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1 Introduction



Context

- 1.1 This Design and Access Statement has been prepared by Energiekontor UK Ltd ("the Applicant") to accompany an application under Section 36 of the Electricity Act 1989 for the construction, 35 year operation and subsequent decommissioning of a wind farm consisting of 13 wind turbines and associated infrastructure ("the Proposed Development") at Glenvernoch, Dumfries and Galloway ("the Site").
- 1.2 This Design and Access Statement explains the design rationale behind the layout, providing an explanation of the design principles and concepts that have informed the Proposed Development (as described in Chapter 3 of the Environmental Impact Assessment Report) and how transport and access issues have been taken into consideration.

The Applicant

- 1.3 Energiekontor UK Ltd is a renewable energy development company with offices in Leeds, Glasgow and Edinburgh. The company was formed in 1999 and develops wind farms throughout the United Kingdom. The company operates 11

wind farms in the UK, including three subsidy-free wind farms in Scotland, with many more in the development process.

- 1.4 EK is part of the Energiekontor Group. The parent company, Energiekontor AG, was established in 1990 in Bremerhaven in Northern Germany. It has since grown to become one of the leading wind energy companies in Europe, having built more than 140 wind farms across the continent.

Methodology

- 1.6 The 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 energy yield whilst seeking to avoid or reduce environmental effects.
- 1.7 The Environmental Impact Assessment (EIA) process also provides opportunities for positive design, rather than merely seeking to avoid adverse environmental effects. The Design and Access Statement is seen as having an important role in contributing to the design process through the clear documentation of design evolution.
- 1.8 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

- 1.9 The Glenvernoch Wind Farm 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:

- Environmental Impact Assessment Report Vol I: Written Text;
- Environmental Impact Assessment Report Vol II: Figures and Visualisations;
- Environmental Impact Assessment Report Vol III: Technical Appendices;
- Environmental Impact Assessment Report Vol IV: Non-Technical Summary;
- Planning Statement; and
- PAC Report

2 Site Selection



Introduction

- 2.1 This section of the Design and Access Statement describes the Site and the surrounding area before setting out the approach to site selection.

The Site

- 2.2 The Site is located within Dumfries and Galloway covering an area of approximately 780ha incorporating grassland and modified bog and is principally used for grazing.
- 2.3 The closest settlements to the proposed turbines are the village of Glentool, located approximately 2.8km north of the Site, and the town of Newton Stewart which is located approximately 7km south-east of the Site.
- 2.4 There are a number of wind farms, either operational, approved or within the planning system, within 10km of the Site. Most notably these include Blair Hill Wind Farm (2km south east of the site) which is being scoped for 22 turbines at 250m tip height. Further afield are the operational Kilgallioch Wind Farm (5.8km west of the Site), the consented Kilgallioch Wind Farm extension (5.3km west of the Site), the operational Airies Farm Wind Farm (7.9km west of the Site), and the consented Gass Wind Farm (10km south west of the Site).
- 2.5 The Site primarily sits within Landscape Character Type 174: Plateau Moorland with Forest, with the Site entrance and part of the access track partly located within LCT 160: Narrow Wooded Valley.

Site Selection Criteria

- 2.6 The overall approach to wind farm site selection is to identify areas of land where the siting of a wind farm would result in minimal environmental effects, be free from overriding technical constraint and be viable on an economic basis. Some of these are considered below.

GIS Constraints Mapping

- 2.7 A Geographical Information System (GIS) "sieve mapping" exercise was carried out as part of the site selection process. This involved identifying and mapping constraints to wind farm development across south west Scotland, including:

- International natural heritage designations, including Ramsar sites, Special Areas of Conservation and Special Protection Areas;
- National and local natural heritage designations, including National Parks, National Scenic Areas, locally landscape designations, National and Local Nature Reserves, Ancient Woodlands and RSPB reserves;
- Cultural heritage assets, including World Heritage Sites, Ancient Monuments, listed buildings, Conservation Areas, Registered Parks and Gardens and Registered Battlefields;
- The pattern of settlement, with all areas within 1km of residential properties excluded from further assessment;
- Aviation interests, including surface obstacle limitation surfaces, MoD Low Flying Areas, local aerodromes and visibility to radars, both military and civilian; and
- Existing, approved or proposed wind farms.

Review of Planning Context

- 2.8 Information on the planning context for renewables in Dumfries and Galloway was reviewed as part of the site search exercise, focusing on the relevant Development Plans, national policy and other relevant material considerations.

Wind Speed Data

- 2.9 The predicted wind resource in any given location is an important consideration in identifying potentially suitable wind farm sites. The electricity that can be generated by a wind farm is directly affected by the wind speed. Wind speed increases with height above ground level and the amount of electricity generated increases disproportionately with increases in wind speed. This in turn affects the carbon emission savings and the commercial viability of a site.
- 2.10 The information on unconstrained areas from the GIS sieve mapping exercise was therefore compared with data on wind speed to identify suitable locations for wind farm development. This was done using the then Department of Trade and Industry (DTI) wind speed database NOABL which provides annual mean wind speeds on a kilometre grid square basis.

Access Suitability

- 2.11 An assessment is required to ensure that appropriate access to a potential wind farm site is available for the transportation of wind turbine components.

Grid Connection

- 2.12 The potential to connect a wind farm into the electricity network was also an important consideration in identifying suitable sites for wind farm development. The capacity of the grid network to accept the likely output from a proposed wind farm is an important factor in understanding the technical feasibility of a development.

Selection of Glenvernoch

- 2.13 The information from the sieve mapping exercise was combined with relevant planning policy, wind speed data and details of the local electricity transmission network to identify suitable areas within the study area for potential wind turbine development. From the various land areas identified, Glenvernoch was selected due to a number of factors, including:
- **Underlying landscape capacity** – The large scale and simple landform composition of the host landscape area, together with the presence of adjacent commercial forestry and absence of any locally designated landscapes within the site area, suggest that the site has potential capacity to accommodate a wind farm development;
 - **Energy capture** – software modelling indicates that the Site offers a strong wind resource with few obstacles or areas of pronounced topography close enough to interrupt wind flow;
 - **Settlement** – the Site is well removed from settlements;
 - **Landscape** – the Site is sufficiently removed from any nationally designated landscapes;
 - **Transport infrastructure** – the Site benefits from suitable access for turbine component delivery; and
 - **Aviation** – it is anticipated that mitigation solutions would be available to avoid any adverse effects.



3 Design Influences and Layout Evolution



Introduction

- 3.1 Once a site has been selected, the design of the wind farm is optimised in order to produce a layout which maximises the use of land available for power generation, balancing this against the overall environmental, social and economic effects of the development. Optimising the layout of a wind farm in this way depends on a range of technical, economic, planning and environmental criteria.

Design Criteria

- 3.2 Technical requirements and constraints are parameters that can physically constrain wind farm design. For the Proposed Development these have included:

- **Energy capture** – the NOABL database indicates that the Site has a favourable wind resource.
- **Land availability** – as agreed with the landowner, the land available for the wind farm.

- 3.3 In addition to the technical requirements and constraints, a range of environmental considerations have also had an influence on the design of the wind farm. These include but are not limited to:

- **Landscape and visual** – the design of the Proposed Development seeks to match the scale of the turbines and the scale of the overall development with the scale of the landscape. Computer modelling was used as a tool to aid design and a 3D model/wireframes were generated for views from key design views around the Site.
- **Ecology** – the layout of the Proposed Development takes account of the ecological interests of the Site and the surrounding area.
- **Archaeology** – all on-site archaeological features have been plotted, assessed and avoided as far as possible.
- **Residential Properties** – the Proposed Development has been designed to ensure that no residential properties would experience unacceptable amenity effects, either as a result of visual dominance or noise.

- **Deep peat** – the Proposed Development has been designed to avoid the areas of deepest peat following depth surveys.
- **Hydrology** – all watercourses within the Site have been considered in the design, with appropriate buffers from all infrastructure provided in the design to safeguard the hydrogeology of the area.

- 3.4 In addition to the above considerations, planning guidance and discussions with statutory and non-statutory consultees and the local community have also had an influence over the evolution of the design.

Planning Policy

- 3.5 As set out in Planning Statement, a wide range of national, regional and local planning and renewable energy policy has been taken into account in the design of the Proposed Development.

Design Guidance

- 3.6 The design of the Proposed Development has taken into account a number of best practice documents in relation to wind farm design. In addition to taking cognisance of the suite of planning guidance discussed in the Planning Statement, the following documents are of particular relevance to the design of the Proposed Development:

- Siting and Designing Wind Farms in the Landscape, Version 3a, SNH (2017); and
- Planning Advice Note (PAN) 68: Design Statements

Design Consultation

- 3.7 The Applicant has undertaken a programme of consultation prior to the submission of this application. This has included consultation with stakeholders including Nature Scot, Historic Environment Scotland, SEPA and Dumfries and Galloway Council and this has influenced the final design of the Proposed Development.

- 3.8 Consultation has also taken place with the public. Host Community Council Cree Valley Community Council was initially contacted in relation to the Scoping Report and to provide an introduction to the Site and the Proposed Development. Neighbouring Community Council's including Barrhill and Kirkcowan Community Council were also contacted to inform them of the Scoping Report and forthcoming public consultation event. A link was also provided to the project website which contained all scoping documents.

- 3.9 The first public exhibition was held at the Glentroll Hive in September 2023. The community were provided with an opportunity to provide feedback and ask questions. A series of exhibition boards were presented at this first public consultation event, consisting of:

- A description of the project;
- An introduction to Energiekontor;
- Details of the Proposed Development, the Site's location and on-site constraints;
- An explanation of the development and EIA processes;
- Wireframes showing what the development would look like from a number of locations; and
- A questionnaire.

- 3.10 Following the scoping exercise, and as the project evolved, the website was updated to present details of the changes that had been made to the Proposed Development since the scoping exercise was undertaken including the reduction in proposed turbine height and turbine numbers.

- 3.11 A second public exhibition was held at McMillan Hall, Newton Stewart in August 2024 which gave the community an opportunity to comment on the 'design freeze' layout which had been subject to Environmental Impact Assessment. A similar format was adopted to the first public exhibition, with additional exhibition boards comprising:

- Photomontages and visualisations;
- A summary of the environmental assessments and mitigation measures included in the Proposed Development;
- Design evolution; and
- How feedback from the first public exhibition had been incorporated.

- 3.12 This process of consultation has identified a number of potential design constraints which the Applicant has subsequently sought to address as part of the EIA and design process. Further details are set out in the various stages of the design iterations below and relevant chapters of the EIA Report.

Constraints Mapping

- 3.13 The starting point for the design of a wind farm is the preparation of a detailed constraints map which sets out all relevant buffer distances, key features and other factors that may constraint the location of wind turbines.

- 3.14 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 standoff distances to residential properties, ecological buffers and separation distances between existing and proposed wind turbines.

Technical Constraints

3.15 The following technical considerations were taken into account in the initial design process:

- A minimum separation distance between the turbines of approximately 3.0 rotor diameters in order to minimise turbulent interactions between wind turbines (wake effect);
- Distance from residential properties;
- A 50m watercourse buffer was applied; and
- Sufficient space and gradient for ancillary infrastructure.

Relevant Planning Policies

3.16 The relevant policies identified in the Planning Statement have been taken into consideration in the site selection process and also subsequently, where relevant, in the design of the Proposed Development.

Landscape and Visual

3.17 The principal design objectives of the Proposed Development are as follows:

- Location of the Site within a landscape character type LCT17a: Plateau Moorland with Forest that is a large scale and simple landform composition of the host landscape area, together with the presence of adjacent commercial forestry and absence of any locally designated landscapes within the site area, suggest that the site has potential capacity to accommodate a wind farm development;
- Reduction in the number of turbines from 18, as proposed within the Scoping Report, to 13 in order to reduce the lateral extents of the wind farm to reduce effects from key viewpoints;
- Utilising the topography of the Site to maintain a uniform layout, creating a standardised perception of tip heights;
- Wirelines were used as design tools in order to minimise the perception of stacking from key viewpoints and improve overall composition; and

- Siting of the construction compound, and substation within the lower lying eastern parts of the Site, to minimise visual prominence.

Noise

3.18 The Proposed Development has been designed to ensure that the wind farm would be able to operate within acceptable noise criteria.

Ecology and Ornithology

3.19 The Site is not the subject of any statutory nature conservation designations. A full suite of ecological and ornithological studies have been undertaken which has allowed the layout to be designed around local sensitivities.

Archaeology and Cultural Heritage

3.20 There is one Scheduled Monument within the Site but no direct impacts have been identified during the design process. There are a number of designated heritage assets in the wider area and potential effects on the settings of such assets have been considered as part of the design process.

3.21 Some of the proposed turbine locations are likely to coincide with some areas of remnant rig and furrow, however these are considered to be of low archaeological significance, and the impact to the overall areas would be very limited.

Design Iterations

3.22 The design process has been undertaken over a prolonged period and the proposal 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.

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

First Design Iteration (Scoping)

- 3.24 An initial layout was prepared based on the following desktop environmental and technical constraints:
- Buffer of 1.2km between wind turbines and residential properties.
 - Watercourse buffers of 50m.
 - Initial turbine ellipses used to position turbines.
 - Phase 1 peat depth survey data.
- 3.25 Based on these constraints the first iteration comprised 18 turbines. This layout formed the basis of the Scoping request.
- 3.26 The request was accompanied by a Scoping Report which set out a summary description of the Proposed Development, identified the issues proposed to be included in the EIAR and proposed an approach to the assessment of effects in each case.

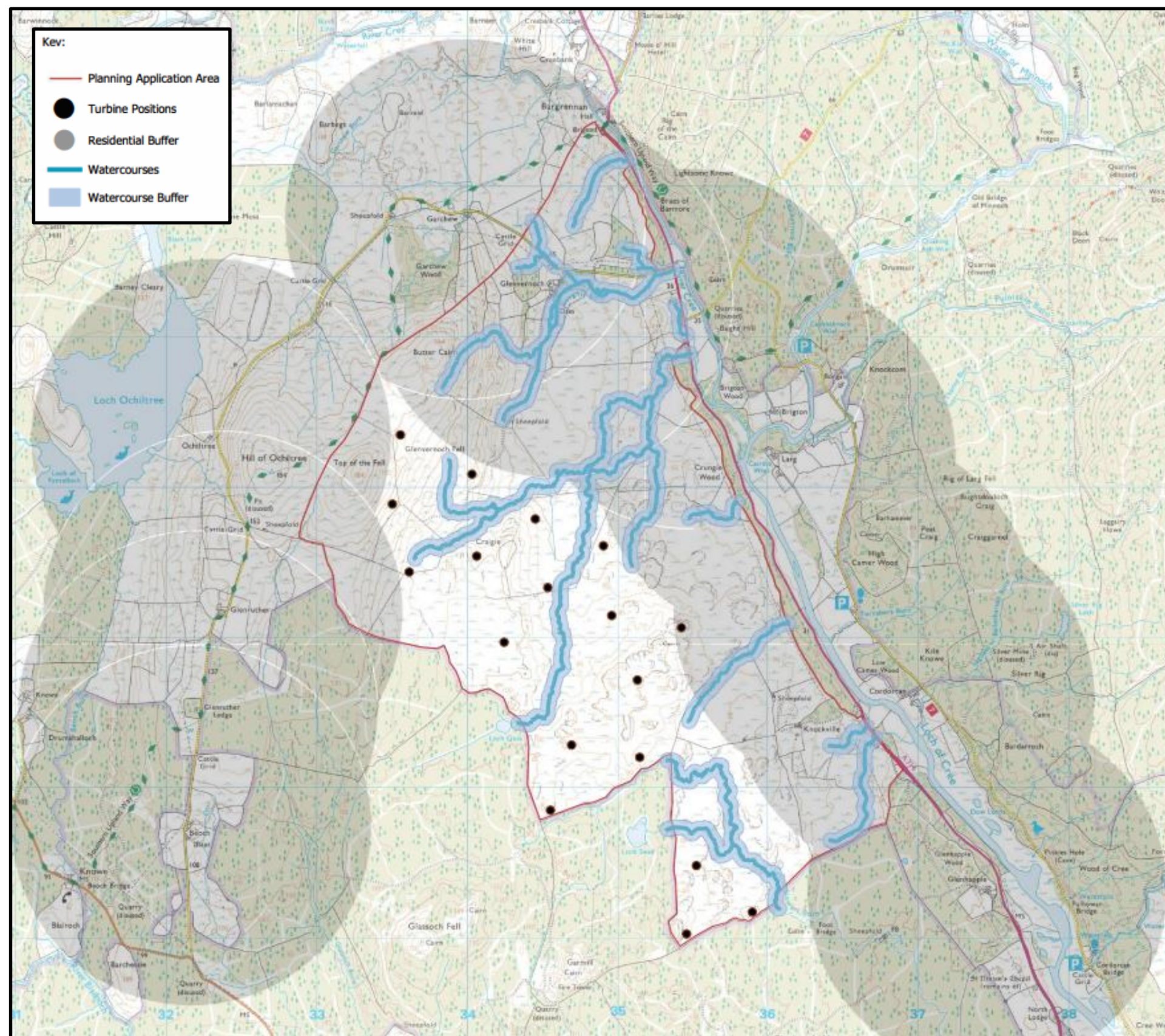


Figure 3.1 : First Design Iteration

Second Design Iteration

- 3.27 The second design iteration incorporated environmental constraint information that was available following on-site survey work. This reduced the number of turbines from 18 to 13.
- 3.28 The second iteration was also based on feedback received as part of the scoping process and meetings held with key stakeholders and consultation responses from statutory consultees.
- 3.29 Visual considerations were a key consideration at this stage of the design process. Turbines were removed to reduce the lateral extents of the wind farm to reduce effects from key viewpoints.
- 3.30 Wirelines were used as design tools to try to maintain a uniform layout with minimal stacking and standardised perception of turbine heights by utilising the contours of the site, limiting the potential for the isolation of turbines.
- 3.31 Spacing was also increased between turbines to optimise wind flow and energy yield. These changes resulted in a layout which is fairly evenly spaced when viewed from all directions and key viewpoints.

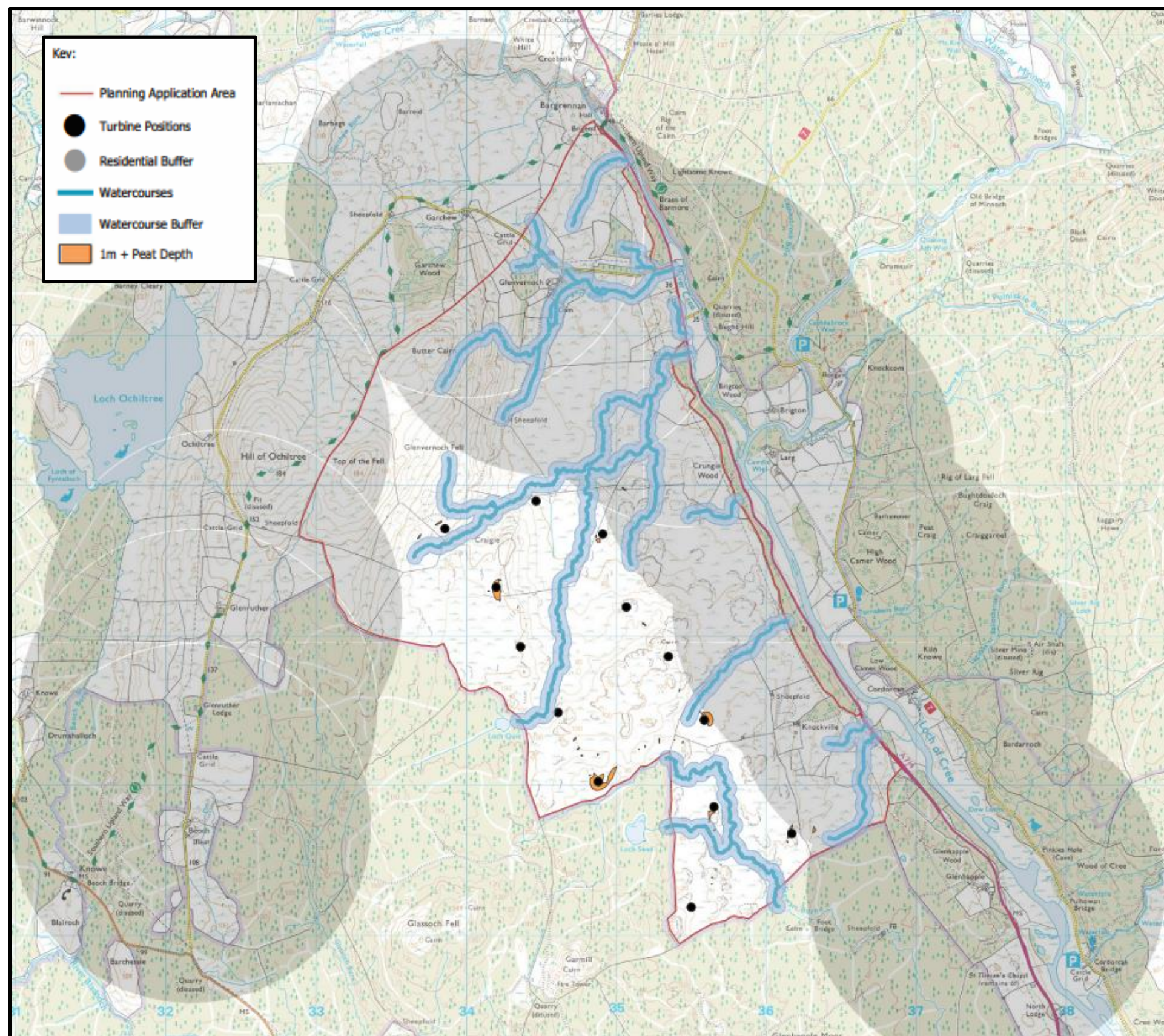


Figure 3.2 : Second Design Iteration

Third Design Iteration

3.32 The final layout was informed by further design work following the completion of Phase 2 Peat Depth Surveys undertaken in the first half of 2024, which showed that four turbines were located in areas of peat deeper than 1m, as illustrated by the orange shapefiles on Figure 3.3 opposite. The turbines affected and their relocation requirements are described below:

- T5 and T11 were both in areas of deep peat of over 5 m and were re-positioned as a priority. T5 needed to be moved north by 50 m, and T1 moved south-east by 100 m along the track;
- T4 needed to be moved south-west by 20 m;
- T12 needed to be moved south-west by 20 m;
- T13 needed to be moved south-east by 20 m;
- T10 needed to be moved east by 50 m;
- T1 needed to be moved east along the track. The proposed location of T1 in Figure 2.2 was found to go over a large bedrock outcrop and would require levelling of the ground, moving it east therefore benefits the construction process; and
- T3 spanned an area of highly variable peat depths, and needed to be re-positioned so that the crane pad and turbine would be in an area of shallower peat.

3.33 Turbine positions were fine tuned to avoid inconsistent turbine spacing, turbine outliers, or excessive overlapping of turbines, to minimise visual confusion and ensure a balanced/compact array from key views in the local landscape.

3.34 Infrastructure such as access tracks and crane pads were then designed around the turbine positions, with the general principles of sufficient space and gradient for ancillary infrastructure generally followed throughout the turbine positioning process (i.e. turbines were not placed where it would be difficult to link them via road, for example).

3.35 Together these design changes and associated elements of infrastructure constitute the 'design freeze' layout, which is the basis on which the EIA has been undertaken.

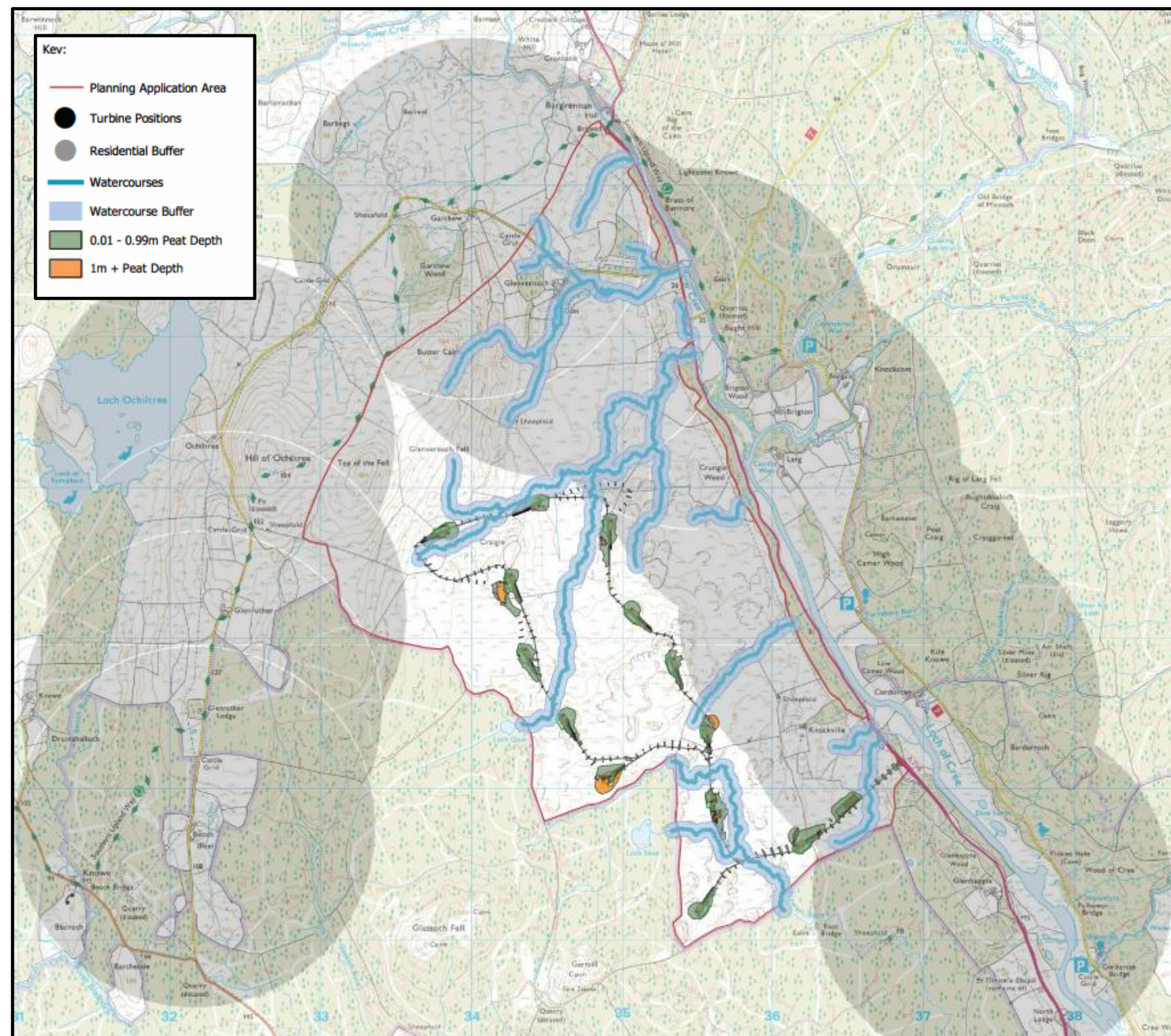


Figure 3.3: Third Design Iteration

4 Design of the Proposal



Introduction

- 4.1 The Proposed Development consists of the development of a wind farm of up to thirteen wind turbines together with associated infrastructure.
- 4.2 The wind farm would provide approximately ~86MW of generating capacity depending on the final turbine selection. This would be made following the grant of consent and be subject to a competitive tendering exercise.
- 4.3 The planning application includes an allowance for potential micro-siting of the wind farm infrastructure. If planning permission is granted, the Applicant would commission detailed ground investigations and geotechnical surveys to determine the overall ground conditions.
- 4.4 It is possible that there may be a requirement for micro-siting of other infrastructure following these investigations and any other pre-construction environmental surveys. Consequently, the application boundary seeks a potential micro-siting allowance of 100 metres for turbines and associated development such as tracks and crane pads.

Key Elements of the Proposal

- 4.5 The principal elements of the Proposed Developments include:
- **Wind turbines** – thirteen wind turbines up to 200 m in height to blade tip.
 - **Turbine foundations** – The foundations of the turbines could be either reinforced concrete gravity structures or piled foundations.
 - **Site tracks** – to provide access for construction and maintenance vehicles from the site access to the substation and wind turbines. They would have a running width of approximately 5m, with local widening on corners and would be surfaced with coarse aggregate.
 - **Construction compound/storage area** – to provide a secure area for site office facilities and storage of materials and components. This would measure 100m x 50m.
 - **Crane hardstandings and outrigger pads** – to provide a level and firm base for the cranes at the location of each turbine.

- **Transformer housings** – the transformers to step up the voltage exported from each turbine would either be placed within the wind turbines themselves, or in a small external transformer housing placed next to each wind turbine tower, depending on the final turbine choice.
- **High voltage and control cables** – to form power and control circuits linking each turbine to the on-site substation, cables would be placed in trenches (dimensions to be determined by the ground conditions, but typically 0.5m x 1m deep) routed alongside the tracks.
- **132kV Substation Compound** – to house the switchgear, transformers and control equipment, plus secure storage space. The substation would be provided within a compound measuring approximately 72m x 50m and would include two single-storey buildings.
- **Energy Storage Compound** – An energy storage facility would be provided within the construction compound area. The capacity of this facility would be determined at a later date.
- **New or upgraded water crossings** – new water crossings are required on Site subject to detailed survey as part of the pre-construction process.
- **New site access** – a new site access would be provided onto the A714. This would link the internal wind farm track network with the wider highway network.
- **Off-site access works** – Temporary highway accommodation works would be required to facilitate turbine component transportation to Site

Wind Turbines

- 4.6 It is proposed to erect up to thirteen wind turbines on the Site. They would be of a typical modern design comprising a three bladed rotor hub mounted on a rotatable nacelle (containing a gearbox and a generator), a tower and foundation.
- 4.7 Research 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 treatment for the surface of materials.

Associated Development

- 4.8 A grid connection would be required to connect the electricity generated by the wind farm into the transmission network for the operational period of the wind farm.
- 4.9 The final details of the grid connection, including the precise route and an assessment of any impacts on the environment, would be determined by the grid operator at a later date. The new grid connection may be subject to a separate design and consent process under Section 37 of the Electricity Act 1989.

5 Access



Introduction

- 5.1 This section of the Design and Access Statement sets out the issues and options considered during the development of the proposals to ensure that the transport and construction of the Proposed Development causes the minimum disruption to the highway network and highway safety.
- 5.2 The site access point and accompanying internal track layout have been designed to accommodate the range of vehicles anticipated during the construction and operation of the Proposed Development.
- 5.3 Public access to the Site would be managed or restricted during the construction period for health and safety reasons.

Existing Highway Environment

- 5.4 A new access is proposed off the A714. The entrance and associated access track would accommodate abnormal loads and construction traffic.
- 5.5 Construction of the access, temporary traffic control measures and its detailed design would be subject to a Traffic Management Plan condition in consultation with the transport authority for the wider development.
- 5.6 The main transport movements during the construction phase would be associated with the movements of Heavy Goods Vehicles (HGVs) to and from the Site. Vehicle movements would be associated with delivering turbine components, concrete and the travel of workers to and from the Site.
- 5.7 Once the development is operational, it is envisaged that the amount of traffic would be minimal. Occasional visits may be made to the Site for maintenance activities. The vehicles used for these visits are likely to be a 4x4 or similar and there may be occasional need for a HGV to access the Site for maintenance and repairs.

Access Design Process

- 5.8 Swept Path Analysis assessments were undertaken to identify whether the delivery route could accommodate the swept path of the abnormal load delivery vehicles carrying components such as the turbine blades and nacelle. This type of analysis is consequently used to identify any necessary works.

- 5.9 The Swept Path Analysis identified two junctions close to the Site where offsite access accommodation works are likely to be required. These have been included within the Section 36 application.
- 5.10 The design of the Proposed Development has taken into consideration the movement and subsequent access of vehicles involved with the construction and operation of the wind farm.
- 5.11 The internal access roads have been designed to take into consideration technical and environmental constraints. The layout for the site access roads has been designed to meet engineering requirements in terms of gradient, drainage and vehicle turbine circles. The design and location of the site tracks have been subject to iterative design and EIA processes to minimise environmental effects.