Chapter 4: The proposals

Introduction

4.1 This chapter describes the West Wight wind farm, commencing with an overview of the proposal followed by details of the construction, operation and decommissioning of the project.

Description of the development

Overview

4.2 The proposed wind farm will consist of six wind turbines and associated site infrastructure, and will have an installed electricity generation capacity of between 9.9 MW and 12 MW. The main elements of the proposal are outlined below and shown on figure 4.1.

4.3 At the time of application, it is not possible to state which precise model of wind turbine will be used because models are regularly updated and changed. For the purposes of this environmental impact assessment, the Vestas V82 two-speed turbine has been considered. The actual model of turbine installed is likely to be of the same or very similar dimensions and specification, and will be required to comply with (or improve upon) the noise limitations required by ETSU-R-97 and meet the physical characteristics detailed below.

4.4 It is anticipated that the site will remain in agricultural use throughout the construction and operation of the project. Only a relatively small footprint (approximately 1%) will be removed from the current arable use.

4.5 Materials and equipment will most likely be brought to the site from Newport along the A3045: abnormal sized loads will then travel to the site along Station Road and the B3401 Main Road through Wellow and Broad Lane; the conventional construction traffic will continue along the A3405 to Thorley Street, turn into Thorley Road and then also access the site from Broad Lane. A transport management plan will be developed for the construction phase of the development to ensure that all vehicles entering and leaving the site use designated routes that respect the sensitivity of local receptors.

Temporary elements

4.6 A short section of temporary track will be created in the north-west corner of the site to allow heavy vehicles to bypass the junction of Main Road and Broad Lane in Thorley. This will be completely reinstated when construction is complete.

4.7 Additional temporary site access tracks may be required by the construction contractor to allow efficient and direct access of plant and HGVs to the

construction sites at each turbine location. The precise details cannot be confirmed until the type of plant and mode of delivery are finalised, but these will be mostly small-scale. Only arable land will be affected, with no effect on trees or hedgerows. If constructed, these temporary tracks would be approximately 5 metres in width. The construction of these temporary additional access roads would necessitate further HGV movements to take the material away from the site at the end of construction, and the traffic assessment has been undertaken on this basis.

4.8 A temporary construction compound (unlikely to exceed 1,200m^2 in size) will be built to accommodate contractors' and site engineers' facilities (offices, toilets, etc), material storage, car parking and plant and material laydown facilities.

Permanent elements

4.9 The wind farm will comprise six wind turbine generators, each with a tubular steel tower, three glass fibre-reinforced epoxy turbine blades, a fibreglass nacelle (which houses the generator, gearbox and yawing mechanisms), and an enclosed, weatherproof electrical transformer. The Vestas V82 turbine is a three-bladed horizontal axis design with an 82 metre diameter (ie each blade is 41 metres long) upwind rotor. The advice of the landscape architect during the environmental impact assessment process was that the tip and hub heights of all six turbines should be a similar height with respect to the general site level (AOD) and important views. To achieve this, four turbines (2, 3, 4 and 6) have a hub height of 59 metres, giving a tip height of 100 metres, while the other two (1 and 5), which are sited in localised hollows, will be taller at 68.5 metres hub height above local ground elevation, giving a tip height of 109.5 metres. Thus the overall height of the wind farm will appear to be level. The finish and colour of the turbines will be agreed with the IoWC, but they are likely to be light grey in colour and with a semi-matt finish.

4.10 The electrical transformers will be located inside the turbine towers.

4.11 An area of hardstanding approximately 35 metres by 18 metres will be created adjacent to each wind turbine. These 'crane pads' are used as a lay-down area and as a base for cranes and other vehicles during construction, maintenance and decommissioning. The crane pads will remain in place throughout the life of the project.

4.12 Approximately 3 kilometres of new, permanent site access tracks will be required for construction and operational access to the wind turbines and infrastructure. These will be approximately 5 metres in width for the duration of the construction period. At the end of construction all of these tracks will be downgraded to a nominal 3 metres running width by reseeding the edges.

4.13 The wind farm will need an electrical switching station. This houses the electrical switchgear and metering equipment, and will comprise a single story, pitched roof building, approximately 7 metres by 5 metres in plan, and 4

metres in height. A small roadstone parking bay will be located adjacent to the switching station.

4.14 A self-supporting, lattice meteorological mast (approximately 59 metres in height) will be erected on site to collect wind speed and direction data during operation.

4.15 Approximately 3.5 kilometres of underground electrical and communication cabling will be installed between turbines and the switching station building, routed alongside or under the site access tracks.

4.16 No lighting will be required for the turbines, although the electrical switching station will have some low voltage security lighting switched from inside the building.

4.17 Although not part of this application, a permanent connection to the local electricity distribution network is required. It is likely that this electrical connection will travel underground from the wind farm's switching station to the local distribution network at the existing 33kV overhead line located to the north of the site (figure 4.2).

4.18 The electrical connection is likely to follow the route shown on figure 4.2, either adjacent to Broad Lane, or parallel to Broad Lane within the agricultural land holding. The consents that are necessary for this connection will be obtained by Scottish and Southern Electricity (SSE).

Activities during and post-construction

Construction programme

4.19 Construction of the wind farm is likely to take approximately six to nine months and will be executed on a rolling programme as outlined in table 4.1. No hedgerows or trees need to be removed from the site for construction, with the exception of a very limited (approximately 5 to 10 metres) stretch of hedge bank to facilitate site access.

4.20 Prior to construction, an environmental management plan will be prepared for implementation during construction to direct, monitor and record the environmental performance of activities at the site. The scope of this plan will be agreed with the IoWC in advance.

Site mobilisation and establishment of construction compound

4.21 The establishment phase will last up to two months but the majority of the activity will take place in the first month. The main two to four week site mobilisation period involves the delivery to site of the plant, equipment and materials required to construct and equip the temporary construction compound and construct the access tracks. These items include earthmovers, excavators, rollers, site offices, security fencing and aggregate.

Activity	Month								
	1	2	3	4	5	6	7	8	9
Site mobilisation & establishment of construction compound	■	■							
Establishment of transport routes, site access tracks and crane pads	■	■	■	■	■				
Turbine & switching station foundations. Site electrical cabling.		■	■	■	■	■			
Erection of wind turbines and switching station				■	■	■	■		
Commissioning of wind farm and full operation						■	■	■	■

Notes: The electrical connection to the local grid is outside this application but is likely to take place at the same time as the erection of the turbines.
Site remediation is due to be completed within 6 months of the project becoming operational.

Table 4.1: Longest likely construction programme

4.22 During this same period, the temporary construction compound will be created. Its location (figure 4.1) has been selected to minimise impact on areas of habitat and archaeological interest, whilst ensuring security, safety and efficiency during the construction process.

4.23 The amount of construction material required for the construction compound will depend on the bearing capacity of the ground within the site, but is estimated to be 3,150m^3 (or 7,900 tonnes). The roadstone material will be sourced from within the Isle of Wight and transported to site on 20 to 27 tonne vehicles during a two-week period. Assuming 25 tonne vehicles, this corresponds to approximately 32 deliveries and 32 return journeys of empty trucks per working day over the 2 week period.

4.24 Suitably designed soakaways will be installed to avoid the possibility of erosion caused by run-off from the construction compound during construction and use.

Establishment of access tracks and crane pads

4.25 The construction of permanent and temporary access tracks and crane pads is expected to take three to four months in total. All affected areas will be stripped of soil and/or graded, while geotextiles and aggregates will be laid along the site access track routes and crane pad locations. In order to minimise potential impact on underground archaeological features, crane pads will be surface mounted. They will be seeded with an appropriate seed mix after construction to minimise visual impact.

4.26 The proposed site track layout has been designed to minimise the length of new access roads required and the impact on existing farming practices on the site. Consideration has also been given to the ecological and archaeological findings of the environmental impact assessment.

4.27 The requirement for construction material for the new site access tracks and crane pads will depend on the bearing capacity of the ground within the site,

but is estimated at 9,900m^3 (or 25,000 tonnes). Roadstone, sourced from the Isle of Wight, will be transported to site on 20 to 27 tonne vehicles during a two-month period, amounting to approximately 25 roadstone deliveries per working day (based on 25 tonne vehicles).

4.28 One of two standard designs is typically used for the site access tracks, with the selection determined by the underlying ground conditions. A floating track may be used where the underlying material is soft and of significant depth (ie more than 1m) to minimise disruption to the underlying soil structure. A cut track is generally used where good foundation materials (such as underlying rock head or hard strata) are found at or near the surface (ie <1m).

4.29 For the temporary construction period access track, a shallow depth of aggregate material will be laid along the route and metal mesh matting laid on top to facilitate vehicle access. The aggregate material and the metal mesh matting will be removed on completion of the construction operations and the disturbed area reinstated.

4.30 During the construction of the site access tracks and crane pads, excavated material will be stockpiled for use in re-dressing the permanent access track edges or forming berms along the access track edges in order to reduce the visual impact of the access tracks on completion of construction.

4.31 The access tracks will be designed to minimise run-off during construction and operation, by allowing water to permeate through the surface and disperse into the underlying strata. Channels will be formed along the track edges to route excess run-off water to soakaways.

Turbine and switching station foundation construction

4.32 The turbine foundations are likely to be of gravity type, constructed from steel reinforced concrete. Turbine foundations will be up to 17 metres by 17 metres in size and approximately 3 metres deep.

4.33 The foundations for the turbines will be founded directly onto the subsoil/rock approximately 2 to 3 metres below existing ground level (subject to confirmation during detailed site investigation; the details of foundation design will be decided post-planning consent, and can be covered by the site environment management plan).

4.34 A plinth will rise from each turbine foundation to form an interface with the turbine tower. Service ducts through the foundation permit electrical and communication cables to pass into the turbine.

4.35 Following the completion of construction, the turbine foundation excavation will be back-filled with granular material of a specified minimum density to just beneath ground level, with further backfilling taking place to ground level using the original topsoil material excavated from the turbine base. Once the landscaping around the turbine foundation is complete, the disturbed area will be seeded with an appropriate seed mix.

4.36 The switching station is likely to be a free standing modular construction supported on a prepared level foundation with excavation and soil replacement as appropriate to provide the required load bearing capacity.

4.37 During the construction of foundations, excavated material will be stockpiled for use in re-dressing the permanent access track edges or forming berms along the access track edges in order to reduce the visual impact of the access tracks on completion of construction.

Erection of wind turbines and switching station

4.38 The wind turbines and switching station will be erected during a three to four month period. Wind turbine components will be assembled adjacent to their respective foundations and lifted into place by crane.

4.39 The electrical switching station will be a modular pre-fabricated unit, with a finish and colour to be agreed with the IoWC.

Cabling and site commissioning

4.40 The route of the electrical and communications cabling has been designed to maintain operational flexibility, reliability and safety. Wherever possible, the cabling will run underground along the route of the access track to the electrical switching station (minimising environmental disturbance), and will total approximately 3.5 kilometres in length (figure 4.2).

4.41 Commissioning of the switching station will commence on completion of the electrical connection to the local distribution grid, followed by commissioning of individual turbines. It is possible that the first turbines will be commissioned prior to the completion of erection of the final turbines, such that the commissioning and construction activities may overlap (table 4.1).

Operation

4.42 Within six months of the wind farm becoming operational, all portacabins, containers, machinery and equipment will be removed from the construction compound and the area will be fully restored to agricultural use. Re-instatement will use stored topsoil excavated during the construction operations and appropriate seed mixes where necessary.

4.43 During operation, the turbines will generate renewable electricity at 690 volts, and this will be stepped up to 33kV by each turbine's dedicated transformer, located within the turbine tower. The wind farm's underground 33kV cabling network will connect these transformers to the on-site switching station. From here, the wind farm will supply electricity to the local distribution network.

4.44 The rotational speed of the V82 turbine when in operation is typically 14.4 revolutions per minute. To facilitate optimal energy capture and keep noise to a minimum, the rotation speed is reduced to 10.8 revolutions per minute in low wind speeds. The turbines will operate in hub-height wind speeds of between (approximately) 2.5 m/s and 20 m/s. The turbines will shut down at hub-height wind speeds greater than 20 m/s, to avoid damage to the turbine.

4.45 Wind speed data collected on site indicate that the wind farm will generate varying amounts of electricity for approximately 80% of the year. It is predicted that the turbines will shut down due to high winds for less than 0.5% of the year.

4.46 Communication cabling (known as SCADA) will connect each of the turbines to the switching station, providing the operator with the facility to monitor and control the wind farm remotely, thereby minimising the requirements for site visits.

4.47 Scheduled maintenance of the wind farm will take place every six months, involving a variety of tasks from grounds and building maintenance to inspection and testing of mechanical and electrical plant. Unscheduled maintenance activities will be undertaken as required to ensure the efficient operation of the windfarm.

Decommissioning

4.48 At the end of the 25 year planned life of the wind farm, it will either be decommissioned and the site reinstated (by agreement with the landowner) or a new planning application may be submitted to retain or modify the existing development. Such an application will need to meet the planning and environmental impact assessment requirements in force at the time.

4.49 The decommissioning period for the wind farm is estimated at four months, and will involve the removal of all above ground structures and the reinstatement of ground disturbed by the works to agricultural use.

4.50 Decommissioning will take account of the environmental legislation and technology available at the time of decommissioning. Notice will be given to the IoWC in advance of the commencement of the decommissioning works with all necessary licences or permits being acquired. Decommissioning will be timed to minimise its environmental impact.

4.51 The operator will develop a decommissioning plan and the works will be undertaken in accordance with a statement of operations which will cover safety and environmental issues during decommissioning. A crane will be required to dismantle the turbines.

4.52 Decisions on re-use of plant items, recycling of materials or their disposal will be made at the time of decommissioning in the light of the technology then available, environmental and economic considerations, and legislation. Being made of steel, the turbine towers and the gears and shafts in the nacelle will be fully recyclable. It is likely that unsalvageable material will be disposed of at a licensed landfill.

4.53 The foundations will be removed to a depth of 600 mm below grade and the soil surface restored to its original condition. At least 500 mm of topsoil will be replaced above any infill. Disturbed areas will be re-vegetated.

4.54 The access roads will be removed or left in place depending on the landowner's preference. It is likely that the underground cabling would also be left *in-situ*.

4.55 Compared to other power generation technologies, wind turbines can be easily and economically decommissioned and removed from site at the end of their economic life and the site returned to its original condition. There will be little or no trace that the wind turbines had been there following decommissioning. As implied in the companion guide to PPS 22 (*Planning for Renewable Energy, A Companion Guide to PPS22*, HMSO, 2004) the decommissioning of wind turbines and their removal from the landscape ensures that any visual impacts are temporary and reversible.