4. Project Description

4.1 Introduction

4.1.1 This chapter describes the project and outlines the site design and activities associated with the construction, operation and decommissioning of the wind farm. It includes details of the construction programme and technical information on the turbines and the associated infrastructure.

4.1.2 Wind turbines are designed to convert the kinetic energy of the wind into electrical energy. Air passing over the blades of a wind turbine causes them to rotate. This low speed rotational motion is converted into electrical energy at a voltage of typically 690V by a generator located inside the nacelle and is then converted to a higher voltage (typically 11 or 33 kV) by a unit transformer located at the base of the turbine. Underground cables link the turbine unit transformers to a dedicated substation on the site where the electricity generated by the wind project is metered, and if necessary transformed to the same voltage as the electricity grid system to which the wind project will be connected. The substation control building is connected to a substation on the national electricity grid, in this case by an underground cable.

4.1.3 The proposed Blackstone Edge Wind Farm would comprise of the installation and operation of a cluster of three wind turbines, each with an assumed rating of 2MW. Details of how the scheme may lead to reductions in emissions of the greenhouse gas carbon dioxide (CO_2) are provided in Chapter 3 and the accompanying Planning Statement.

4.1.4 The site is located in South Yorkshire, approximately 15km to the west of Barnsley, 7km south-east of Holmfirth and approximately 1 km to the north east of the village of Crow Edge as shown in Figures 1.1 and 1.2.

4.1.5 The Blackstone Edge site lies within upland farmland, within the Yorkshire Southern Pennine Fringe, between the moorland of the Peak District and the settlement/urban fringe areas of Barnsley and Huddersfield and the former coalfield areas to the north east and south east. Generally the landscape can be described as transitional between the strong valleys and the pastoral Pennine and High Peak foothills and hill plateaux. The landscape appears to be remote in character, with scattered farmsteads and hamlets, but the towns are also in close proximity, with long views to the urban areas across the plateaux.

4.2 Specification of wind turbines

4.2.1 For the wind farm at Blackstone Edge, three wind turbines are proposed. Potential environmental effects have been assessed on the basis of the largest size turbine that might be installed. Specifically the maximum dimensions of the turbines at the site will be restricted to 101m height from ground to blade tip. Each blade would measure up to 41m, with a tower giving a hub height of up to 60m. Figure 4.1 shows a typical wind turbine.

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4.2.2 The wind turbines would be of a modern, quiet design, incorporating tapered tubular steel towers and three blades made from fibre-reinforced epoxy attached to a nacelle housing containing the generator, gearbox and other operating equipment. The transformer for each turbine, depending on the final selection of wind turbine used, may either be contained inside the tower base, within the nacelle or in a small external kiosk at the tower base. External kiosks would typically measure up to 2m x 3m and 2m in height. An illustration of a kiosk is provided in Figure 4.9. Since the size of the kiosk is small compared to the larger turbines, the kiosks are not featured on the photomontages provided as part of this assessment.

4.2.3 The turbine operation would be fully independent and automatic. It is proposed that the finish of the wind turbines, towers and blades should be of a low-reflective semi-matt pale grey colour, subject to the agreement of the local planning authority and other consultees.

4.2.4 The final choice of turbine will depend on a competitive tendering process between turbine manufacturers. Any alternative turbine will be of a similar design to that shown in Figure 4.1. The turbines will not exceed the tip height of 101m and will be required to comply with other operational parameters identified in this document. Any alternative turbine will also be subject to final approval of Barnsley MBC's Environmental Health Officer and planning department.

4.2.5 In line with all modern wind turbines the machines would start generating when wind speeds are in excess of the 'cut-in' wind speed (typically 3 to 4m/s). The power output would increase with wind speed until the rated power output is reached (typically 16m/s). In the event of extreme wind speeds in excess of 25m/s, the turbines would shut down until the wind speed has dropped to a level where it can safely start operating again.

4.2.6 The assessments presented in this Environmental Statement have been undertaken based on the 2MW Repower MM82 wind turbine.

4.3 Site Description

4.3.1 The site layout is shown in Figure 1.2. The area where turbines would be sited is situated on agricultural land that is currently used for grazing. The site has been designed in accordance with the BWEA Best Practise Guidelines for Wind Energy Development. The project and associated infrastructure are positioned to take account of the assessments detailed in the rest of this ES: notably landscape and visual effects, noise, ecology, archaeology, hydrology and geology and to meet technical criteria for optimum spacing. Full details of the design evolution process for the proposed wind farm development are detailed in the Blackstone Edge Wind Farm Design and Access Statement (Entec UK Ltd., May 2007).

4.3.2 The area taken by the proposed project is small and it is therefore anticipated that the existing land use would continue, largely unaffected by the presence of the wind turbines.

4.3.3 Micro-siting flexibility is inherent in what is proposed to allow necessary adjustments to be made to turbine grid coordinate positions of up to 40m in any direction (apart from directions that reduce the distance of the nearest turbine to residential property or encroach on any other defined stand-off requirements such as

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the constraints identified on Figure 2.1). Such micro-siting adjustment would be in accordance with the results of post-consent geophysical and other detailed site investigation works and subject to final sanction by Barnsley Metropolitan Borough Council.

4.4 Access from the Public Highway

4.4.1 The proposed access route for the project is from either Junction 35A or 36 of the M1 then continuing along the A61, the A616, the A628, Royd Lane and Whitley Road. Figure 4.2 outlines the proposed access route and Figure 4.8 shows the site entrance access (where the site adjoins the public highway).

4.4.2 Swept-path assessments have shown that in order to deliver the turbines to the site, it will be necessary to undertake relatively minor works within the highway and also possibly within a small area of third party land.

4.4.3 It is proposed that the final details of the site access will be agreed with the local Highways Department prior to construction.

4.5 Site Tracks

4.5.1 The construction of new on-site tracks would be required for the purposes of providing access to the wind turbines. Site access track routes are shown in Figure 1.2 and Figure 4.8. The tracks would be typically 4.5 to 5.0m wide with 0.5m shoulders on each side. Construction of the site tracks would involve the removal of the vegetation and top soil to a depth of some 100-150mm. This would be stored adjacent to the track for later, partial reinstatement. Geotextile membranes would then be laid with crushed stone to an average depth of 200 - 300mm (depending on specific ground conditions) then hard on top. On bends, it would be necessary to construct wider areas of track to reflect the minimum bend-radii for the longest construction loads (the turbine blades).

4.5.2 Appropriate drainage requirements would be incorporated where the site specific conditions make this necessary. Provision for surface drainage would also be incorporated within the track structure to maintain existing surface water run-off. Similarly, running surfaces would be suitably cambered to reduce surface drainage flows. Figure 4.3 shows typical road construction methods.

4.5.3 The layout of the access tracks has been developed in accordance with the following criteria, where applicable:

- Track length should be kept to a minimum to reduce environmental impact, construction time, road-stone requirement and disruption to the agricultural land use.
- Tracks are routed to avoid any sensitive ecological, hydrological and archaeological features and an archaeological watching brief will be in place during the track and all other hardstanding works.
- Tracks are aligned to follow closely the existing field boundaries for the great majority of its length, minimising the impact on the existing field pattern and agricultural operations.

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- It is anticipated that the construction of all site tracks would utilise stone from local quarries. The nearest quarries are:
  - Marshalls Mono Ltd (approx Grid Ref - SE 19251 08942);
  - Hillhouse Edge Quarries (approx Grid Ref - SE 13026 06731); and
  - Morgan Aggregate Stone Products (approx Grid Ref - SK 25752 95683).

4.5.4 In addition to the site tracks themselves, areas of hardstanding measuring 20m x 40m and four small areas of hardstanding of 2.5m x 2.5m x 0.5m would be required at each wind turbine position to support the crane (including outriggers) used for the erection of the wind turbines. The construction of these hardstanding areas will be similar to the construction of the site tracks, with 100-150 mm of topsoil removed and stored adjacent to the sites, geotextile material laid down and crushed stone laid on top to an average depth of 300mm.

4.5.5 Reinstatement of the track verges and the areas of hardstanding would be undertaken following construction. As there would be a continuing need to use the site tracks, partial reinstatement using stored topsoil would reduce the track width to between 3m and 4m with reseeding where appropriate. Similarly, areas of hardstanding would be covered with original topsoil and re-seeded.

4.5.6 In accordance with best practice any works including foundations for the turbines and control building will be a minimum of 20m away from any watercourse.

4.6 The Construction Compound

4.6.1 During the construction period a compound would be required. The compound would be surrounded by a secure fence and would house the following items:

- Temporary port-a-cabin(s) to be used for site offices and welfare facilities including one or two "port-a-loo" type toilet facilities with provision for sealed waste and storage to ensure there are no discharges into local water courses;
- Parking for cars and construction vehicles;
- Low noise generator (included double bunded fuel tank);
- Containerised storage for various components and materials required for construction including tools and small parts; and
- Storage of any other components and materials.

4.6.2 The compound would have dimensions of approximately 40m x 40m and will be located adjacent to the western boundary of the site and to the south west of turbine 1 (see Figure 1.2).

4.6.3 Reinstatement of the construction compound area would be undertaken following construction by covering the area with original topsoil and re-seeding.

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4.7 Turbine Foundations

4.7.1 The wind turbine foundations would require an excavation of approximately 18m by 18m and up to 3m in depth. The foundations would typically have dimensions of up to 16m x 16m x 1.5m, giving an additional one metre all around the foundations to allow shuttering access, with the shuttering positioned and supported. The detailed civil engineering design of the foundation would be carried out after the final selection of wind turbine and the granting of planning approval, and would also take account of geotechnical conditions identified in detailed ground investigations carried out post consent. A typical turbine foundation design and construction is shown in Figure 4.4.

4.7.2 Following excavation down to a suitable bearing layer, the bottom of the excavation would be lined with 75mm depth of blinding concrete. A reinforced concrete foundation would then be constructed, which would incorporate the holding down ring and bolts for the wind turbine. Each foundation would comprise up to 360 cubic metres of concrete and 32 tonnes of reinforced steel bar. Once the foundation has been formed the excavation will be back-filled with a 750mm layer of compacted crushed stone and overlaid with other excavated material.

4.7.3 Prior to the excavation phase the area to be used for the foundations would be stripped of topsoil and subsoil. The topsoil would be stored separately for later use. The original excavated area would be reinstated to ground level following the construction of the foundation, with the removed topsoil replaced and re-seeded. It is envisaged that the land would then be returned to agricultural use.

4.8 Climate Monitoring Mast

4.8.1 A climate monitoring mast (anemometer) of approximately the same height as the proposed hub height of the wind turbines will be installed. The mast would be approximately 60m high and consist of a lattice tower with wind monitoring equipment attached at various heights; a typical monitoring mast is detailed in Figure 4.5. The mast would record wind speed and direction and environmental conditions. The data would be monitored remotely.

4.9 Site Cable Runs

4.9.1 The wind turbines envisaged for use on the site would produce electricity at approximately 690V. This would be transformed to local grid voltage using a transformer at each turbine. From the transformer, underground cable runs would link the turbines to the control building. Cable runs, including communications cables, would be located in a trench approximately 1m deep and 0.5m wide, routed alongside access tracks. Excavated material from the trench would be stored alongside the trench and replaced during back-filling. Topsoil would be stored separately and fully reinstated over the trench following construction.

4.10 Grid Connection

4.10.1 The project will be connected to the local electricity grid network by Yorkshire Electricity Distribution (YEDL).

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4.10.2 A building will be required at the wind farm site to house the necessary metering and protection equipment and provision for this is included within this application. The exact dimensions of the building cannot be known at this early stage of design, because detailed technical electrical engineering studies will be required to be undertaken after planning consent is granted. The control building and electrical substation however will be located alongside the temporary construction compound in the north west corner of the site, as shown in Figure 1.2. The building would be of a single storey apex roofed design similar to that shown in Figure 4.6 and have dimensions no larger than 12m x 8m x 6.5m. The building would make use of local materials and its style would be agreed with the local planning authority. The substation grid transformer will contain oil for cooling and insulation purposes. It will be bunded to 110% capacity to contain oil in the event of a leak.

4.10.3 The control building will contain the switchgear belonging to both the Applicant and the Distribution Network Operator (YEDL), along with all protection, metering and SCADA (Supervisory Control and Data Acquisition) panels and equipment. A basic single office desk with computer monitoring equipment will be provided for the use of visiting operational staff.

4.10.4 The SCADA system would allow turbine operations to be monitored and controlled from a central location remote to the Development Site and hence the control building is not expected to be permanently manned. The system will ensure early reporting and rectifying of any faults which may occur. The control building will contain a single WC and hand wash facility (waste taken to a septic tank) for use by visiting maintenance staff.

4.10.5 The grid connection is expected to be at the Hazlehead substation (see Figure 4.7). An underground power line will connect the farm to the local distribution grid network. This will be subject to a separate planning procedure but for the purposes of this EIA the underground grid connection route has been considered within this ES and the assessments presented in the chapters that follow. At the time of writing YEDL have advised to assume that the underground cables will be laid within/along existing roads and road corridors. The proposed grid connection route is shown in Figure 4.7.

4.10.6 For the purposes of this environmental impact assessment we have assumed that plant to be used for laying the underground grid connection cables would include two excavators, a roller, delivery lorry and small dumper. Based on the underlying geology of the area, it has been assumed that a rock trencher would not be required.

4.11 Pre Construction Works

4.11.1 Enabling works undertaken in the pre-construction period would include:

- *Off site access consultation with the appropriate regulatory authorities;*
- Any necessary land drainage and pipeline crossing consents and approved modifications; and
- Detailed site investigation works in accordance with best practice construction techniques. For example, site investigations will include geotechnical surveys.

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4.12 Construction Programme and Environmental Management

4.12.1 E.ON was the first UK wind farm developer to be certified to the internationally recognised environmental management standard, ISO 14001, and as such places a great emphasis on the proper management of environmental risk during construction activities.

4.12.2 Depending on the site conditions encountered, potential weather delays and suppliers, the main construction period would last for approximately six to nine months, from commencement of construction through to reinstatement at the end of the construction period.

4.12.3 All construction activities would be undertaken in strict adherence with an Environmental Management Plan (EMP), which would be developed prior to the start of construction by the Applicant in consultation with the local planning authority, Environment Agency, English Nature and other relevant authorities. The EMP will define the environmental measures and procedures to prevent, minimise and mitigate adverse impacts and to ensure compliance with applicable environmental standards during both the construction and operation of the construction.

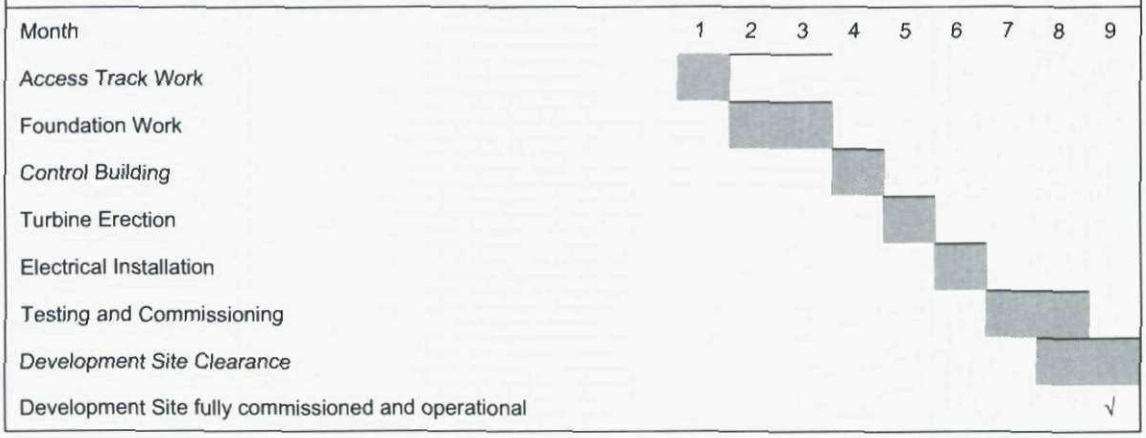
4.12.4 Construction would consist of the following phases:

- Improvement of the site access;
- Construction of a temporary construction compound for off-loading materials and components and to accommodate site offices and welfare facilities;
- Construction of site tracks for access to turbine locations;
- Construction of the control building and electrical substation;
- Construction of turbine foundations;
- Construction of the cable to the grid connection point;
- Excavation of cable trenches and the laying of electricity and communication cables;
- The delivery and erection of turbine towers and installation of nacelles and blades;
- Commissioning of the Wind Farm; and
- Site reinstatement.

4.12.5 An indicative construction programme is provided in Box 4.1and indicates up to a nine month construction programme.

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Box 4.1 Indicative Construction Programme



4.12.6 Measures to prevent contamination of the ground during the construction period would be implemented and continue throughout the life of the project. To achieve this, contractors on the site would be limited to the storage of only sufficient diesel fuel for the plant on site. Storage of any fuel oils would be within a bunded area or bunded tanks in accordance with the Control of Pollution (Oil Storage) Regulations, 2005. In addition, the following measures will be taken;

- Concrete - the foundation concrete specified would be of high strength structural grade which is not prone to leaching of alkalis. The concrete delivery lorries would only be allowed to wash out at a designated point on site after pouring.
- Lubricants - proper draining and containment would be employed during routine servicing to prevent spillage of lubricants or hydraulic fluid.
- Coolants - the transformers that will be used in the development are sealed units containing non-toxic cooling oil. These units are similar to those used elsewhere in the UK and leakage is negligible.
- There will be no long term storage of lubricants or other petrochemical products on the site.

4.12.7 Throughout the site operation best working practices, incorporated in the Environmental Management Plan, will be adopted and measures to protect the water environment will be made in accordance with recommendations set out by the Environment Agency. All vehicles visiting sites will be equipped with sand trays to place below any oil/diesel filling activities, and will also be equipped with emergency oil spillage kits.

4.13 Construction Traffic

4.13.1 Equipment would be delivered to site at the commencement of the relevant construction phase and would be intended to remain on site until work is finished. Such equipment would include excavators, dump trucks, rollers etc for road

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construction and cable installation work. Other equipment, such as cranes for turbine erection would be brought in when required.

4.13.2 The majority of plant and delivery vehicles used during construction would be of standard dimensions. The exceptions to this will be the vehicles used to deliver turbine blades and the large crane transportation vehicles. The turbine blades will require police escort due to their abnormal length. The remainder of the wind turbine components would be delivered to the site on flatbed articulated trailers. Typically a crane of 1000 tonne lifting capacity and a mobile crane of 100 tonne lifting capacity would be required for the erection of the turbines. A typical crane of 1000 tonne lifting capacity would have a travelling weight of 128 tonnes. It would be delivered on separate trailers and erected on site.

Traffic Generation

4.13.3 This section considers the traffic generations associated with the construction phase of the wind farm. Estimates of traffic generation associated with the construction phase of the project have been derived from first-principles, based on assumptions made with regard to the following activities:

- Delivery of road stone for the construction compound;
- Delivery and subsequent removal of plant and equipment to site for access track construction, site compound, etc;
- Delivery of geogrid material for the construction of access tracks and construction compound;
- Delivery of road stone for construction of access tracks;
- Delivery of road stone for areas of crane operation;
- Delivery of transformers and sub-station equipment;
- Delivery of cable used to connect the turbines;
- Delivery of sand to backfill cable trenches;
- Ready-mix concrete delivered to the site for construction of the turbine foundations;
- Formwork and reinforcing steel delivered to the site for construction of the turbine foundations;
- Delivery and removal of mobile cranes used to erect the turbines;
- Delivery of the turbine equipment;
- Delivery of base rings; and
- Delivery of blade hubs.

4.13.4 It is anticipated that the maximum number of staff likely to be on site at any one time would be approximately 20. These staff could arrive and depart from the site by various modes of transport from a variety of locations, and therefore trip

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generations are difficult to predict. Furthermore, these trips are unlikely to have a significant environmental impact relative to the number of HGVs generated from the site.

Construction Compound

4.13.5 A temporary construction compound area is required to accommodate deliveries of equipment and machinery at the onset of the works. This area will require a hard standing footing of approximately 1600m^2 (approximately 40m x 40m). Based on a fill depth of 0.300m, 480m^3 of stone will be required (approximately 864 tonnes based on a density of 1.8t/m^3). Assuming an HGV can carry 20 tonnes of stone, an estimated 44 deliveries of road stone will be required for this activity, resulting in a total of 88 two-way trips.

General Plant & Equipment – Delivery and Removal

4.13.6 A range of equipment is expected to be delivered to site including earth movers, mechanical excavators, dump-trucks etc. This is expected to be delivered to site near the onset of the works and is likely to be removed at the end of the activity for which the equipment relates. The exact equipment complement is unknown, but around 60 HGV deliveries is considered to be a reasonable estimate, making a total of 240 two-way trips for delivery and removal (120 for delivery and 120 for removal).

Access Tracks

4.13.7 Road stone will be imported for the construction of access tracks. It is anticipated that there will be a requirement for approximately 1.4km of access tracks within the development. However, for a robust assessment, a figure of approximately 10% will be added to this length, equating to an assumed working length of 1.54km of access track. Based on a fill depth of 0.300m and a track width of 5m, there will be an approximate requirement of 2,310m^3 (around 4,158 Tonnes) of stone for this activity (based on a density of 1.8t/m^3). Assuming an HGV can carry 20 tonnes of stone, it is considered that an estimated 208 deliveries of road stone will be required for this activity, resulting in a total of 416 two-way trips.

Geogrid

4.13.8 As noted above, a total of 1.54km of access tracks will require construction, using three layers of 5m wide reinforcing geogrid material. In addition, the construction compound area of 40m x 40m will also require three layers of geogrid material. Assuming that the geogrid material is delivered in 50m x 5m rolls, it is anticipated that 38 rolls of geogrid material will be required. Given that an HGV can carry 10 rolls, 4 deliveries would be required, i.e. 8 two-way trips.

Crane Operation Areas

4.13.9 Stone will be imported for construction of suitable areas to enable crane operations. Assuming each turbine will require an operational area of 20m x 40m at a depth of 0.300m and a further four small areas of hardstanding of 2.5m x 2.5m x 0.500m, this equates to a total requirement of 729m^3 (approximately 1,313 Tonnes) for all three turbines. Therefore an estimated 66 deliveries of road stone will be required for this activity, resulting in a total of 132 two-way trips.

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Control Building and Electrical Substation Foundations

4.13.10 Approximately 150m^3 of concrete is required to construct the foundations of the substation and hardstanding area. Assuming a load capacity of 6m^3 per HGV, 25 loads would be required, resulting in 50 two-way trips.

Electrical Substation Delivery

4.13.11 Although the exact sub-station specification and means for delivery is yet to be confirmed, 10 loads are assumed to be required to deliver the substation, compound and associated fencing etc. A total of 20 two-way trips are therefore required for these items.

Cabling

4.13.12 Underground cabling will be installed on-site to connect the turbines with the substation. Based on the proposed turbine and substation arrangement, a maximum of 1.54km of track would need to be served by three lines of cabling, therefore approximately 4.62km of cable is required. Assuming that the cable is delivered in 500m drums and an HGV can carry eight drums, it is estimated that two loads are required, therefore resulting in four two-way trips.

Sand

4.13.13 Cabling in trenches (1.0m deep and 0.5m wide) will be protected by a maximum of 300mm of soft sand and backfilled with material from excavations on the development site, where appropriate. Based on a density of 1.6t/m^3, this equates to approximately 240 tonnes of sand per kilometre of trench. Therefore based on 1.54km of access track, a total of 370 tonnes will be required. Assuming an HGV can carry 20 tonnes per load, this would result in 38 two-way trips.

Turbine Bases

4.13.14 The design of the turbine foundations (16m x 16m x 1.5m) requires up to 384m^3 of concrete per base. Given that three turbines are proposed for the site, a total volume of approximately 1,152 m^3 of concrete would be needed. Assuming a load capacity of 6m^3 per HGV, 192 loads would be required, therefore 384 two-way trips. Technical constraints may require the concrete for an individual turbine to be delivered and poured in one day to prevent joints in the mass structure. This creates a short but disproportionate impact and has therefore been considered separately from the impact of the other traffic movements.

Formwork & Reinforcing Steel

4.13.15 Formwork and reinforcing steel is required for the concrete bases. Each turbine will require two deliveries of steel. In addition, a total of four loads of formwork will be required for all the bases. Based on three turbines, a total of 10 deliveries will therefore be required, resulting in 20 two-way trips.

Mobile Crane Delivery & Removal

4.13.16 It is assumed that crane parts will be delivered on a maximum of 10 HGVs, including ballast. A total of 40 two-way trips will therefore be generated for delivery and removal (20 for delivery and 20 for removal).

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Turbine Delivery

4.13.17 Six vehicles are required to deliver the components for each full turbine (assuming one for nacelle, three for the blade set, and two for the tower). Given that there are three turbines proposed on the site, a total of 18 loads will be delivered, resulting in 36 two-way trips.

Base Rings

4.13.18 Each turbine base is surmounted with a circular steel support plinth to suit the base profile of the turbine tower. A maximum of three base rings can be loaded onto an HGV therefore one load is required, resulting in two two-way trips.

Blade Hubs

4.13.19 Each turbine requires a hub to attach the blades to the nacelle. A maximum of three hubs can be loaded onto an HGV therefore one load is required, resulting in two two-way trips.

Traffic Generation Summary

4.13.20 Table 4.1 summarises the predicted traffic generations associated with each relevant activity during the construction phase.

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Table 4.1 Traffic Generations

Activity	Total Loads	Total Trips (Two-way)
Delivery of Road Stone for Construction Compound	44	88
Delivery and Removal of Plant and Equipment	120	240
Delivery of Road Stone for On-site Access Tracks	208	416
Delivery of Geogrid Material	4	8
Delivery of Road Stone for Areas of Crane Operation	66	132
Delivery of Concrete for Substation	*25*	*50*
Delivery of Sub-station equipment	10	20
Delivery of Cabling	2	4
Delivery of Sand	19	38
Delivery of Concrete for Turbine Basis	*192*	*384*
Delivery of Formwork and Reinforcing Steel	10	20
Delivery and Removal of Mobile Crane	20	40
Delivery of Turbines	18	36
Delivery of Base Rings	1	2
Delivery of Blade Hubs	1	2
Total (excluding concrete)	**523**	**1,046**
Total (including concrete)	**740**	**1,480**

Source: Entec UK Ltd

4.13.21 The construction period of the proposed development will be approximately nine months, with HGV deliveries to the site being made for the first six months. Table 4.2 below shows the total trips distributed according to the 6-month indicative construction programme in order to demonstrate the worst case.

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Table 4.2 Two-way trips per month

Activity	Month					
	1	2	3	4	5	6
Stone for Compound	88					
Delivery of plant and equipment	60	60				
Road Stone for Access Tracks	208	208				
Road Stone for Crane Areas			132			
Culvert Materials		20				
Geogrid	4	4				
Substation Foundations						50
Substation						20
Cabling			4			
Sand			38			
Turbine Bases				384		
Formwork and Reinforcing Steel				10	10	
Crane Delivery			20			
Delivery of Turbines					36	
Delivery of Base Rings					2	
Delivery of Blade Hubs					2	
Crane Removal						20
Removal of plant and equipment						120
Total Trips	**360**	**292**	**194**	**394**	**50**	**210**

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4.13.22 Table 4.3 shows the total daily trips by month for all construction, based on an average of 4½ weeks per month and an average five working days per week[12] (rounded down to 22 days per month). It should be noted that figures have been rounded up to even figures to account for two-way trips being made in a day.

Table 4.3 Estimated Maximum Daily Two-way Trips per Construction Month

	Month					
	1	2	3	4*	5	6
Excluding concrete deliveries						
	18	14	10	2	4	10
Days involving concrete deliveries only						
	N/A	N/A	N/A	128 (x 3 days)	N/A	N/A

* For a robust assessment, traffic movements (excluding concrete deliveries) during the fourth month have been calculated based on 19 working days as opposed to 22 working days for other months. This is due to the netting out of days when concrete deliveries are made, in which case it is likely that no other deliveries are likely to take place during these days (as detailed below).

4.13.23 Table 4.3 shows that the maximum traffic impact associated with the construction of the proposed wind farm, excluding the concrete deliveries, is predicted to occur in the first month of the construction programme. During this month, an average of 18 two-way trips are predicted to be generated on each working day, i.e. 9 in and 9 out. On average, this equates to two deliveries into the site per hour over a 12 hour period (Monday to Friday 07:00-19:00).

4.13.24 The movements of concrete lorries are restricted by the pouring method to a total of 3 days, with all deliveries for one turbine base required during the same day. As a result there will be 3 days during the 6 month programme when 64 deliveries of concrete (128 total vehicle movements) will occur. It is assumed that deliveries of other materials will not take place when concrete is being poured.

Percentage Impact

4.13.25 The impact of construction related traffic identified in Table 4.3 has been calculated, in percentage terms, relative to the background traffic in the construction year of the development (2009), both with and without concrete deliveries. This exercise has been conducted for the 'maximum credible case' month in the construction programme in terms of traffic generation, i.e. month one.

[12] Whilst some weekend working may occur, the level of activity on the site is likely to be lower than during the working week therefore no weekend assessment is included

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Table 4.4 shows the predicted percentage impact at A628 (Manchester Road) and Royd Lane.

Table 4.4 Predicted 'maximum credible' Percentage Impact (2009)

Count Site	Location	Total Flows	Base HGVs	Construction HGVs	Percentage Impact Total Flow	Percentage Impact HGVs
Days with no concrete deliveries						
1	A628 (Manchester Road)	4,831	561	18	+0.4%	+3.2%
2	Royd Lane	820	60	18	+2.2%	+30%
Days of concrete deliveries						
1	A628 (Manchester Road)	4,831	561	128	+2.6%	+22.8%
2	Royd Lane	820	60	128	+15.6%	+213%

Source: Paul Castle Consultancy Ltd

Summary

4.13.26 The above exercises have been conducted for the predicted worst-case month for traffic generations within the construction programme. That is, month one excluding concrete deliveries, based on an average of 18 two-way HGV trips per day (9 in and 9 out). A scenario has also been assessed based on days involving concrete deliveries, these days are predicted to take place within month four (inclusive) of the construction programme.

4.13.27 During month one, it is predicted that there will be increases in HGVs during the assessment period of 3.2% and 30% on the A628 (Manchester Road) and Royd Lane respectively.

4.13.28 During days involving concrete deliveries (3 days out of the 6 month programme), it is predicted that there will be increases in HGVs during the assessment period of 22.8% and 213% for the A628 (Manchester Road) and Royd Lane respectively.

4.13.29 It should be noted that the HGV trip generations used for the assessments are based on the worst-case months during the construction programme. However, as shown in Tables 4.2 and 4.3, it is expected that during the remainder of the programme, traffic generations will be much less than this figure (with the exception of days involving concrete deliveries).

4.13.30 A full traffic and transport assessment, which considers construction generated traffic, is provided in chapter 10.

4.14 Maintenance and Operation

4.14.1 It is anticipated that the proposed Blackstone Edge Wind Farm will be operational in January 2010.

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4.14.2 Once operational, the Blackstone Edge Wind Farm would be operated remotely from a central control room at Rheidol Hydroelectric Power Station in Wales, and an existing, off-site local maintenance contractor's office, which would not be permanently manned.

4.14.3 The Wind Farm operations will be overseen initially by the turbine manufacturer and later by suitably qualified local contractors who will visit the Development Site to carry out regular inspection and maintenance activities. The following turbine maintenance will be carried out, along with any other maintenance required by manufacturer's specifications:

- Initial service;
- Routine maintenance and servicing;
- Gearbox oil change; and
- Blade inspection.

4.14.4 Servicing shall include the performance of tasks such as maintaining bolts to the required torque, adjustment of blades, inspection of blade tip brakes and inspection of welds in the tower. In addition oil sampling and testing from the main gearbox will be required and oil and components replaced at regular intervals. In the event of any unexpected events onsite, such as failure of a generator or gearbox, appropriate maintenance works will be carried out immediately.

4.14.5 Ongoing track maintenance will generally be undertaken in the summer months when tracks are dry. Safe access will be maintained all year round.

4.15 Decommissioning

4.15.1 Following the construction and commissioning of the wind farm it will be operational and generating electricity for 24 years, after which time it would be decommissioned. Alternatively, the life of the wind farm could be extended, subject to the award of a further consent. For the purposes of this ES it is assumed that decommissioning will occur at the end of the wind farm's 24 year lifetime.

4.15.2 Assuming the development site is decommissioned, the wind turbines and associated infrastructure would be removed in accordance with industry good practice and/or in compliance with any planning conditions which had been attached to the planning permission. Current industry good practice involves the complete removal of turbines, mast, switchgear and other equipment, the removal of the concrete foundation plinth and crane hard standings to below ground level and the re-instatement of these areas to their original condition prior to the wind farm being built. A Decommissioning Plan would be submitted to the appropriate authorities of the time.

4.15.3 In the same way as in the construction and operation phase inherent mitigation will be put in place in the decommissioning phase to protect the environment. The current consensus is that it is not appropriate to completely remove the entire turbine foundation, nor the roads and the cables between turbines due to the additional ground disturbance and potential for adverse environmental effects that

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this would involve. In any case, the access tracks are often a feature which landowners wish to retain following decommissioning.

4.15.4 A more detailed program of mitigation will be specified when the exact nature of the decommissioning is known, and will take into account any new guidance or legislation. Mitigation could include designing the access tracks to minimise disturbance to the environment in the same way as during the construction and operation phases, following appropriate guidelines for the handling and remediation of soils and formulating a site Environmental Management Plan in accordance with appropriate guidance.

4.15.5 The decommissioning process would take approximately two months to complete. A decommissioning programme would be agreed with the relevant authority prior to the commencement of decommissioning works.

4.16 References

British Wind Energy Association, 1995, Best Practise Guidelines for Wind Energy Development.

Entec UK Ltd, 2006, Blackstone Edge Community Power Wind Farm: Access Study.

The Control of Pollution (Oil Storage) (England) Regulations, 2005.

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