2 Site Selection & Design

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2.1 Introduction

2.1.1 This chapter provides a description of the site selection process and design iterations that were undertaken prior to arriving at the final design which is described in Chapter 3.

2.2 Background

2.2.1 The Applicant proposes to construct the Proposed Development as part of a phased programme for redevelopment of the 'Hagshaw Cluster' over the next five years (discussed further in Chapter 3).

2.3 Site Selection

2.3.1 As neighbouring landowners to Cumberhead Forest, 3R Energy are working in partnership with ScottishPower Renewables (SPR) to develop a wind energy scheme on the eastern part of the Cumberhead Forest as an extension to the consented Douglas West Wind Farm – known as 'Douglas West Extension'. As landowners of Scotland's first wind farm on the neighbouring Hagshaw Hill, 3R Energy have also recently concluded arrangements with SPR to repower Hagshaw Hill Wind Farm at the end of its operational life. 3R Energy and SPR have now extended their partnership to develop the Cumberhead West Wind Farm (the Proposed Development) which would complete the wind energy picture within the western part of the forest. Refer to Figure 1.2.

2.3.2 There are many benefits in taking these projects forward in partnership, including: helping to create and sustain local employment, keeping income generated in the local area, and maximising renewable generation and community benefit opportunities from the sites. Together, these projects create a unique opportunity for the local area to secure a substantial 30 year income stream that could deliver a transformational change agenda for the villages of Coalburn, Lesmahagow, Douglas and outlying settlements, aligned to a strategic opportunity to develop a regional Adventure Tourism destination on the M74.

2.3.3 There are also many benefits from a physical perspective which can be achieved by these projects being taken forward in a coordinated fashion, including:

- Delivery of an outcome which is better designed in landscape terms, more strategically efficient and cost-effective;
- Optimisation of renewable generation from an established wind farm location;
- More efficient use of existing infrastructure and grid connection assets;
- Consideration of energy storage options;
- Better coordinated habitat management proposals;
- Enhanced public access delivery across multiple sites; and
- A significant Community Benefit package which would generate a 30-year income stream to fund a Local Investment Strategy for the area.

2.4 Alternative Sites

2.4.1 EIA legislation requires the consideration of alternatives and an indication of the reasons for selecting the site, except where limited by constraints of commercial confidentiality.

2.4.2 As noted above, the Proposed Development site sits within a landscape of operational or consented wind farm developments, part of the 'Hagshaw Cluster' which benefits from a strong wind resource, direct access to the M74 motorway and proximity to the electricity network. It is therefore considered to be a suitable site for wind energy development, making use of some existing site

infrastructure and recognising the accepted principle of wind energy generation within the local landscape.

2.4.3 The Proposed Development site is considered an appropriate and viable location for a wind energy project due to:

- Remoteness from communities;
- Good average wind speeds and generation capacity, evidenced by the surrounding operational sites;
- Being within an established wind farm landscape, where there is an opportunity to progress a coordinated layout, phasing, access, grid connection and landscape strategy throughout the 'Hagshaw Cluster';
- Easily accessible direct from the M74 without the requirement to pass through any communities;
- Ability to re-use existing access tracks (both to and within the Proposed Development site) with minor upgrading;
- Ability to extend existing borrow pits used previously for forestry access track construction;
- In close proximity to a viable grid connection point;
- Positively contribute to regional and national renewable energy and carbon reduction targets; and
- Provision of social and economic benefits to the local area.

2.5 Design Process

Design Principles

2.5.1 Current best practice guidance provides a framework for the consideration of key design issues including turbine size, layout composition, wind farm design in relation to landscape character and designing for multiple wind farms (SNH, 2017).

2.5.2 The following principles were adopted during the design iterations made by the Applicant to ensure that the final design of the Proposed Development was the most suitable for the site:

- Avoided inconsistent turbine spacing, such as relatively large gaps, outliers or excessive overlapping turbines to minimise visual confusion and ensure a balanced / compact array from key views;
- Considered the positioning of existing and consented wind farm developments in the local area from key views;
- Consistency in turbine scale with consented and proposed developments in the immediate vicinity;
- Avoided locating turbines on the highest point of Nutberry Hill;
- Retained a separation of at least 1 km from the closest isolated residential dwellings that are not financially involved in the Proposed Development;
- Minimised impacts on the existing forestry resource and operations within the site;
- Suitable stand-off distances to nearby SPA/SSSI designated sites;
- Avoidance of areas of deep peat wherever possible;
- Location of watercourses and ground conditions/topography; and

- Other environmental constraints and associated buffers.

2.5.3 Other objectives were to maximise the use of existing infrastructure within the Proposed Development site including existing tracks (both to and within the Proposed Development site) and borrow pits.

Turbine Layout & Scale

2.5.4 The Applicant has considered a number of alternative layouts for the Proposed Development. The finalised layout is the sixth iteration of the Proposed Development. The preliminary layouts took account of identified technical and environmental constraints, particularly associated with proximity to residential dwellings, environmental designations and areas of deep peat, (see Chapters 3 Proposed Development and 11 Hydrology), based on desk- study and field survey work, as well as preliminary viewpoint wirelines and wind yield analysis.

2.5.5 Preliminary wirelines were generated for a range of layout options, to assess the suitability of design with respect to visual effects on key receptors. Wireframes were generated from key viewpoints in the local landscape, each of which is a representative assessment viewpoint in the Landscape and Visual Impact Assessment (LVIA) (Chapter 6). The Applicant's professional advisors produced and reviewed the preliminary wireframes and analysed the landscape capacity of the Proposed Development site, in order to advise on the most appropriate design to maximise renewable energy generation from the site while not resulting in unacceptable landscape and visual effects. Regard was taken in this process to the other operational and consented schemes in the landscape near to the site and the manner in which they would already serve to create a wind farm landscape in which the Proposed Development would be sited.

Design Iterations

2.5.6 The initial layout (referred to as "Layout A") was developed with 26 turbines to maximise utilisation of the site. Layout A is shown in Figure 2.1.

2.5.7 Layout B was developed from the landscape and visual feasibility studies and used to inform the EIA Scoping Report issued in June 2020 is shown in Figure 2.2. At scoping stage, the main developable area identified encompassed the extent of the Cumberhead forestry boundary. Layout B was developed from the initial layout to move turbines away from residential properties at Birkenhead Farm, the design was amended during the design iteration process to increase the distance between the turbines and properties in this part of the landscape, thereby reducing the potential visual effect on this area. Layout B was also developed to increase the stand-off to the Muirkirk and North Lowther SPA to the north and north west. The number of turbines was reduced from 26 to 20 turbines.

2.5.8 Layout C (shown in Figure 2.3) was developed following Scoping and took into account the findings of initial environmental surveys and feedback from neighbouring properties and wider consultees. The site boundary was extended to include an additional area of land identified to the south-east of the main developable area, and two turbines were added, utilising this area. This area of land enabled the proposed turbine locations to offer a more compact and harmonised layout with the adjoining wind farm developments when viewed from key receptors to the east. Turbines were consequently removed from the north-eastern extent of the site to increase separation distance from uninvolved residential properties, and following initial peat depth surveys, the northernmost turbines were relocated to avoid areas identified as being deep peat.

2.5.9 Layout D (shown in Figure 2.4) introduced an alternative access route along an existing forestry track to the south east of the main developable area. At the same time turbines were further pulled back from the north-eastern area of the site and one turbine was removed, thereby further reducing the potential visual effect on the residential properties to the north-east.

2.5.10 Layout E developed a preliminary infrastructure layout for a 21 turbine scheme and is shown in Figure 2.5. This also included the movement of T19 west to increase distance from the geological SSSI. As noted above, the Proposed Development utilises existing infrastructure as much as possible,

following existing forestry tracks and developing historically quarried areas for borrow pit search areas.

2.5.11 Further design iterations were undertaken following phase 2 peat probing and on-site walkover surveys. Identification of an unused existing track informed the movement of T5 to the west and the access track between T16 and T19 was realigned to make use of an existing water crossing. Based on the results of phase 2 peat surveys, to avoid areas of deep peat, the track between T17 and T18 was moved east, the track between T10 and T11 was moved south, and the track to T13 was redesigned. In addition, the substation was relocated towards the centre of the site (as is preferable from a power balance perspective) once further peat probing identified a suitable location.

2.5.12 The resulting final layout taken forward to application is shown in Figure 3.1 and described in detail in Chapter 3.

Forestry

2.5.13 An important factor taken into the design and positioning of the final turbine layout has been the existing forestry resource across the site. Where possible turbines were micro-sited to minimise the number of forestry blocks that required clear felling as part of the Proposed Development. Further assessment of the potential effects on the commercial forestry operation is provided in Chapter 16.

2.5.14 The design also took into consideration the recommended bat habitat standoff distances from blade swept path to key habitat features (woodland edge/ treetop) (Natural England, 2014). Turbines will be 'keyholed' within the replanted commercial forest and 20 m tree free area placed around access tracks and the substation area.

Access Tracks & Crane Hardstanding

2.5.15 The site benefits from existing access from the M74 Junction 11, along an existing tarmac haul road and then (following construction a short new link road) along existing forestry access tracks to the main body of the Proposed Development site. The on-site access tracks are also part defined by existing infrastructure (forestry tracks) which has been re-used wherever possible.

2.5.16 Proposed new tracks have been designed to take into account existing wayleaves between forest blocks in order to reduce impacts on the commercial forestry operations and are also based on site topography, underlying ground conditions and to minimise and appropriately locate water crossings.

Substation & Construction Compounds

2.5.17 The first proposed construction compound and laydown area are located at the entrance to the main development area to optimise construction activities. The proposed substation location, which will also incorporate an energy storage facility, and the second construction compound are located near the centre of the main development area. All have been sited to avoid watercourses, areas of deep peat and minimise impacts on sensitive habitats.

2.6 Summary

2.6.1 The final Proposed Development layout has been informed by a robust design iteration process, taking into account potential environmental, landscape and visual impacts and their effects, physical constraints, and health and safety considerations. The information used to inform the design iteration process included baseline data, review of preliminary visualisations, ongoing impact assessments and wind yield optimisation.

2.6.2 The final turbine layout and scale has been designed to maximise renewable energy generation from the site, whilst keeping within acceptable limits for potential impacts on the environment.

2.6.3 The EIA Report is based on the final layout selected for the Proposed Development. The final layout comprises 21 turbines up to 200 m in height and associated access tracks, crane hardstandings,

substation and energy storage facility, construction compounds, laydown area, borrow pit search areas and two meteorological masts.

2.7 References

Natural England (2014). Bats and onshore wind turbines: interim guidance. Third Edition TIN051.

SNH (2017). *Siting and Designing Wind Farms in the Landscape. Version 3a.* Available at: https://www.nature.scot/siting-and-designing-wind-farms-landscape-version-3a

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