UPPER OGMORE WIND FARM

Design and Access Statement

JUNE 2020

CONTACTS

DAVID JONES
Associate Technical Director

dd + 44 (0) 29 2092 6700
df +44 (0) 29 20926775
m +44 (0) 7525731266
e David.jones@arcadis.com

Arcadis.
Arcadis Cymru House
St Mellons Business Park
Fortran Road
Cardiff
CF3 0EY
United Kingdom

Upper Ogmore Wind Farm

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Author	Kate Tomos
Checker	David Jones
Approver	David Jones
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CONTENTS

1 Introduction

1.1 Background

The Applicant, Renewable Energy Systems Ltd (RES) is proposing to develop the Upper Ogmore Wind Farm and Energy Storage Facility on land at Grid Reference E29150, N19450 to the north of Bridgend in the administrative boundary of Bridgend County Borough Council (BCBC). The Upper Ogmore Wind Farm is hereafter referred to as 'the Development.'

A detailed description of the Development is provided in Section 1.3 of this Design and Access Statement (DAS) in relation to the following works, as set-out within the planning application:

'The Development of seven three-bladed wind turbines incorporating four up to a maximum tip height of 149.9m and three up to a maximum tip height of 130m, along with a site entrance, new access tracks, crane hardstanding, control building and substation compound, electricity transformers, energy storage containers and drainage works.'

This Statement has been prepared in accordance with statutory legislation for Developments of National Significance ("DNS") to be submitted to the Planning Inspectorate Wales under Part 5 of the Planning (Wales) Act 2015, which amends the Town and County Planning Act 1990 ("the Act") and the Developments of National Significance (Procedure) (Wales) Order 2016 and subsequent Regulations.

The statutory requirement for a DAS to accompany an application for a DNS is prescribed in Article 14 of 'The Developments of National Significance (Procedure) (Wales) Order 2016.'

Preparation of the DAS has had regard to the following national and local policy guidance:

- Design and Access Statements in Wales: Why, What and How, Design Commission for Wales (2014) (Ref 1);
- Technical Advice Note 12: Design, Welsh Assembly Government (2009) (Ref 2);
- Planning Policy Wales, 9th Edition, Welsh Government (November 2016) (Ref 3);
- Designing Wind Farms in Wales, Design Commission for Wales (Updated 2014) (Ref 4);
- Bridgend County Borough Council Local Development Plan (2013) (Ref 5); and
- Neath Port Talbot County Borough Council Local Development Plan, 2011 – 2026 (Ref. 6).

The Statement forms part of a suite of documents which comprise the application for the proposed Development, consisting of application drawings, forms and certificates, Planning Statement, Environmental Statement (ES) and Pre-Application Community Consultation (PACC) Report.

This Statement provides details of the design principles that have influenced the wind farm proposal and the access issues associated with the application site in accordance with relevant policy and guidance.

No single approach is required by the above guidelines, and the content and level of detail to be contained within a DAS varies, depending upon the scale and type of the development proposed. Within the context of this application, the structure of the DAS is set-out broadly in line with these guidelines as far as is relevant to the proposed Development.

1.2 Site Location

The application site is located on privately owned agricultural land to the south of the A4107 in Bridgend County between Blaengwynfi, Nantymoel and Blaengarw. A small portion of the site, relating to access on private forestry track, is located in Neath Port Talbot County. The location of the Site is shown on ES Figure 1.1 'Site Location Plan'.

The application boundary is shown on ES Figure 1.2 'Planning Application Boundary' and contains the main wind farm site, including the position of the wind turbines and associated infrastructure and all upgrades required along the access route.

The application site is centred on the summit of Werfa (568 m). From this high point the plateau slopes gently down in all directions, though only marginally to its northern boundary which follows the administrative

boundary between BCBC and NPTCBC across the upland. On the other sides the plateau drops sharply at the valley edges. Small watercourses drain the Site to the south-east and south-west.

Land cover consists of upland grassland, used as rough grazing. The application boundary adjoins coniferous plantations to the east, west and north, but there is none on the application site. The only enclosures are in the eastern part of the Site and comprise post and wire fencing. The summit of Werfa features an OS trig point and two communications masts within a fenced compound. The compound is accessed via a track from the A4107 and is serviced by a low-voltage overhead power line on wooden poles which runs from the Garw Valley. A series of vertical axis wind turbines were formerly located to the south of the masts, but only the foundations now remain. To the west and north the turbines of Llynfi Afan Wind Farm are located along the Werfa ridge.

There are several public rights of way (PRoW) crossing the application site, including a bridleway linking Cwmparc with the Garw Valley, and footpaths linking the surrounding valleys, and following the ridge of Mynydd Llangeinwyr south. Being unenclosed upland grazing, most of the application site is open access land, with the exception of the enclosed pastures in the east.

The north-east boundary of the application site follows the A4107, which connects the Afan Valley with the A4106, which in turn connects the Ogmore Valley with the Rhondda Valley. The application boundary also includes 3.6 km of forestry track to the north which runs between stands of commercial conifer plantation and is managed by Natural Resources Wales (NRW).

1.3 Project Description

The Development consists of the following elements, as shown on ES Figure 3.1 ‘Infrastructure Layout’.

- Seven three-bladed horizontal axis wind turbines, four up to 149.9 m tip-height and three up to 130 m tip height to be erected on steel re-enforced concrete foundations;
- Hardstanding areas at each turbine location;
- Approximately 4.3 km of new access track;
- An upgraded site entrance off the A4107;
- Wind farm substation compound containing a control building;
- 25 permanent containers housing energy storage devices, inverters and other ancillary equipment;
- Temporary construction compound;
- Permanent and temporary drainage works;
- Two borrow pits;
- Off-site road improvement works along existing forestry track;
- One temporary and two permanent PRoW diversions; and
- Provision of 10.00 ha of new common land.

1.4 Site Context

The application site, as defined by the red line boundary on ES Figure 1.2 ‘Planning Application Boundary’ covers an area of 384 hectares (ha). It is noted that the areas, as defined by the red line boundary, within each local planning authority are as follows:

- Site Area BCBC: 362 ha
- Site Area NPTCBC (access route only): 22 ha

There are no land-use allocations affecting the application site. The application site is located within a non-statutorily designated Special Landscape Area and Landscape Conservation Area. The Brecon Beacons National Park is located approximately 12 km north of the proposed Development. The Rhondda Landscape of Special Historic Interest is located to the north of the application Site on the opposite side of the A4107.

The majority of the application site is designated as Registered Common Land and includes a network of PRoWs that traverse the Site, as well as one bridleway.

Operational wind farms close to the Site include: Llynfi Afan (12 turbines) immediately west of the proposed Development; Pant-y-Wal/Fforch Nest 5.8km to the south-east (29 turbines); and the 76-turbine Pen y Cymoedd scheme to the north, approximately 6.5 km away.

2 Planning Policy and Guidance

2.1 Introduction

The design of the proposed Development has been influenced by a range of planning policy considerations, as well as good practice guidance. Full detail of the planning policy framework is provided within the Planning Statement and within Chapter 4 of the ES, which accompany this application.

This section provides an outline and assessment of the design policy framework at both a national and local level that is of relevance to the Development.

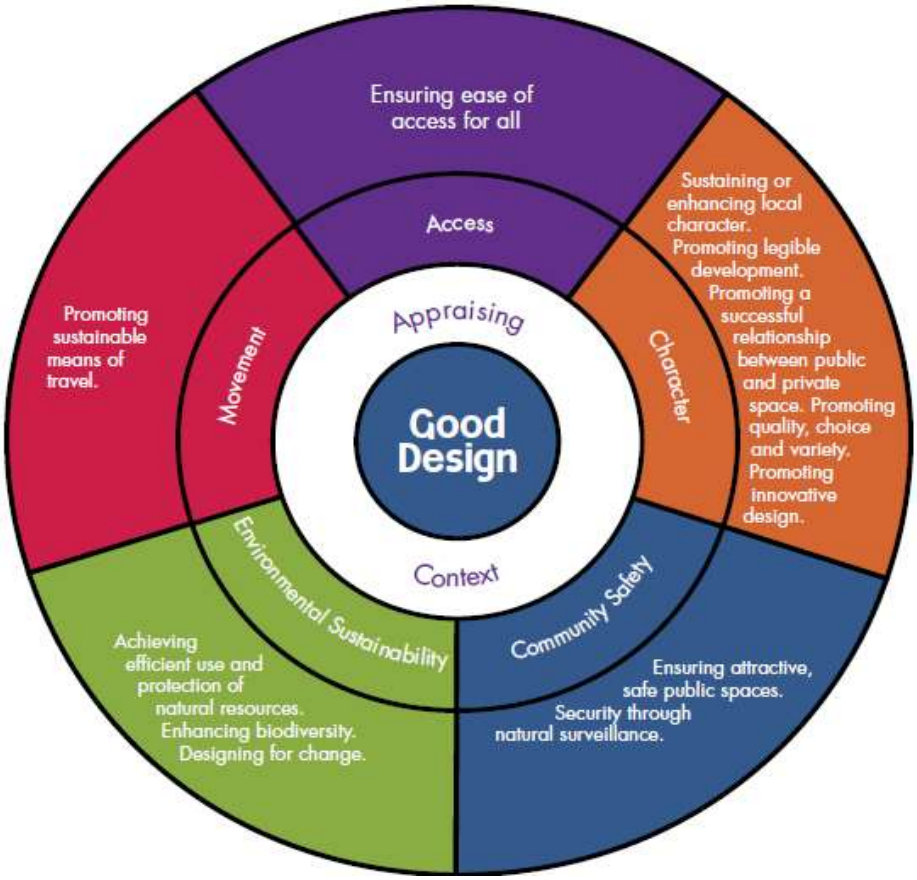
2.2 National Planning Policy

Planning Policy Wales 9th Edition, Welsh Government (November 2016)

Planning Policy Wales (PPW) 9th Edition (Welsh Government, November 2016) (Ref. 3) states that meeting the objectives of good design should be the aim of all those involved in the development process and applied to all development proposals. These objectives can be categorised into 5 key aspects of good design, shown as follows:

- Environment sustainability;
- Movement;
- Character;
- Community Safety; and
- Access

These and their associated explanations are presented in the following diagram:



Source: PPW 9th Edition (2016)

PPW 9th Edition states clearly that the design principles and concepts that have been applied to development proposals should be reflected in the content of any DAS and are material considerations in the determination process.

PPW 9th Edition considers that *'the visual appearance of the Development, its scale and relationship to its surroundings and context are material planning considerations'.* Whilst noting that local planning authorities (LPAs) should reject poor building and contextual designs, guidance makes clear that LPAs should not attempt to impose a particular architectural taste or style arbitrarily and should avoid inhibiting opportunities for innovative design solutions.

In preparing a DAS, applicants are advised that an integrated and inclusive approach to sustainable design should be followed, proportionate to the scale and type of the development proposal.

Technical Advice Note (TAN) 12: Design – Welsh Assembly Government (2009)

TAN 12: Design (Ref 2) is the principal source of design guidance for Wales and provides a broad framework with which to steer design standards and principles at the local level. It fully advocates those aspects of good design identified in PPW 9th Edition and presents a series of design guidelines to deliver these elements.

Appendix 1 of TAN 12 includes further detail regarding the content and form of a DAS and has informed the structure of this document. In relation to design, TAN 12 states that a DAS must explain the following:

- Access;
- Character;
- Community Safety;
- Environmental Sustainability; and
- Movement to, from and within the development.

One aspect highlighted as being of particular importance within the guidance are the contributory elements that define the character of the proposal, as set-out in PPW 9th Edition, namely the principles of 'amount', 'layout', 'scale', 'appearance' and 'landscaping' and how these have been addressed within the development proposal.

2.3 Local Planning Policy

At the local level the statutory Development Plan comprises the BCBC Local Development Plan (LDP) 2006-2021 (Adopted September 2013) (Ref. 5). As the access route is within NPTCBC the NPTCBC Local Development Plan, 2011 - 2026 (Ref. 6) has also been considered.

In providing the local planning framework for the proposed Development, the Adopted LDPs contain a number of policies of relevance. These are referred to in full within the accompanying Planning Statement and are not repeated here. However, those relating to the design and access aspects of the proposed Development are summarised below.

Bridgend County Borough Council Local Development Plan 2006-2021 (Adopted September 2013)

Policy SP2 (Design and Sustainable Place Making) states that:

'All development should contribute to creating high quality, attractive, sustainable places which enhance the community in which they are located, whilst having full regard to the natural, historic and built environment by:

1. Complying with all relevant national policy and guidance where appropriate;

2. Having a design of the highest quality possible, whilst respecting and enhancing local character and distinctiveness and landscape character;

3. Being of an appropriate scale, size and prominence…

8. Avoiding or minimising noise, air, soil and water pollution;

9. Incorporating methods to ensure the site is free from contamination (including invasive species);

10. Safeguarding and enhancing biodiversity …'

Neath Port Talbot County Borough Council Local Development Plan, 2011 - 2026

Policy TR 2 (Design and Access of New Development) states that:

'Development proposals will only be permitted where…….The development does not compromise the safe, effective and efficient use of the highway network and does not have an adverse impact on highway safety or create unacceptable levels of traffic generation.

2.4 Other Guidance

Design and Access Statements in Wales: Why, What and How, Design Commission for Wales (Updated 2014)

The *'Design and Access Statements in Wales: Why, What and How Guidance,'* (Design Commission for Wales (DCfW), 2014) (Ref 1) highlights that *'early consideration of design issues is essential and central to good development. It is a formal record illustrating the design process, allowing a co-ordinated and effective consultation process to take place.'*

Designing Wind Farms in Wales, Design Commission for Wales (Updated 2014)

The *'Designing Wind Farms in Wales'* Guidance (DCfW, 2014) (Ref 4) is a non-statutory document, although it states that it is compliant and builds upon the requirements included within PPW and TAN 12. Although consideration has been given to its contents throughout the DAS, the guidance is primarily aimed towards large scale wind farms, as opposed to small to medium scale wind farm developments.

3 Design

3.1 Introduction

This section considers the need for renewable energy and the process of site selection, followed by an outline of the design principles that have guided the design solution. This includes details of the iterative design process that has been undertaken. Finally, the approach to the design of the Development is presented in line with the requirements set out in the relevant guidance.

3.2 Vision

The promotion of renewable energy is a clear priority which runs through European and national legislation, plans, programmes and policy. European and national legislation has set legally binding targets for renewable energy and reductions in CO_2 emissions. Both energy and planning policy seek to promote renewable energy development and recognise the importance of onshore wind projects. National policy recognises that the development of renewable energy is vital to facilitating the delivery of the Government's commitments on both climate change and renewable energy development.

This support forms a key element of the UK Government's climate change programme and Welsh Government planning policy and guidance, both of which re-affirm the respective administration's commitment to delivering sustainable development and in tackling climate change. The full context for the promotion of renewable energy development at all levels from the international, European, national, through to the local level is set out within the Planning Statement and Chapter 4 of the ES which accompany this application.

The Development will make an important contribution towards the Welsh Government's installed onshore wind energy targets and the reduction in the emission of gases that contribute to climate change.

3.3 Site Selection

The Applicant has an established track record as a developer of renewable generating facilities. As part of its process of site selection, an extensive range of technical, environmental and economic assessment tools are used to identify potential Wind Farm sites, based on the following criteria:

- Sufficiently high wind speeds to ensure energy production from the wind turbines that would yield an adequate return on investment;
- A site which complies with planning policy and in particular, avoids unacceptable effects on designated sites; maintains an appropriate distance from dwellings and; avoids impeding or interfering with major electromagnetic transmission and airport communication systems;
- A site of sufficient area to accommodate the number of wind turbines required for economic viability;
- Adequate vehicular access to a site using existing roads wherever possible to minimise the amount of civil works, particularly during the construction phase;
- Terrain and topography affect wind flow across a site and need to be considered in relation to turbine performance, specification and life-span; and
- Suitable ground conditions for the construction of wind turbine foundations, erection of the machines and the provision of access tracks and cables.

This was further assessed through a GIS (Geographical Information System) based site selection study, which was used to identify potential constraints which could restrict development or would need to be addressed in the design process. The findings of this assessment demonstrated that the proposed Development site had the potential to accommodate a wind farm development, subject to further feasibility studies.

3.4 Feasibility Study

A preliminary review of data was undertaken at an early stage in the project, following the initial site selection process to establish potential environmental constraints and designations affecting the proposed Development site. From this a key constraints drawing was prepared, informed by the following surveys and assessments:

- Breeding and wintering bird survey;
- Ornithological vantage point survey;
- National Vegetation Classification (NVC) Phase 2 survey;
- Terrestrial fauna surveys;
- Peat probing;
- Hydrology assessment;
- Archaeology and cultural heritage surveys;
- Landscape field survey;
- Aviation;
- Transport and traffic;
- Geology and mining;
- Ground Investigations;
- Noise;
- Shadow flicker; and
- Technical and engineering site walkovers.

An overview was undertaken of the planning policy position at a national and local level in order to determine compatibility with the policy framework.

Following these studies, it was considered that the application site was technically and environmentally viable as a wind energy development of the scale proposed.

As the next stage in assessing the site's feasibility, the Applicant undertook an iterative design exercise to investigate alternative designs solutions. The purpose of this process was to identify any issues which would make the Site unacceptable for development and to ensure that the final design was environmentally, economically and technically viable.

3.5 Design Strategy

The relationship of a wind farm to its setting is a key consideration in wind farm design in view of the potential impacts of such large scale structures within the landscape and therefore a clear strategy is important in setting out the overall approach to the design development of the wind farm proposal.

The overall aim of the design strategy for the proposed Development has been to balance the need to optimise the energy yield whilst paying due regard to environmental and technical sensitivities.

The overall aims of the design strategy have been to:

- Produce a cohesive layout which would be legible in views from the surrounding landscape, whilst respecting environmental constraints;
- Develop a layout that reflects the landform and topography of the landscape; and
- Develop a layout that relates to other wind farms in the locality.

The design strategy for the proposed Development has therefore considered the surrounding natural environment, as well as site accessibility and economic aspects.

3.6 Design Evolution

The layout and design of the proposed Development has been led by design considerations and constraints which are expanded upon below. The combination of design, technical and environmental constraints has,

through the iterative process of the Environmental Impact Assessment (EIA), resulted in the design solution for the proposed Development. At the same time, the site layout has provided an optimum environmental fit within the technical and environmental parameters of the proposed Development.

The section below therefore describes in further detail the constraints which have influenced the design of the final layout for the proposed Development. Throughout the layout and design process, constraints within the application site have been identified and addressed through various desk studies and consultations.

Constraints have been considered as part of the proposed Development's design and assessment, which has resulted in the consideration and modification of the scheme proposals as demonstrated below. The process of designing the site layout has been an iterative one undertaken under three main design stages, as follows:

- Layout 1 - Initial Feasibility Stage
- Layout 2 - Revised Turbine Layout
- Layout 3 – Final Constraints and Refinement

All three layouts are shown on Figure 2.3 ‘Turbine Layout Evolution’ in the accompanying ES.

Layout 1 - Initial Feasibility Stage

Layout 1 was prepared at the initial feasibility stage and the turbines were located following the identification of preliminary constraints. The aim was to show the maximum potential extent of development within the developable area (defined as the land with slopes of less than 15% on which it would technically be feasible to install large wind turbines). This concluded that the application site could potentially accommodate 17 turbines with a 125m tip height.

Layout 2 - Revised Turbine Layout

Layout 2 was prepared following completion of geotechnical site investigations, incorporating increased tip heights and rotor diameters to maximise efficiency.

The key risk addressed through the second layout iteration was potential geological instability due to historic mining activities and active geological faults. Following ground investigations, the turbine layout was revised in order that all turbines were located outside zones of high risk of instability. This resulted in a significant decrease in turbine numbers from 17 to eight.

To maximise energy capture, the turbine tip height was provisionally increased from 125 m to 149.9m, subject to design review by the landscape and visual consultants following their baseline assessments.

The above studies resulted in a layout of eight turbines of up to 149.9m tip height.

Layout 3 – Final Constraints and Refinement

The final major iteration of the turbine layout took place following the completion of environmental surveys. Detailed environmental and technical surveys were carried out to characterise the baseline environmental conditions on the application site and wider study areas.

An analysis was undertaken of Landscape Policy and Guidance and a review of the local landscape was undertaken, based on the LANDMAP data (Natural Resources Wales, 2013). Information was also gathered on wind farm schemes in the local area. A preliminary Zone of Theoretical Visibility (ZTV), photographs and wire frames from selected key viewpoints were also prepared to give an initial appraisal of likely landscape and visual effects.

Any constraints to development resulting from the baseline surveys were added to the key constraints drawing and design recommendations were taken into account as the layout evolved.

As a result of the surveys and assessments, and feedback received during consultation (detailed in Section 3.7 below), the following key changes were proposed for the final turbine layout:

- Removal of turbine T8 due to landscape and visual effects;
- Reduction in tip heights of turbines T1, T2 and T6 to 130m due to landscape and visual effects; and

- Repositioning of turbine T3 to avoid electromagnetic links, and in response to feedback from the November 2017 public exhibitions regarding its proximity to Blaengarw.

This resulted in the final seven wind turbine layout, including four turbines up to 149.9m tip height and three turbines up to 130m tip height.

Prior to the final layout, further site visits were undertaken to check that there were no remaining physical constraints within the application site that may impact upon the turbine performance such as topography and the proximity and height of the adjoining forestry and to agree principles for the design of the onsite infrastructure. No further revisions to the turbine layout were proposed and the turbine layout was fixed.

3.7 Design Consultation

A variety of activities have been undertaken by and on behalf of the Applicant to inform the local community and to involve them throughout the design development process. The consultation process has involved a series of meetings with key stakeholders, as well as through public exhibition events held in November 2017 and September 2018, which has allowed members of the public and others to engage directly with the Applicant's design team.

Consultation with statutory and non-statutory bodies has continued throughout the design development, from the preliminary layout of the proposed Development, to the consideration of the scheme details with BCBC as part of pre-application discussions.

Further details of the consultation process and how this has informed the final design solution are included within the accompanying ES. A Pre-Application Consultation Report, which includes details of consultation undertaken with the public and with statutory bodies, has been produced and is submitted with this application.

4 Design Solution

4.1 Introduction

The development proposals have been finalised in response to site surveys and various assessments, along with responses to the consultations undertaken and detailed design work, as described in the previous section.

As part of the final design solution, consideration has been given to the design issues in terms of location, size and colour of each of the component parts of the proposed Development, as well as technical and environmental requirements.

4.2 Character

The following sub-sections address each of the character elements of the proposed Development in turn:

Amount

The proposed Development will involve the erection of seven wind turbines, four up to 149.9m tip height and three up to 130m tip height. A typical wind turbine is shown on ES Figure 3.2 'Wind Turbine Elevation'. The proposed Development also includes associated infrastructure including: a substation and control building within a site compound (see ES Figure 3.6 'Substation Building and Compound'); energy storage containers (see ES Figure 3.7 'Energy Storage Layout Plan' and ES Figure 3.8 'Energy Storage Elevations'); a temporary construction compound (see ES Figure 3.10 'Temporary Construction Compound Site Layout); formation of upgraded site entrance from the public road network (see ES Figure 3.9 'Site Entrance'); access tracks within the application site (see ES Figure 3.1 'Infrastructure Layout'); turbine foundations (see ES Figure 3.3 'Wind Turbine Foundations'); crane hardstandings (see ES Figure 3.4 'Crane Hardstanding General Arrangement'); and drainage works.

The actual land take of the proposed infrastructure occupies an area of 7.46 ha, less than 1.9% of the area enclosed by the application boundary. The total area, including temporary construction working area is 16.81 ha.

The overall land take of the proposed Development is considered to be minor and no change is proposed to any of the existing land use practices around the turbines. The proposed Development will not affect the current use of the application site.

Operational effects on the existing land use are considered to be minimal. The current use of land within the application site for grazing will continue. The construction of the access tracks will benefit current land use practices through ease of access.

It is anticipated that the proposed Development will have the capacity to generate enough energy to power approximately 22,000 homes each year. Furthermore, the proposed Development is likely to reduce CO_2 emissions by 38,500 tonnes each year and has a 35 year operational period.

Once the operational life of the proposed Development has ended, a decision will be made about whether to refurbish, remove or replace the turbines.

Layout

The proposed Development layout is shown on ES Figure 3.1 'Infrastructure Layout'. This has been designed with consideration given to a range of technical and environmental requirements and constraints (as detailed in Section 3 of this Statement). This has included factors such as visual impact, location of watercourses, ecological constraints, location of infrastructure, noise amenity, impact on cultural heritage, impact on ecology, ground stability, and site topography.

The final turbine locations have also been influenced by other technical factors, such as achieving appropriate spacing between turbines.

The location of the wind turbines therefore represents the point which minimises adverse environmental effects and which has allowed the most appropriate layout for the proposed Development to be achieved.

Elements of the proposed Development may be subject to further, minor refinement known as 'micrositing', within the application boundary. In the event that micrositing is required post consent, the Contractor and Applicant will review all environmental constraints to ensure the proposed micrositing will be environmentally acceptable.

Scale

Wind turbine design continues to evolve and improve and therefore the most suitable model for the application site can change with time. The exact model of turbine will be chosen following planning consent and prior to construction as part of a competitive tender process. Nonetheless, the turbine selection will not differ materially from those assessed within the accompanying ES and will be within the specified parameters.

The maximum turbine height up to 149.9m has been chosen as a result of technical surveys and environmental considerations. Photomontages of the proposed wind turbines from a number of agreed viewpoints in the area have been included within Chapter 5 of the ES.

The landscape and visual effects of the scale of turbines within their landscape setting have been considered through a comprehensive landscape and visual impact assessment, which is included in Chapter 5: Landscape and Visual Impact Assessment (LVIA) of the ES. The Brecon Beacons National Park is located approximately 12 km north of the proposed Development. The Rhondda Landscape of Special Historic Interest is located to the north of the application site on the opposite side of the A4107.

The LVIA has concluded that significant effects on landscape character are likely to be experienced across an area extending no more than 2 km from the proposed turbines, and much less to the north and west of the application Site. The area where significant effects will occur is approximately bounded by the ridge of Craig Ogwr to the east, the summit of Mynydd William Meyrick, the settlement of Price Town, the south end of the ridge of Mynydd Llangeinwyr, the settlement of Blaengarw, the summit of Mynydd Caerau, and the hairpin bend on the A4107 to the north. Beyond this area effects on landscape character will reduce to minor or negligible, and not significant. The viewpoint assessment identifies significant effects on sensitive receptors up to 4.8 km from the proposed Development, with effects judged as major being limited to within 2 km. Minor (not significant) effects were identified at locations up to 11.5 km from the proposed Development, and effects at more distant viewpoints were judged to be negligible.

The Cultural Heritage assessment (Chapter 7 of the ES) has concluded that the proposed Development will not have a significant impact on any Landscapes of Historic Interest.

Appearance

There is little difference in design between the potential turbine types that could be considered for the proposed Development. The final choice of wind turbine will be dependent on economics and available technology at the time of construction but will be within the maximum dimensional envelope of the blade tip heights specified for the purpose of assessment. ES Figure 3.2 'Wind Turbine Elevation' illustrates the typical wind turbine dimensions.

Wind Turbines and Foundations

In terms of appearance the turbines will be of a standard three blade horizontal axis design, with maximum height to blade tips of 130 m (three turbines) and 149.9 m (four turbines).

. A significant amount of research has been undertaken in relation to turbine colour and finish and a matt grey finish is generally agreed to be the most appropriate. This is reflected in the DCfW guidance (Ref. 1): "*A light grey colour generally achieves the best balance between minimising visibility and visual impacts when seen against the sky…..Light grey will relate positively to a range of backdrops seen within the different views of and in different weather conditions*."

Each turbine will have a transformer and switchgear. The transformer's function is to raise the generation voltage from approximately 690 volts to the higher transmission level that is required to transport the

electricity into the grid. Depending on the turbine supplier, the transformer and switchgear may be located inside or outside each turbine. The external transformers are typically 7.0m (long) x 4.0m (wide) x 2.5m (high) (as shown on ES Figure 3.2 'Wind Turbine Elevation').

The wind turbines will be erected on steel re-enforced concrete foundations. The turbine bases will be appropriately designed for the specific ground conditions. It is anticipated that the foundations will be of gravity base design, but there may be the requirement to use piled foundations where ground conditions dictate. Final base designs will be determined after a full geotechnical evaluation of each turbine location, which will be undertaken prior to the start of construction. ES Figure 3.3 'Wind Turbine Foundation' provides an illustration of a typical gravity base wind turbine foundation design.

Crane Hardstandings

During the erection of the turbines, crane hardstanding areas will be required at each turbine base (ES Figure 3.4 'Crane Hardstanding General Arrangement'). Typically, these consist of one main permanent area of 1,100m^2 adjacent to the turbine position, where the main turbine erection crane will be located. The other areas, totalling 530m^2, will be temporarily used during the assembly of the main crane jib. The hardstanding will be constructed using the same method as the excavated access tracks and involves the topsoil being replaced with suitable structural fill to finished level.

After construction operations are completed, the temporary crane pad areas will be reinstated. There will be a requirement to use cranes on occasion during the operational phase of the proposed Development, so the main crane hardstanding (1,100m^2) will be retained to ease maintenance activities.

Access Tracks

The on-site access track layout has been designed to minimise environmental disturbance by avoiding sensitive features and keeping the length of track commensurate with the minimum required for operational safety. Typical access track designs are shown in ES Figure 3.5 'Access Track Typical Details'.

In areas of peat with a depth greater than 0.5 m consideration will be given to the use of floating tracks. The feasibility of a floating road construction is dependent upon a number of factors, namely: the geomorphology of the peat; topography; length of road section; wind farm layout; number of vehicle movements for each option; restoration requirements; peat re-use considerations. All parameters noted above will be assessed at the detailed design stage post consent and the best practice road construction type will be inferred from the various design constraints.

The access track itself will be constructed of inert material of suitable grade to withstand the expected traffic loading. Road construction techniques and roadside ditches will be designed to minimise the effect on natural hydrology as much as possible.

The forestry through which the access route passes is managed by Natural Resources Wales (NRW). The access will use existing forestry tracks and will require strip widening in the verges at various locations along a stretch of approximately 3.6 km. To accommodate the upgrades to the forest track it is not anticipated that any trees will need to be felled. However, if it is necessary to fell a line of trees to widen the access, then it might be necessary to fell an entire forest block which could be up to a maximum of 8.6 ha due to wind throw. The felling requirements have been agreed in consultation with NRW and have been designed to ensure that trees will be felled back to a firm edge to avoid wind throw.

Substation and Control Building

A substation and control building will be required on-site to provide a point of connection for the wind farm to the local electricity distribution network. The layout and elevations of the proposed control building and substation compound are shown in ES Figure 3.6 'Substation Building and Compound'. The substation equipment (transformers etc) will be located within an onsite compound measuring up to 64m x 40m. The substation and control building will be designed and constructed to the standard required by the distribution network operator (Western Power Distribution, WPD) for the accommodation of substation equipment. The compound area will be surrounded by a 2.4m metal palisade security fence.

Three single story control buildings will be located outside of the fenced compound area, measuring approximately 17. m x 4.6m, 12.2m x 4.6 and 6.0m x 5.4m. These control buildings will accommodate

switchgear and metering, protection and control equipment, equipment storage, and welfare facilities for staff.

Energy Storage

25 permanent containers housing energy storage devices, inverters and other ancillary equipment will be positioned adjacent to the control building and substation compound on hardstanding used originally for the temporary construction compound. The area of the energy storage compound will be 52m x 44m. The layout and elevations of the proposed energy storage containers are shown on ES Figure 3.7 'Energy Storage Layout Plan' and ES Figure 3.8 'Energy Storage Elevations'. The containers will be similar to shipping containers and the compound area will be surrounded by a 2.4m metal palisade security fence.

Temporary Construction Compound

During the construction phase of the proposed Development, the wind farm will include a temporary construction compound. This will cover an area of 50m x 80m. The proposed temporary compound area will be constructed by top soil excavation in a similar manner to the access tracks, and laying stone over a geotextile membrane. During construction, temporary fencing will be erected as required, around the construction compound. Details of the temporary compound layout are included on ES Figure 3.10 'Temporary Construction Compound Layout Plan'.

The compound will include the following:

- Temporary portable cabins for office accommodation, monitoring of incoming vehicles and welfare facilities
- Self-contained toilets with provision for waste storage and removal
- Containerised storage areas for tools, small plant and parts
- An area for site vehicle parking and storage of larger material items
- A standing and turning area for vehicles making deliveries to the site
- A bunded area for storing fuels, oils and greases.

On completion of the construction work these facilities will be removed and the areas not being used for energy storage will be reinstated.

Borrow Pits

Borrow pits are proposed as a potential source of site won rock for use primarily in the construction of new tracks and hardstandings. The location of the borrow pit areas of search are shown on ES Figure 3.1 'Infrastructure Layout' and ES Figure 3.11 shows indicative borrow pit details.

These areas of search are shown as the maximum potential area of borrow pit extraction, but it is not anticipated that these areas will be fully exploited. Areas of search are shown as the nature and quality of the underlying geology will not be known until the detailed pre-construction ground investigation has been completed. Once operations are sufficiently underway, restoration of the borrow pits will take place progressively behind the working area to encourage re-vegetation. This will minimise any impact to the surrounding environment by minimising the working area at any point.

Site Signage

The proposed Development will have a series of signs to provide directions and also information on health and safety. Temporary construction signage will direct traffic on site and also identify areas to avoid due to environmental constraints or mitigation measures.

4.3 Community Safety

Properly designed, erected and maintained wind turbines are a safe form of technology. The nature of the proposed Development is such that it raises no issues in terms of 'secured by design' criteria.

Signs will be erected at the entrance to the application site to provide information about the proposed Development, together with contact and safety information.

The proposed Development includes a permanent diversion to bridleway BW64 GWV and footpath FP103 GWV, both of which run through the application site, in order to maintain a suitable distance from the proposed wind turbines. In addition, a temporary diversion to footpath FP31 OGV is proposed to maintain a suitable set back distance from the borrow pits. As the borrow pits will only be in use during construction of the wind farm, this temporary diversion will only be in place during the construction period. The original footpath route will be re-opened once the wind farm is operational. Proposed footpath diversions are shown on ES Figure 12.1 'Public Rights of Way Diversions'.

The implementation of the Construction Environmental Management Plan (CEMP) will ensure that disruption to PRoWs during construction are kept to a minimum and adequate warning signage will be provided at crossings of footpaths or bridleways.

4.4 Environmental Sustainability

The concept of renewable energy is to generate power from sustainable resources, in this case wind energy. It is anticipated that the proposed Development will have the capacity to generate enough energy to power approximately 22,000 homes and generate enough renewable energy for carbon savings of over 38,500 tonnes each year, with a 35 year operational period.

The location of the proposed Development will not facilitate travel by public transport, walking or cycling, although it is assumed that there may be an element of car sharing amongst staff working at the application site.

The wind turbine components will largely be sourced from outside the area and delivered on specialist vehicles. For other elements, such as the use of stone, borrow pits on Site will limit the amount of material imported to the Site. For the construction of the turbine and control building foundations, imported ready mixed concrete is likely to be used, which will be sourced from a local concrete batching facility.

During construction and decommissioning, wherever possible excavated stone or soils will be reused on site primarily for the restoration of disturbed ground, including cable trenches and wind turbine foundations, and in earthworks for tracks.

The ES outlines other measures which will be employed in relation to pollution prevention, such as the bunding of areas used for fuel storage in the site compound.

5 Access

5.1 Introduction

The proposed Development will need to be accessed by vehicular traffic during construction, operation and decommissioning phases. The traffic impacts of the proposed Development during these phases is discussed below, together with any implications for public and disabled access.

5.2 Movement

Off Site Access/Construction Traffic

A single site entrance on the A4107 at the location of an existing field entrance is proposed, although modification will be required to facilitate the passage of abnormal delivery vehicles, including earthworks and improved visibility splays. Details are shown on ES Figure 3.9 'Site Entrance'. This access will be used by all vehicles accessing and leaving the Site.

Widening of part of the existing NRW forestry track (between the A4061 and A4107) will be required. Typical forestry track widening details are presented in ES Figure 9.4. Strip widening in the verge at various locations will be required along a stretch of approximately 3.6 km.

The total number of vehicle journeys during the 10 month wind farm construction period is anticipated to be approximately 11,500. The greatest number of journeys per day will be generated when the turbine foundations and transformer bases are poured.

Deliveries of construction materials and turbine components to the application site will be carefully managed in accordance with a detailed traffic management plan.

On-Site Construction Traffic

The on-site access track layout has been designed to minimise environmental disturbance and land take.

New tracks are proposed to access the individual turbine locations, with a running width of approximately 5m. The tracks will be constructed of crushed and graded stone. Following construction, the appropriate material will be used to reinstate the track sides.

Operational Traffic

During operation traffic associated with the wind farm will be minimal. Site traffic will be limited to small maintenance vehicles carrying crews of two people undertaking general maintenance work and repair. Typically, four maintenance visits will be carried out per month.

5.3 Public Rights of Way/ Public Access

There are several PRoWs crossing the application Site, including a bridleway linking Cwmparc with the Garw Valley, and footpaths linking to the surrounding valleys, and following the ridge of Mynydd Llangeinwyr south.

The proposed Development includes a permanent diversion to bridleway BW64 GWV and footpath FP103 GWV, both of which run through the application site, in order to maintain a suitable distance from the wind turbines. The permanent diversions represent an increase in length of approximately 260m over the existing footpath and bridleway.

In addition, a temporary diversion to footpath FP31 OGV is proposed to maintain a suitable set back distance from the borrow pits. This represents an increase in length of approximately 100m over the existing footpath although it will be re-opened once the wind farm is operational.

5.4 Access for All

Whilst the new access tracks will provide additional walking opportunities for all, including the less mobile, they have not been designed for this purpose. Wind farm developments are not operational developments of a type that are required to be accessed by members of the public regardless of mobility levels (other than

maintenance staff) and therefore specific disabled access has not been considered as part of the proposed Development.

The emphasis within the proposed Development has been on reducing the impacts of the wind farm in this location, therefore measures such as hard surfacing or reducing gradients have not been considered.

6 Conclusions

The proposed Development has been designed with the consideration of a range of technical and environmental constraints. Mitigation measures have been proposed wherever possible to reduce any adverse impacts of the proposed Development on the environment.

The proposed Development is consistent with and positively enhances the key international, European and national (UK and Wales) objectives to increase renewable energy production, whilst balancing this against the environmental impacts of the proposed Development. The accompanying ES has shown that this has been achieved with no unacceptable impacts on a range of environmental considerations in line with policy guidance.

Consultation with key stakeholders and the local community has played an important part in the iterative design process and the final design has been appropriately informed by this.

The traffic impacts of the proposed Development and implications for public access have been appropriately assessed. The route to the application site has been selected in order to minimise traffic impacts and utilise existing tacks where possible. The improvements required to the access tracks are minimal and have been sensitive to environmental constraints. It is therefore considered that the design solution has met the objectives of the design strategy, comprising a technically viable layout which minimises adverse environmental effects.

7 References

1. Design Commission for Wales Design and Access Statements in Wales: Why, What and How (2014)
2. Welsh Government (2009). Technical Advice Note 12: Design.
3. Welsh Government Planning Policy Wales 7th Edition (2014)
4. Design Commission for Wales (Updated 2014) Designing Wind Farms in Wales
5. Bridgend County Borough Council (2013) Local Development Plan, adopted 2013
6. Neath Port Talbot County Borough Council Local Development Plan, 2011 – 2026, adopted January 2016.

Arcadis (UK) Limited

Arcadis Cymru House
St Mellons Business Park
Fortran Road
Cardiff
CF3 0EY
United Kingdom

T: +44 (0)29 2092 6700

arcadis.com