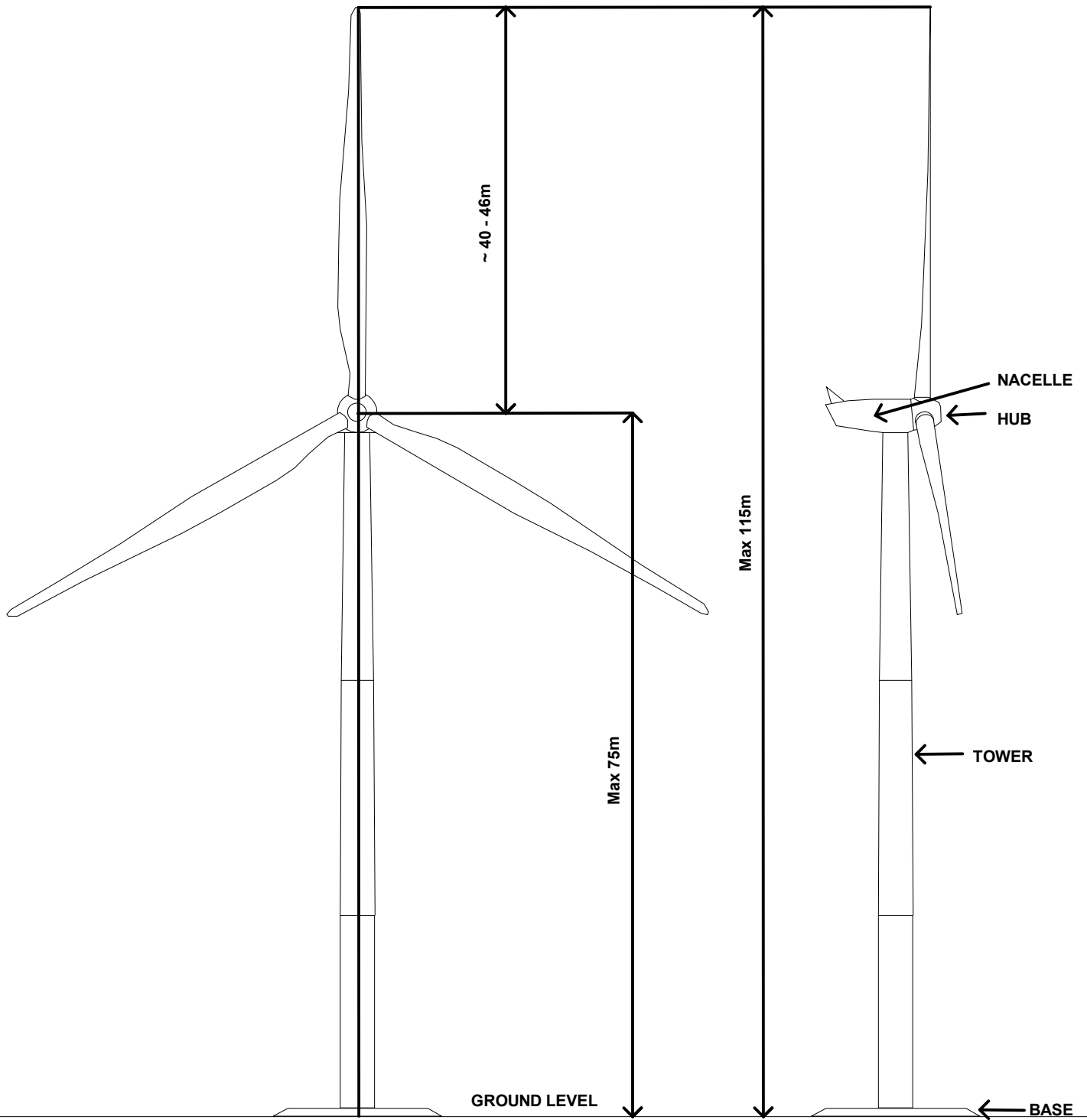
App'd: JS

Date: MARCH 2009

Scale at A4: 1:15000

Drawing Number: 60045400/Figure 1





WEST ANCROFT WIND FARM

FIGURE 3
TYPICAL WIND
TURBINE

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Design: APR

Drawn: APR

Chk'd: ESC

App'd: JS

Date: MARCH 2009

Scale at A4: NTS

Drawing Number: 60045400/Figure 3