# CHAPTER 1 INTRODUCTION

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Preface

Context

This Design and Access Statement has been prepared by Energiekontor UK Ltd (“EK”) to accompany a planning application and Environmental Statement (ES) for the construction, 25 year operation and subsequent decommissioning of a wind farm extension consisting of four wind turbines, each up to 122m in height to blade tip, including associated development (the “Proposed Development”) at land within the boundary of the existing Hyndburn wind farm (the “Application Site”).

This Design and Access Statement explains the design principles and concepts that have informed the Proposed Development (as described in Chapter 5 of the ES) and how transport and access issues have been considered.

The Applicant

EK was founded in 1999 as a subsidiary to the German based company Energiekontor AG.

Since 1990, Energiekontor AG has developed 90 wind farms in Germany, Portugal and the UK with a total capacity of over 693MW and an investment of around 1,096 million euros.

The Applicant has developed 5 wind farms in the UK and is currently in the process of financing and constructing a further two wind farms.

Methodology

The design process involved in formulating the design of the Proposed Development has been led by a combination of environmental design and engineering requirements. The aim has been to arrive at an appropriate layout in terms of maximising the energy yield whilst seeking to avoid or reduce environmental effects.

The Environmental Impact Assessment process also exploits opportunities for positive design, rather than merely seeking to avoid adverse environmental effects. The Design and Access Statement has an important role in contributing to the design process through the clear documentation of design evolution.

Wind farms are a sustainable form of development and the potential environmental effects are usually associated with the construction period and the temporary effects during the operational period of wind turbines on landscape and visual amenity. The Proposed Development has therefore been developed with environmental considerations at the forefront of both site selection and site design.

The Application

The Hyndburn Wind Farm Extension planning application is submitted in full and in addition to this Design and Access Statement is accompanied by the following documents, which should be read together:

- ES Volume 1 – NTS
- ES Volume 2 – ES EIA Assessments
- ES Volume 3 – Technical Appendices
- ES Volume 4 – Figures and Visualisations
- Planning Statement;
- Section 106 Draft Heads of Terms; and
- Statement of Community Involvement.
1 INTRODUCTION

1.1 This Design and Access Statement has been prepared to support proposals by the Applicant for the construction of a wind farm comprising four wind turbines on land within the envelope of the existing wind farm at Hyndburn.

1.2 The application is accompanied by a full suite of supporting reports including an ES prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2011. This Design and Access Statement accompanies the application and should be read in conjunction with the ES and the Planning Statement.

1.3 Article 2 of the Town and Country Planning (Development Management Procedure (England) Order 2010) seeks to provide a requirement for a Design and Access Statement with all planning applications, the content of which is dependent upon the extent of development, with certain proposals being omitted from the requirement. It has also taken account of the CABE publication 'Design and Access Statements – How to Write, Read and Use Them'.

1.4 In accordance with the guidelines published by CABE, the proposed wind farm has been based on the following:

- Design Component including Assessment; Involvement; Evaluation and Design; and
- Access Component

1.5 The Company has therefore prepared this Design and Access Statement to explain how this development proposal has evolved and an analysis of the proposed site and its context and consideration of design and access principles relevant to a proposal of this nature.

1.6 The Design and Access Statement should explain the design principles and concepts that have been applied to the development, relating to the:

- Amount – on site constructed quantities;
- Layout – the buildings and the spaces in between and the relationship of these to the surrounding environment;
- Scale – height, width and length of each proposed building and space between;
- Landscaping;
- Appearance of the development – what the finished development will look like;
- How issues relating to access to the development have been dealt with – i.e. the policy adopted relating to access and how relevant development plan policies have been taken into account;
- How the design of the development takes into account its context;
- Whether any consultation has been undertaken;
- How any issues which might affect access have been addressed;
- How prospective users will be able to gain access to the development from the existing transport network;
- Reasons for choosing the main points of access to the site and the layout of internal routes; and
• How features which ensure access will be maintained.

1.7 In light of the above, this Design and Access Statement therefore describes the principles that have shaped and influenced the design of the Proposed Development.

1.8 In doing so it draws upon the technical assessments that have been undertaken as part of the ES. All of these studies have, to a certain extent, influenced the evolution of the eventual project design and access arrangements, as have the input of various consultees and stakeholders. Chapter 4 of the ES, in particular considers the design iteration process that was undertaken to improve the project’s environmental performance. At each stage of the design process, potential environmental impacts were assessed and elements of the proposals were amended to eliminate, reduce or offset potential adverse effects.

1.9 The site layout plan (Figure 1.1) shows the boundary of the overall Site edged in blue and the location of the turbines. This takes into account all the technical and environmental constraints associated with the project. These are detailed within the ES and this Statement.

Figure 1.1 Site and Wind Turbine Layout
2 SITE AND SURROUNDINGS

Site Location
2.1 The Site covers 8.9ha and is located on land within the existing envelope of Hyndburn Wind Farm.

2.2 In addition to the existing 12 turbine wind farm and associated infrastructure, land within the application site, the wider Oswaldtwistle Moor and the in-by land to the north is currently in agricultural use. It is tenanted by three farmers and is used for the grazing of sheep and cattle. Grazing restrictions are still in place on the moor as part of the moorland restoration programme implemented as part of the existing wind farm development.

Site Context
2.3 The application site is located approximately 2.1km east of the village of Belthorn, 2.2km south of Oswaldtwistle and 11km south east of Blackburn. It is accessed from Haslingden Road, which links to the M65 Motorway, 4km to the west.

2.4 The application site comprises land in the immediate proximity of the existing Hyndburn wind farm. The Application Site is located within the Southern Pennines (36) National Character Area (NCA) which is described as a large scale, open, sweeping landscape with high flat topped hills providing extensive views, cut into by narrow valleys with wooded sides and containing numerous reservoirs. Prominent features including Stoodley Pike, Darwen Jubilee Tower, Rivington Pike, wind farms and communications masts are noted for being widely visible.

2.5 The Lancashire Valleys (35) NCA is located 0.5km north of the Application Site which is a landscape with intensely urban character derived from main towns of Blackburn, Accrington and Burnley along with the M65 motorway, Preston-Colne rail link and the Leeds and Liverpool Canal.

Figure 1.2 Site Location Hyndburn Wind Farm Extension
3 THE PROPOSED USE OF THE SITE

3.1 The Proposed Development comprises four wind turbines with a maximum tip height of 122m to ensure that they would be the same height as those at the existing Hyndburn wind farm. The Proposed Development includes the following infrastructure:
- four turbines up to 122m in height (to tip blade);
- turbine foundations;
- hard-standing areas for erecting cranes at each location;
- new access tracks;
- four external turbine transformers.

3.2 In addition to the above infrastructure components, construction will involve the creation of a temporary construction compound in the same location as before.

3.3 All electricity cabling connecting the wind turbines within the site would be located underground.

3.4 The proposed development, including the main elements as noted above are presented within this document or shown within the application drawings presented in Volume 4 of the ES.

3.5 Once the Proposed Development is constructed, the land between the turbines will continue to be used for agricultural purposes. A wind farm rarely occupies over 1% land coverage of a total farm landholding.

3.6 The development would be time limited to 25 years from the first date of electricity export and would include a construction phase (approximately 6 to 8 months), an operational phase (25 years) and a decommissioning phase (approximately 6 months).

3.7 The planning application includes, within the red line boundary, an allowance for potential micro-siting of the wind farm infrastructure. If planning permission is granted, the Applicant will commission detailed ground investigations and further archaeological studies to determine the most appropriate siting. Consequently the planning application boundary allows for potential micro-siting of the wind turbines and tracks associated hardstandings and provision for other site infrastructure.

3.8 The construction and decommissioning of the wind turbines, ancillary equipment and on-site infrastructure are described in detail in Chapter 5 of the ES.

Wind Farm Operation

Operational Timescale

3.9 Following construction and commissioning, the wind farm would be operational and generating electricity for a period of up to 25 years, after which time it would be decommissioned.

Maintenance

3.10 Wind farm maintenance would be carried out by the turbine supplier and later by suitably qualified contractors who would visit the site to carry out regular inspection and maintenance activities. The following wind turbine maintenance would be carried out, along with any other maintenance required by the supplier’s specifications:
- initial trial run and service;
- routine and non-routine maintenance and servicing; and
- blade inspection.

3.11 Routine maintenance and servicing would necessitate monthly visits to the site by a maintenance crew (if necessary), typically two persons in a small van or other similar sized vehicle. Maintenance staff would be able to park on the crane pad for each turbine.

3.12 Routine servicing would include the performance of tasks such as maintaining bolts to the required torque, adjustment of blades and inspection of welds in the tower. In addition, oil sampling and testing from the main gearbox would be required and oil and components replaced at regular intervals.

3.13 In the event of any unexpected breakdowns on-site, such as the failure of a generator or gearbox, appropriate maintenance works would be carried out immediately. The replacement of major components would require a crane and heavy transport vehicles.

3.14 On-going track maintenance should it be required would generally be undertaken in the summer months when tracks are dry. Safe access for maintenance purposes would be maintained all year round.
4 AMOUNT, LAYOUT AND SCALE

Constraints Mapping

4.1 The starting point for the Design of the site is the preparation of a detailed constraints map which sets out all relevant buffer distances, key features and other factors that constrain the location of wind turbines.

4.2 The process of EIA plays an important role in this process as it enables all the technical constraints to be identified which could restrict the location of wind turbines. The evolution of design has as such, been informed by matters including stand-off distances to the existing Hyndburn wind farm, residential properties, public roads, public rights of way and landscape considerations.

Technical Constraints

4.3 The following technical parameters were taken into account in the design process:

- a separation distance between the turbines of 3.0 – 3.5 rotor diameters (across the prevailing wind direction) and 4.5 – 5.5 rotor diameters (in prevailing wind direction) to minimise turbulent interaction between wind turbines (wake effect);
- over-sailing distance from the site boundary (45m buffer inside the site boundary based on the potential rotors (blades) under consideration);
- distance to residential properties; and
- over-sailing distance from the footpath which runs along the western boundary of the site.

Landscape and Visual

4.4 Although the design of the wind farm was largely fixed due to its proximity to the operational wind farm and on-site constraints, the principal design objectives of the Proposed Development were as far as possible to:

- design the wind farm and associated infrastructure to respond to the local landscape character, having particular regard to the content of the published landscape character assessments for the area, and provide an acceptable design solution in terms of scale, layout and visual composition;
- achieve a simple, balanced, rational and coherent image when viewed in the local and wider landscape;
- minimise landscape and visual effects on views from local residential properties and communities;
- minimise landscape and visual effects from recreational routes; and
- minimise landscape and visual effects from main transport routes.

Figure 1.3 Site Location Hyndburn Wind Farm
Land Use

4.5 Consideration has been given to minimising the loss of grazing land and the effects on farming practises during construction and operational phases of the development.

Noise

4.6 The Site has been developed to ensure that a minimum standoff distances can be achieved. The ES confirms that the development is within the acceptable noise criteria set out in the Guidance document ETSU R-97.

Ecology and Ornithology

4.7 Baseline information has been gathered through a combination of: consultation with key ecological organisations such as Natural England, the Environment Agency (EA), the Royal Society for the Protection of Birds (RSPB), and The Lancashire Environment Record Centre (LERC); desk studies, the reuse (where appropriate) of data gathered in connection with the existing wind farm (both pre and post construction) and new field based survey work.

4.8 The proposed development will not have any adverse effects on key receptors that are significant in EIA terms and will, through moorland restoration proposals, have a significant beneficial effect on both moorland habitats and the breeding bird assemblage.

Archaeology and Cultural Heritage

4.9 No certain sites or finds of prehistoric, Roman or medieval date are recorded on Oswaldtwistle or Haslingden Moors within the vicinity of the proposed development, although the site of a probable Bronze Age stone circle is located on Thirteen Stone Hill to the east.

4.10 During the course of the last century Oswaldtwistle Moor was effectively abandoned and past settlement and exploitation is now only evident as ruined farmsteads, dry reservoirs, semi-ruinous field walls and overgrown quarries and trackways.

4.11 There are no Scheduled Monuments within 3km of the proposed development.

4.12 Subject to the implementation of the mitigation measures proposed it is considered that the effects of proposed development upon heritage assets would not be significant in terms of the Environmental Impact Assessment Regulations, would constitute less than substantial harm in relation to the National Planning Guidance and would comply with relevant statute and local plan policies.

Design Iteration

4.13 The design has been undertaken over a prolonged period and has been progressively revised and refined during this time to take account of the information arising from pre-application consultation and the findings of various EIA assessments.

4.14 Details of some of the key iterations of this design process are outlined below.

Amount

4.15 A number of design objectives particular to this development have been established, drawing on the design advice and consultation process. Through this method the Proposed Development has evolved to meet these guidelines ensuring that significant landscape mitigation is already ‘embedded’ within the Proposed Development, prior to the assessment of residual effects.

4.16 Generally speaking, proportionate wind farm extensions tend to have less of a landscape and visual effect than entirely new wind farm development, particularly in an area where there has been no precedent or history of this, as the impact of wind farms on the landscape has already been established. The amount of development in this instance has been taken to be predominantly comprised of the number of wind turbines proposed on the site.

4.17 The existing infrastructure will be retained and even the existing substation will be used to connect the proposed extension to the local distribution network.

4.18 Figure 1.4 shows a typical modern wind turbine, comprising a three bladed rotor hub mounted on a nacelle (containing gearbox and generator), tower and foundation.

4.19 There are many factors which normally determine the amount of development (i.e. turbine numbers and height) proposed for a wind farm. In this case, these factors are primarily the need to achieve maximum distances from nearby residential properties, the nature of the local landscape and need for an appropriate composition together with the minimum internal separation distances required for the effective operation of the wind turbines.
4.20 All on site tracks will be of compacted aggregate at a depth of approximately 370mm, a typical surface width of 4.5m with localised widening on curves and at junctions. A combination of cut and floated tracks will be used and the extent to which has been established following further on site peat depth assessments. The extent of the floated track are shown in yellow in an extract of a drawing from Volume 4 of the ES is showing this extent is presented below.

Figure 1.4 Existing wind turbine at Hyndburn

4.21 The final position of wind turbines, the layout of access tracks and the siting of the substation result from the influence and interplay of a number of factors, both on and off site. The temporary site compound and temporary storage area will occupy a total surface area of approximately 1500 square metres during the period of construction and will be located in the area that was previously used for the existing wind farm.
The topography of the site and the nature of the local landscape were a key consideration in the design of the project. Consultation responses received from the local community and other stakeholders affirmed the importance of ensuring the careful consideration of landscape effects in the design of the proposal.

4.22 Wireframe and photomontage analysis by Landscape Architects commissioned by the Applicant has been utilised to design a layout which relates well to the scale and landform of the site and its surroundings in order to minimise landscape and visual effects. The design provides a balanced and well composed layout, which as far as possible avoids visual ‘stacking’ of turbines behind one another from key viewpoints.

4.23 The effect referred to as ‘shadow flicker’ was similarly considered in the design process. Under certain combinations of geographical position and time of day, the sun may pass behind the rotors of a wind turbine and cast a shadow over nearby properties. As the blades rotate the shadow can appear to ‘flick on and off’ through windows. The effect on the occupiers of receptor properties can be distracting. Shadow flicker can be avoided and minimised by the careful siting of wind turbines. However, any residual effects can be mitigated using turbine control systems which are able to temporarily shut down turbines if light conditions at a particular time of the day would result in shadow flicker being experienced by a particular receptor. The ES details the shadow flicker assessment and reports on the findings.

4.24 Local hydrology has been examined and taken into account in the layout in order to minimise infringement on the adjacent catchment. A number of mitigation measures are proposed and outlined in Chapter 11 of the ES.

4.25 The local ecology of the site has influenced the design of the access tracks and the location of all elements of the built development components of the proposal. Ecological enhancement and landscaping measures are proposed with the objective of improving local biodiversity.

Scale

4.26 Considerations of scale relate to the physical size of the Proposed Development. In deciding upon the size of turbines to install there is a balance to be struck between the aims of maximising power generation and ensuring that the environmental effects of the proposals are acceptable, bearing in mind landscape and visual effects (and potential concomitant noise emissions/shadow flicker effects).

4.27 Turbine size is a function of the height of the tower i.e. hub height and the radius of the rotor. The rated power increases exponentially as the rotor radius increases. Similarly, an increase in wind speed results in an exponential increase in power. For any given location wind speed rises with elevation above ground because of the effects of wind shear. Raising the hub height of machines can increase energy capture at any given site. In addition, nearby obstacles will increase the turbulence in the wind. High turbulence can affect turbine performance and turbine life expectancy. Technical development has enabled the use of taller towers to position rotors in less disturbed air and maximise electricity generation.

4.28 Hence, from a power generation perspective there is a strong economic argument to install the wind turbines with the largest rotors at the highest possible hub height. However, the developer has balanced this economic factor against the need to ensure that the environmental effects of the Proposed Development are acceptable. Indeed, the main concern with wind farm developments is often considered to be the visual and landscape effects of the turbines which tends to increase with turbine size. In this instance, the biggest influence on the design of the project was the need to maintain a suitable separation distance to the existing wind farm in both design and turbine performance.

4.29 The scale of the wind turbines for the Proposed Development has been considered through the production and analysis of a comprehensive series of photomontages and wireframes for several different options. Initial desktop layouts had sought to erect more turbines than the current layout, however, consideration of residential property distances, visual and landscape effects has led to the Applicant to reduce the proposed number of turbines in the final design to four turbines, with a maximum tip height of 122m.

4.30 The design process required several months of study and deliberation with refinements of the design being implemented at a number of stages. This design process has involved input from all professional consultants that have participated in the Environmental Impact Assessment. The ES documents the various turbine size and layout iterations, from the original concept to the final proposal, indicating the
changes to the design that have been undertaken and giving the reasons for those changes.
5 LANDSCAPING

5.1 The Proposed Development would result in the loss of a small amount of grazing land. There will be limited vegetation removal in order to create both the tracks within the site and to locate the wind turbines.

5.2 Within the locality, where hedgerows form field boundaries, these restrict some views towards the Site. Woodland blocks and roadside vegetation also restrict some views, particularly from the south near Haslingden Grane. Electricity pylons and masts create visual intrusions in the vicinity of the Site.

5.3 Shelter belt planting using native woodland species was implemented in 2013 to potentially screen views of the existing Hyndburn turbines from the southern elevation and garden of Brewer Lot Farm. This planting would also potentially screen views of the Proposed Development.
6 APPEARANCE AND DESIGN

The Wind Turbines

6.1 Turbines with tubular tower designs would instead be utilised. The appearance of the wind turbines would be optimised by ensuring:

- all turbines would be to the same specification from the same manufacturer;
- the turbines would be painted an off white/grey with no graphics on the blades or tower (the final specification of which would be determined in consultation with the LPA); and
- all the turbine rotors would rotate in the same direction.

6.2 Wind power-related research by Government has shown that the best colour for turbines when seen against Northern European skies is light grey or off-white and that non-reflective finishes are the best treatment for the surface of materials. This would help to reduce visual impact.

6.3 The turbine towers would be of tapering tubular steel construction. The blades would be likely to be made from a fibre reinforced epoxy material. Each turbine requires a transformer. Depending on the final model of turbine chosen, transformers may be housed internally within the turbine towers, or they may be housed externally in discrete cabinets next to the turbine bases. If they are to be housed externally they are small in size and standard in appearance as shown in the figures below:

On-Site Infrastructure

6.4 In arriving at aesthetic choices, the Applicant has been mindful of the characteristics of the local landscape, the findings of the visual and landscape assessments in the ES and industry research of visual aesthetics.

6.5 A further design objective that has guided the appearance of the layout and landscaping of the proposals is that the wind turbines should form a balanced composition when observed from key viewpoints in the local landscape.

6.6 The construction of the site access tracks will be kept to a simple method i.e. crushed stone aggregates to a nominal depth of 370mm, swales would be installed adjacent to the tracks which will be sown with seed to promote grass growth. Grasses will be allowed to establish themselves naturally over the track surfaces which will assist in reducing any visual effects of the tracks.

6.7 The cables between the wind turbines and the substation will be buried below the access tracks and there would be no visual impacts associated with cables. Following construction, the temporary site compound and storage area would be removed.

6.8 The wind farm would be established for 25 years which allows time for construction, operation and decommissioning of the project.
7 ACCESS

7.1 It was determined that road transport is the most feasible and routes for abnormal and normal vehicles have been identified, with the preferred route for both being from the M65 Junction 5 along the B6231 and B6236 to the site as agreed under the planning consent for the operational wind farm.

7.2 The principal effects would be felt during the first six months of the construction. The first three months would be the most onerous with a peak of 17 HGV movements per day during month two, i.e. approximately two additional HGV movements per hour during the peak month of construction.

7.3 Any deliveries to the site would be strictly managed, both in terms of route choice and the timing of deliveries. Deliveries would be scheduled, as far as possible, to occur outside peak periods, and penalties would be enforced if routing arrangements were not obeyed.

7.4 Police, the HA and LHA involvement is proposed throughout the planning process to ensure local conditions, seasonal events and any proposed or ongoing road works are taken into account in the proposals. This would ensure that delays are kept to a minimum and that highway safety is maintained.

7.5 Local conditions have been assessed and the percentage increase in traffic generation identified for each of the potential routes to the site. The highest percentage increase was identified along the B6236 where percentage HGVs calculated as 47.2%, but with a less than 1% increase in total traffic. This is considered to be an over-estimation of the likely increase as not all vehicles would be articulated HGVs. Further to this, the change in vehicle volumes at this location may be moderate for a very short time frame.

7.6 For the majority of routes assessed, the percentage increases in traffic (both total volumes and heavy vehicles) is negligible. This is due to the temporary time scales of change, and the low number of, or sensitivity of receptors.

7.7 A package of mitigation measures is proposed to minimise any adverse impacts which have resulted in overall effects which are considered to be negligible. These effects are short term (approximately six months duration) and are not considered significant in terms of the EA Regulations. Chapter 10 of the ES discusses the highway and transportation arrangements in full.

Figure 1.9 Access arrangements during construction