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Chapter 2.

Site Selection and Design Evolution

Contents

Glossary

Term	Definition
Environmental Impact Assessment	Environmental Impact Assessment (EIA) is a means of carrying out, in a systematic way, an assessment of the likely significant environmental effects from a development.
Environmental Impact Assessment Regulations	The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations)
Environmental Impact Assessment Report	A document reporting the findings of the EIA and produced in accordance with the EIA Regulations
Proposed Development	The South Kyle II Wind Farm development
Proposed Development Area	The area within the “Site boundary” as illustrated on Figure 1.1which the Proposed Development will be located

List of Abbreviations

List and describe your abbreviations here.

Abbreviation	Description
AIL	Abnormal Indivisible Loads
EAC	East Ayrshire Council
ECU	Energy Consents Unit
EIAR	Environmental Impact Assessment Report
FLS	Forestry Land Scotland
GDL	Inventory Garden and Designed Landscape
GIS	Geographic Information Systems
IEF	Important Ecological Feature
IOF	Important Ornithological Feature
LVIA	Landscape and Visual Impact Assessment
NPF4	National Planning Framework 4
OEMP	Outline Operational Environmental Management Plan
PAC	Pre-Application Consultation
PAN	Planning Advice Note
PS	Planning Statement
SG	Supplementary Guidance
SPA	Swept Path Analysis
SPP	Scottish Planning Policy
SSSI	Sites of Special Scientific Interest
ZTV	Zone of Theoretical Visibility

2.1. Introduction

2.1.1. The purpose of this chapter is to identify the steps and alternatives that have been considered by the Applicant in the site selection and design evolution of the proposed South Kyle II Wind Farm (hereafter referred to the Proposed Development). The final design of the Proposed Development is fully described in Chapter 3 Project Description this EIAR (Volume 1). This chapter demonstrates how the design and layout of the Proposed Development evolved through the iterative design and EIAR process. A process which included the initial site selection, the identification of various constraints and site-specific factors, consideration of candidate turbines most likely to be available and viable at the time of construction, consideration of stakeholder feedback and the identification of key design criteria. The Proposed Development is considered to strike the optimal balance between minimising environmental impacts, maximising renewable electricity generation and contributing to the net zero target.

2.1.2. Although not required for applications submitted under Section 36 of the Electricity Act 1989, a Planning Statement (PS) has been provided in support of the application.

2.1.3. This chapter refers to the following

Chapters (Volume 1)

- Chapter 3: Project Description;
- Chapter 4: Climate Change, Legislative and Policy Context;
- Chapter 5: Landscape and Visual Impact Assessment (LVIA);
- Chapter 11: Traffic and Transport;
- Chapter 13: Aviation and Other Effects;

Figures (Volume 2a):

- Figure 1.1: Site Layout;
- Figure 1.2: Site Location and Regional Context;
- Figure 1.3: Site Constraints; and
- Figure 2.1: Layout Design Evolution – (Iterative turbine layouts).

2.2. Consideration of Alternatives

2.2.1. Paragraph 5(2)(d) of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 requires that the Environmental Impact Assessment Report (EIAR) includes a description of reasonable alternatives studied by the Applicant. The alternatives considered were those which are relevant to the development and its specific characteristics. Further considerations included an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment.

2.2.2. As noted in PAN 1/2013: Environmental Impact Assessment:

“Whilst the Directive and the Regulations do not expressly require the Applicant to study alternatives, those alternatives which are in any case considered as part of the project planning and design process must be assessed, and an outline of the main alternatives studied by the Applicant included in the EIAR. The EIAR must also give an indication of the main reasons for the choice made, taking into account the environmental effects”.

2.2.3. The Applicant has considered a number of alternative layouts for the Proposed Development through an iterative design process described below. The finalised layout of the Proposed Development is shown in Volume 2a Figure 1.1: Site Layout.

2.3. The Site Selection Process

2.3.1. This chapter of the EIAR sets out the wider approach to site selection across Scotland. The chapter then focusses upon the process of refining the layout in respect of the Proposed Development.

2.3.2. The Applicant has an ongoing search regime seeking sites across Scotland which may have potential for renewable energy development. The search regime culminates in a range of sites that progress to a desk-based and/or site visit feasibility study. The purpose of this study is an assessment of individual sites for potential to accommodate a range of development solutions. The feasibility studies can cover a large number of sites. The rigorous scrutiny carried out in the feasibility studies results in the exclusion of sites which offer the least potential to accommodate wind farm development. The short-list of remaining sites included the Proposed Development Area.

2.3.3. Sites which provide a positive outcome in the feasibility study are progressed to an in-depth site-specific suitability assessment and eventually, if appropriate, to an application to the relevant determining authority. Factors influencing the suitability of a site included the following:

- Indicative wind speeds as estimated by the ETSU NOABL UK wind speed database;
- The quality of wind flow;
- The separation distance to inhabited buildings;
- The lack of designated landscapes within the site;
- The potential to locate infrastructure away from designated areas;
- The proximity of the Proposed Development Area to the grid;
- Feasibility of grid connection;
- Service provider infrastructure;
- Environmental sensitivity;
- Extant Planning Policy direction;
- Area topography, including gradients, shading and aspect, exposure, watercourses and land use;
- Landscape character;
- Access feasibility;
- Cumulative impact of other renewable energy developments;
- Proximity to civil and military airspace, including MOD test facilities; and
- Landowner willingness to accommodate infrastructure.

2.3.4. The outcome of the above process indicated that the Proposed Development Area would be a technically and environmentally appropriate location to develop a wind farm.

2.3.5. At the early development stages of the Proposed Development, the prevailing national policy direction was Scottish Planning Policy (SPP)[1] (June 2014). SPP provided support for wind development in principle and encouraged local authorities to guide developments towards appropriate locations.

2.3.6. Paragraph 161 highlighted the requirement for planning authorities to define a "*spatial framework identifying those areas that are likely to be most appropriate for onshore wind farms"*. SPP stated that spatial frameworks must be based on the following criteria (set out in SPP Table 1, Page 39):

- "Group 1: Areas where wind farms will not be acceptable – National Parks and National Scenic Areas;
- Group 2: Areas of significant protection: - Recognising the need for significant protection, in these areas wind farms may be appropriate in some circumstances. Further consideration will be required to demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation. – Group 2 areas include World Heritage Sites; Natura 2000 and Ramsar sites; Sites of Special Scientific Interest; National Nature Reserves; Sites identified in the Inventory of Gardens and Designed Landscapes; Sites identified in the Inventory of Historic Battlefields; areas of wild land as shown on the 2014 SNH map of wild land areas; carbon rich soils, deep peat and priority peatland habitat; and an area not exceeding 2 km around cities, towns and villages identified on the local development plan; And
- Group 3: Areas with potential for wind farm development: - Beyond groups 1 and 2, wind farms are likely to be acceptable, subject to detailed consideration against identified policy criteria".

2.3.7. The site did not lie within any 'Group 1' areas or 'Group 2' areas, or within any national or international designations for ecology, ornithology or cultural heritage.

2.3.8. A review of the Carbon and Peatland 2016 online map resource[2] indicates that the site lies includes areas of Nationally Important Carbon and Peatland Soils. However, the developable area has been designed in consideration of peat and thus has avoided these areas.

2.3.9. East Ayrshire Local Development Plan 2[3], Policy RE1: Renewable Energy Developments is the 'lead' policy for the assessment of renewable energy developments. Policy RE1 sets out a list of considerations which were taken into account when assessing the development potential of the Proposed Development.

2.3.10. This Policy was supported by the Energy and EV Charging Supplementary Guidance (SG)[4] (2024). This SG sets out further detailed assessment criteria and a wind turbine spatial framework to support Policy RE1 when assessing applications for renewable energy development. Again, the policy direction in the SG (2024) informed the design evolution of the Proposed Development.

2.3.11. In conclusion, the rigorous site selection criteria, taking appropriate cognisance of the then extant planning policy available when the site selection criteria were being applied, provided a strong justification for the Proposed Development Area being progressed to the next stage of the design process.

2.4. Progressing Site Design

2.4.1. To progress the chosen Proposed Development Area, the design process aimed to achieve a layout that maximised the output of renewable energy whilst limiting the potential for environmental impacts during construction and operation. Factors influencing the suitability of the layout include:

- Wind resource and quality of wind flow to optimise generation outputs;
- Suitable separation distance from dwellings so that unacceptable impacts related to potential noise, shadow flicker and residential visual amenity can be avoided;
- Topography of the Proposed Development Area is compatible with the construction and operation of a commercial scale wind farm;
- Avoidance of watercourses and water bodies;
- Avoiding areas of deep peat;
- Avoiding ecologically sensitive habitats;

[1] SPP was superseded by NPF4 in February 2023. However, the policy assessment carried out at the time is relevant to the site selection and design process.

[2] Scotland's Environment [Online] Available from - Map | Scotland's environment web [Accessed 25/06/2024]

[3] East Ayrshire Council *Local Development Plan 2* [Online] Available from - Local development plan 2 · East Ayrshire Council (east-ayrshire.gov.uk) Accessed 25/06/2024

[4] East Ayrshire Council *Energy and EV Charging* [Online] Available from - EAC Accessed 09/08/2024

- Landscape and visual impacts; and
- Stakeholder feedback.

2.5. Design Constraints

2.5.1. The following section provides an overview of the various factors which are relevant to the design of the Proposed Development.

2.5.2. Volume 2a Figure 1.3: Site Constraints highlights constraints within the surrounding area that influenced the design process.

2.5.3. A Scoping Report was submitted to the Scottish Government in February 2022 by Natural Power on behalf of the Applicant (Volume 3,Technical Appendix 1.1: Scoping Report). At that time, it was envisaged the Proposed Development would comprise up to 17 wind turbines, between 180 to 220 m in blade tip height, battery/energy storage and green hydrogen generation and storage along with associated infrastructure anticipating an installed capacity of around 102 MW and 119 MW. The feedback from scoping and the following considerations have informed the final layout and design of the Proposed Development:

Policy Context

2.5.4. A high-level review of legislation, national and local planning policy has been provided in Volume 1, Chapter 4: Climate Change, Legislative and Policy Context and an assessment of such material is provided in the accompanying Planning Statement. Relevant policy is also highlighted in the individual EIAR topic chapters. The iterative design process factored in such policy context.

Wind Resource

2.5.5. Long-term wind resource production estimates were derived from multiple sources including measurements collected by a Light Detection And Ranging (LIDAR) system to measure atmospheric characteristics including wind speed and direction at a number of heights from ground level for the Proposed Development Area.

2.5.6. Detailed assessments have been undertaken using Wind Atlas Analysis and Application Program (WasP) modelling software by the Applicant in order to better understand the local wind regime. This has led to an improved understanding of the specific complex flow regime that results from the terrain and forestry surrounding the Proposed Development. The turbulence intensity, wind shear, inflow angle and veer across the Proposed Development Area were assessed in order to inform the design process (along with all relevant physical, environmental and technical constraints). The process was undertaken iteratively in order to arrive at the appropriate number, size and location of turbines for the Proposed Development to minimise project risks (turbine performance / operational issues) and maximise project efficiency and energy yield output.

2.5.7. The site has been designed with a comprehensive understanding of the onsite wind regime. In addition, wind energy assessments indicate that the Proposed Development Area has excellent wind resource allowing for more efficient energy generation with less infrastructure.

Grid Connection

2.5.8. The grid connection to the on-site substation will come via an overhead line from New Cumnock substation, which is located within 100 m of the Proposed Development Area. The connection date is expected to be around May 2029 and would be subject to a separate application for consent under Section 37 of the Electricity Act 1989.

2.5.9. The proximity to New Cumnock substation was key in considering the location of the Proposed Development Area.

Access

2.5.10. The Proposed Development will be accessed via the existing northern entrance through existing North Kyle Wind Farm and its site entrance from A713 or alternatively via existing South Kyle Wind Farm and its site entrance, also, from A713. This site entrance has been designed to accommodate deliveries for the larger turbine components.

2.5.11. It is proposed that Abnormal Indivisible Loads (AIL) will primarily use northern entrance via North Kyle Wind Farm. A detailed Abnormal Load Route Survey Report is included in Volume 3, Technical Appendix 11.3: AIL Route Survey and identifies the necessary access improvements that will be required to enable loads to access the site.

2.5.12. All other traffic will be accessing the site from B741, north of the Proposed Development.

2.5.13. Street furniture (i.e. road signs, lighting columns, traffic lights, telegraph poles and bollards) have been identified from aerial imagery and included on the Swept Path Analysis (SPA) drawings.

2.5.14. More information is included in Volume 1, Chapter 11: Traffic and Transport.

Land Use

2.5.15. Located to the south east of Dalmellington, the Proposed Development Area is occupied predominantly by commercial plantation forestry. As such, forest felling and replanting will be undertaken to facilitate the Proposed Development.

Proximity of Dwellings

2.5.16. Residential amenity has been considered throughout the design iteration process as the design has sought to minimise potential impacts on the nearest dwellings, both in terms of visual amenity, shadow flicker and noise impact. There are 10 dwellings within 5 km of the Proposed Development and these dwellings have been considered in Volume 3, Technical Appendix 5.5: RVAA and in Volume 1, Chapter 5: Landscape and Visual Impact Assessment. A noise assessment has been undertaken and is reported on in Volume 1, Chapter 10: Noise. Shadow flicker has been assessed and reported in Volume 1, Chapter 13: Aviation and Other Issues. The combined effects of the potential visual amenity and noise impacts has been considered in the synergistic effects section of Volume 1, Chapter 15: Synergistic Effects and Summary of Mitigation and Residual.

Landscape and Visual

2.5.17. From the outset of the project the effects on landscape and visual amenity were important considerations on the site selection and project design evolution.

2.5.18. A Chartered Landscape Architect, experienced in undertaking siting, design and assessment of renewable energy developments in accordance with best practice guidance, have advised the Applicant during design process, commenting on scoping layout and design iterations. The role of the Landscape Architect consisted of reviewing the siting and design of the wind turbines and associated infrastructure and advising in order to minimise, as far as practical, the potential effects on landscape and visual amenity.

2.5.19. The first step of the Landscape and Visual Impact Assessment (LVIA) was to establish the extent of the study area. In accordance with NatureScot guidance (2017), for turbines in excess of 150 m in tip height, a 45 km study area is recommended. This was offset from the outermost turbines of the Proposed Development.

2.5.20. Initially, a 17-turbine layout using tip heights of between 180 m to 220 m was developed across the Proposed Development Area (Volume 2a, Figure 2.1: Layout Design Evolution, Design 1,). Zone of Theoretical Visibility (ZTV) mapping was analysed to gain an appreciation of the theoretical visibility of these turbines within the 45 km study area.

2.5.21. A ZTV map has been produced to illustrate the potential maximum extent of visibility of the Proposed Development based on the layout at tip height and hub height (Volume 2b, Figures 5.2 and 5.3 respectively). Consideration has also been given to other wind farms that are operational, consented or currently the subject of applications for consent in the context of the potential for cumulative effects. **Note:** ZTV assumes bare earth and no screening as a worst-case scenario.

2.5.22. For the cumulative assessment, an initial study area of 60 km was identified in accordance with the relevant guidance (SNH, 2012). Following a review of likely relationships between wind farms, this was refined to 45 km from the outermost turbines and data was collected for sites currently in operation/under construction, consented, submitted applications and in scoping which would likely be experienced in conjunction with the Proposed Development.

2.5.23. Further detail is provided in EIAR Volume 1, Chapter 5: Landscape and Visual Impact.

Ecology and Ornithology

2.5.24. A desk study was undertaken involving an online search using NatureScot Sitelink[5] and the online GIS tool MAGIC[6] (Multi-Agency Geographic Information for the Countryside). In addition, baseline ornithological and ecological surveys were commenced in April 2021 and continued until the end of September 2022. The purpose of the desk-based study and surveys was to assess connectivity of the Proposed Development with designated sites. Additional assessment included collision risk modelling and disturbance of receptor species within the Proposed Development Area.

2.5.25. The design of the project was able to avoid sensitive habitat and species, and the resultant layout was considered unlikely to impact on designations or have a significant impact on any target species, and as such the Proposed Development was considered potentially suitable for wind development, subject to further detailed assessment.

2.5.26. An Outline Operational Environmental Management Plan (OEMP) to further minimise effects and impacts on bats and fish is included within Volume 3, Technical Appendix 6.3. It is considered that implementation of these mitigation and habitat enhancement measures will reduce the likelihood of impacts on Important Ecological Features (IEFs) and Important Ornithological Features (IOFs) at the appropriate biogeographical scale.

2.5.27. Potential effects upon ecology and ornithology are fully assessed in the EIA and the findings are presented in Volume 1 Chapter 6: Ecology and Biodiversity and Chapter 7: Ornithology.

Hydrology, Geology and Hydrogeology

2.5.28. The design of the Proposed Development, to date, has avoided known impacts on hydrological receptors as far as possible, through embedded mitigation.

2.5.29. Hydrologically, the Proposed Development Area is situated across the upper reaches of three hydrological networks: the Muck Water, the Water of Desugh and the River Nith. There are nine named burns which supply these networks situated in and around the Proposed Development Area (Benbrack Burn, Knocklee Burn, Linn Water Mossdale Burn, Peddinnan Burn, Pochriegavin Burn, Polmath Burn, Powkelly Burn and Prickeny Burn. In addition, there are six designated Sites of Special Scientific Interest (SSSI) within 5 km of the Proposed Development Area.

2.5.30. Preliminary constraints were mapped as part of the screening process to 'scope out' potential locations for the wind turbines other associated infrastructure. An indicative layout was then established (Volume 2a Figure 2.1: Layout Design Evolution, Design 1, 17 Turbine Layout), with appropriate buffer zones places around specific areas of the Proposed Development where significant constraints were identified. These constraints included deep peat deposits, watercourses, flood zones and GWDTE amongst others.

2.5.31. There are areas of peat present within the Proposed Development Area. Phase 1 peat depth survey and hydrological walkovers were undertaken in 2021 as part of the site feasibility and scoping assessments. Further surveys, including a watercourse crossing assessment, Phase 2 peat surveys and a hydrological walkover survey including visiting Private Water Supplies were undertaken. Survey results were then fed into the designing of the Proposed Development.

2.5.32. Potential impacts on watercourses have been taken into account by applying adequate buffers on the constraints mapping and applying these buffers during the designing and final placement of turbines and battery storage infrastructure.

2.5.33. Potential significant effects upon hydrology, geology and hydrogeology are fully assessed in the EIA and the findings are presented in Volume 1, Chapter 8: Hydrology, Geology and Hydrogeology.

Cultural Heritage

2.5.34. The presence of cultural heritage receptors was investigated within and out with the Proposed Development Area. Initial assessment indicated there are 13 known cultural heritage assets within the Proposed Development Area. A further two have been recorded within 100 m of the boundary of the Proposed Development Area. These assets are listed in Volume 1, Chapter 9: Cultural Heritage.

2.5.35. There are four Inventory Garden and Designed Landscapes (GDLs), eight Conservation Areas, 292 Listed buildings and 26 Scheduled Monuments within 15 km of the perimeter of the Proposed Development Area.

2.5.36. A baseline assessment comprising of a desk-based assessment and walkover survey was undertaken which identified cultural heritage assets in the Proposed Development Area. These were accounted for, and they were avoided, during the design evolution and thus direct effects avoided. A full cultural heritage assessment is provided in Volume 1, Chapter 9: Cultural Heritage.

Forestry

2.5.37. The Proposed Development is located within an area of extensive commercial forestry. The land is part of Scotland's National Forest Estate, owned by Scottish Ministers on behalf of the nation, and managed by Forestry Land Scotland (FLS).

2.5.38. Changes to woodland structure has been analysed and described including changes to woodland composition, timber production, traffic movements and the felling and restocking plans.

2.5.39. Initial desktop assessment identified no woodlands recorded in the Ancient Woodland Inventory Scotland within the South Kyle commercial forests. Further small areas of native woodland were recorded in the NWSS within the commercial forests however these were not recorded as ancient woodland. These native woodland areas were avoided when considering turbine placement. There are no woodland designations over the Forestry Study Area.

2.5.40. Further details on Forestry are provided in Volume 1, Chapter 12: Forestry.

[5] NatureScot [Online] Available from - SiteLink - Home (nature.scot) Accessed 05/04/2024

[6] DEFRA MAGIC [Online] Available from - Magic Map Application (defra.gov.uk) Accessed 05/04/2024

Aviation and Existing Infrastructure

2.5.41. The potential for the Proposed Development to interfere with military and civil aviation assets has been considered. Preliminary analysis was completed for the Proposed Development which indicated radar at Lowther Hill and surveillance radar at Glasgow Prestwick Airport (GPA) would have a line of sight to the proposed turbines. In addition, the turbines will be more than 150 m tall and therefore be subject to mandatory lighting requirements under the Air Navigation Order.

2.5.42. These have all been assessed further within the EIA and full details are provided in Volume 1, Chapter 13: Aviation and Other Issues.

2.5.43. The presence of existing infrastructure such as service pipes and cables, TV transmission and electromagnetic paths were considered and avoided.

2.5.44. Geographic Information Systems (GIS) data used within the initial feasibility study indicated there was existing electricity power lines within the Proposed Development Area which have been avoided during the design process. Full details are provided in Volume 1, Chapter 13: Aviation and Other Issues.

2.6. Environmental Benefits

2.6.1. The essential benefits of using wind energy for the generation of electricity are that it is renewable, safe and does not release any gaseous emissions into the atmosphere during operation. The operational wind fam will also provide a power source that contributes to diversity and security of supply which remain critical component of the Government's energy policy.

2.6.2. The Proposed Development, excluding the energy storage facility, is expected to have an estimated generating capacity of around 92.4 MW (based on currently available turbine models). The Proposed Development will help to support climate action plans, emission reduction targets and contribute towards future electricity demands in Scotland and the UK by creating enough electricity to meet the average annual domestic needs of approximately 79,820 average UK households (wind based on annual GB average domestic household consumption, quoted by the Department of Business, Energy and Industrial Strategy, of 3,239 kWH per year, January 2024[7]).

2.6.3. When generating electricity, the Proposed Development would offset the generation of a similar amount of electricity that would otherwise be generated by conventional fossil fuel power stations. The displaced emissions, mainly carbon dioxide, achieved by the Proposed Development would be approximately 341,710 tonnes of carbon emissions saved over the lifetime of the Proposed Development (subject to final wind turbine procurement). The Proposed Development would contribute towards international and national targets for the generation of renewable energy and reductions in greenhouse gas emissions.

2.6.4. In addition, the carbon dioxide offset would make an important contribution towards the Scottish Government target to reduce carbon dioxide emissions by 100 % by 2045. The Proposed Development would also offset emissions of the other greenhouse gases from conventional power stations; in particular coal fired generating plant. These gases including sulphur dioxide and oxides of nitrogen cause environmental problems such as acid rain.

2.6.5. Onshore wind farms, particularly those close to areas of electricity demand, provide an important contribution towards making Scotland and the UK more energy self-sufficient. If constructed, the Proposed Development would contribute to the aim of achieving energy self-sufficiency and narrow the energy supply gap.

[7] RenewableUK *Wind Energy Statistics Explained* [Online] Available from - Statistics Explained - RenewableUK (Accessed 09/04/2024)

2.7. The Consultation Process

2.7.1. The consultation process commenced prior to Scoping in February 2022. In accordance with the Energy Consents Unit – Good Practice Guidance for Applications under Section 36 and 37 of the Electricity Act 1989[8] provided by the Scottish Government. The Scoping Report was submitted in February 2022, after which statutory consultation responses were received. Non-statutory consultees were also engaged during the scoping process. Community consultations also began during the scoping period with the offer of meetings; email and telephone communications; and two rounds of public exhibitions.

2.7.2. The consultation process was carried out to:

- Identify any further key considerations and highlight concerns from statutory consultees;
- Clarify the key points raised during the initial feasibility assessment;
- Promote communication with both statutory and non-statutory consultees and other stakeholders concerning key issues; and
- To confirm and agree the proposed methods for survey, evaluation and assessment.

2.7.3. Natural Power and the Applicant considers consultation with the community to be a crucial part of the development process and will continue to engage with the local community throughout the application process. As this is a Section 36 application there is no formal requirement to follow the pre-application consultation procedures for major developments under the Planning etc. (Scotland) Act 2006, however this application will follow the processes and standards set by the legislation and best practice guidelines (PAN 3/2010 - Community Engagement).

2.7.4. There were two rounds of public exhibitions across 2022 and 2024, scheduled to contribute to the design evolution process, the first round was held on 22 November 2022 across two days (11 am - 7pm across two venues: New Cumnock and Dalmellington). The second round was in April 2024 and held over two days: Tuesday 23rd April 3:30 – 7 pm and Wednesday 24th April 4 – 7 pm across two venues: Dalmellington Community Centre and New Cumnock Town Hall. These exhibitions showcased the Proposed Development and provided a chance for the public to learn more about the proposal and provide feedback.

2.7.5. All information presented at the November 2022 and April 2024 public exhibitions was also made available on the project's website, which gave those members of the public who were not able to attend the in-person exhibitions further opportunity to learn about and provide feedback on the Proposed Development.

2.7.6. The Pre-Application Consultation (PAC) Report provides full details on the consultation process.

2.8. Design Evolution

2.8.1. This section describes the design alternatives for the Proposed Development and discusses how the site design and layout continued to evolve throughout the EIA Process. The layout of the Proposed Development was designed under the guidance, requirements and considerations of the Applicant, specialist contributions from within Natural Power and from other expert contractors. The site design process was also guided by the findings of the baseline surveys, by the recommendations of the specialist consultants and by issues raised by statutory and non-statutory consultees, as well as relevant planning policy.

2.8.2. The aim of the siting and design process was to arrive at a design that would minimise environmental effects, be technically feasible, and economically viable using the best available techniques and engineering principles. The design optimised the Proposed Development for the generation of low carbon and low-cost electricity to contribute to national targets to decarbonise energy sources. As noted above, the design process included the selection in

[8] Scottish Government Good Practice Guidance for Applications under Section 36 and 37 of the Electricity Act 1989 [Online] Available from - Electricity Act 1989 - sections 36 and 37: applications guidance - gov.scot (www.gov.scot) Accessed 05/04/2024

number and size of turbines, placement of turbines, tracks and other associated infrastructure whilst taking account of topographical, landscape and visual, cultural heritage, ecology, ornithology and hydrology concerns.

2.8.3. The location of individual turbines was guided by the technical requirements for construction and operation including the potential manufacturer's warranty requirements and the nature of the topography in which the turbines are to be located. Siting was also guided by the results of the baseline studies and scoping exercise, with particular attention given to the likely landscape and visual effects, residential amenity and the hydrology and peat resource at the Proposed Development.

2.8.4. Computer modelling of wind resource and constraints was used as a tool to aid the development of the designed layout. Additionally, wirelines were generated for views from locations around the Proposed Development and used to 'test' the design in views from the surrounding area.

2.8.5. A number of different site layouts were devised and, following extensive investigation and consultation, an optimum layout was chosen through numerous design iterations. The site layout design evolution has been illustrated in Volume 2a, Figure 2.1: Layout Design Evolution which shows the evolution from the Scoping layout (Design 1) through to the Design Freeze (Design 4) as shown in Volume 2a, Figure 1.1: Site Layout.

2.8.6. The remainder of this chapter highlights the site design considerations and the key stages in the site design evolution, illustrating the iterative process that has resulted in the Proposed Development. Through each of the design iterations considered, key technical and environmental constraints and design criteria have been applied.

Influence of the Policy Context

2.8.7. The full range of predicted impacts have been considered throughout this EIAR. A review of legislation and planning policy has been provided in Volume 1, Chapter 4: Climate Change, Legislative and Policy Context and an assessment of such material is provided in the accompanying PS. A review was undertaken of design guidance documents and other standard texts on renewable energy development such as the NatureScot (then Scottish National Heritage (SNH)) guidance on 'Siting and Designing Windfarms in the Landscape[9]'. These are considered further in Volume 1, Chapter 5: Landscape and Visual Impact Assessment.

Design Strategy Principles

2.8.8. The design strategy for the key elements of the Proposed Development has considered the following objectives:

- To maximise site efficiency and low carbon electricity production;
- To provide a turbine layout with simple form, which reflects the scale of and relates to the landscape character of the Proposed Development and its surroundings;
- To avoid areas of constraint where practical;
- To avoid an overly complex and visually confusing layout;
- To achieve a balanced composition of the turbines against the landscape and skyline from key viewpoint locations; and
- To give due consideration to turbine proportions.

2.8.9. The current economic climate is driving greater efficient in electrical generation within a competitive energy market. Turbine manufacturers are responding to this by reducing the manufacture of turbines under 180 m and, in this context as well as the site-specific characteristics of the Proposed Development, turbines of up to 200 m tip height are considered as the candidate turbine. The inclusion of turbines up to 220 m to blade tip was considered in the design evolution. However, due to the increase of significant landscape and visual effects and the required separation distances required, the design team concluded that the 220m larger turbines, although could be accommodated, were not suitable for this area.

2.8.10. Wind farm design with turbines up to 200 m tip height is reflective of Scottish Government aspirations for demonstrably better energy yields from consented sites. This scale of turbine with larger rotor diameters is capable of maximising the wind energy output for this site and represents a candidate turbine which is expected to be deliverable and be viable.

Constraints to Proposed Development

2.8.11. The main environmental considerations on site which have influenced the final design of the Proposed Development are:

- Surveillance Minimum Altitude Chart (SMAC);
- Electricity power line;
- Noise;
- Ecological habitats;
- Peat;
- Watercourses;
- Residential amenity; and
- Landscape and visual.

Public Consultation

2.8.12. The following principles of effective public engagement have been followed as described in PAN 3/2010: Community Engagement:

- Access to information;
- The opportunity to contribute ideas;
- The opportunity to take an active part in developing proposals and options;
- The opportunity to be consulted and make representations on formal proposals and policies; and
- The opportunity to receive feedback and be informed about progress and outcomes.

2.8.13. The Applicant has liaised with the local community, ensuring that communities were given additional information if required and ensuring that all queries from community councils, community groups and members of the community were answered and followed up if required.

2.8.14. Details of exhibitions and other stakeholder engagements can be found in the accompanying PAC Report submitted with the application for the Proposed Development.

Iterative Design Process

2.8.15. The iterative design approach aimed, as far as practically possible, to avoid and then mitigate significant effects through the careful siting and design of the Proposed Development, which was repeatedly assessed and amended, balancing different environmental issues and consultee concerns expressed during early consultation. This embedded mitigation design process has also considered advice contained within SNH's (now NatureScot) current guidance 'Siting and Designing Wind Farms in the Landscape'[10]. The iterative process led to over 15 revisions of the layout with the four key design stages are presented below.

[9] 'Siting and Designing Windfarms in the Landscape' Version 3a August 217) [Accessed 25/06/2024]

[10] Ibid

Design 1: Scoping Layout (February 2022)

2.8.16. As detailed in Section 2.5.3, the design process began with a layout consisting of up to 17 turbines, tip heights of between 180 and 220 m (Volume 2a, Figure 2.1: Layout Design Evolution, Design 1).

Scoping Responses (June 2022)

2.8.17. Design 1 was presented to the ECU, EAC and consultees in the Scoping Report in February 2022. A copy of this can be found in Volume 3, Technical Appendix 1.1: Scoping Report. The full Scoping Opinion was issued by the ECU on 29 June 2022 and is provided in Volume 3, Technical Appendix 1.2: Scoping Opinion, of this EIAR and contains a copy of all the consultee scoping responses. This consultation helped identify and clarify key issues, promoted dialogue with both consultees and stakeholders, and confirmed methods for survey, evaluation and assessment going forward. The consultee responses were reviewed in partnership with the specialist sub-consultants in order to make sure all relevant issues identified were assessed as part of the Proposed Development survey work and were addressed in the relevant EIAR chapters.

2.8.18. In addition to the formal scoping and consultation, further discussions took place with EAC, Historic Environment Scotland (HES), Scottish Environmental Protection Agency (SEPA), NatureScot and Civil Aviation Authority (CAA) to agree on specifics of survey methodologies and potential mitigation should the Proposed Development gain consent and to update these consultees on progress.

Public Consultation (November 2022)

2.8.19. Detailed analysis of written feedback from the first round of public consultations can be found in the PAC Report. Key concerns raised in design terms, in summary, related to the size, visual impact, proximity and relationship of turbines to dwellings and communities, but also possible impacts to ecology, ornithology and noise.

Design Update #1 (November 2022 – Jan 2023)

2.8.20. The first formal design review was carried out across November 2022 and January 2023 between the Applicant and specialist consultants from relevant disciplines of expertise including; ecology and ornithology, hydrology, civils design, landscape and visual, wind analysis, noise, cultural heritage and traffic and transport. The aim of the design review day was to review the layout following receipt of the scoping opinion, consultee responses and collection of more desk study and site survey data.

2.8.21. Consultants reviewed the proposed layout from scoping (Design 1) which included assessing the proposed turbine locations together with preliminary infrastructure locations.

Design 2: Post Scoping Consultation and Surveys – March 2023

2.8.22. Based on the comments received from scoping (June 2022), design review 1, public consultation (November 2022) and further survey work (June 2022 – March 2023), amendments by the Applicant led to Design 2. Changes that were made are summarised below:

- Reduced number of turbines from 17 to 9 and maximum tip height from 220 m to 200 m:
  - Aviation: to avoid Instrument Flight Procedure (IFP) impacts with Glasgow Prestwick Airport (GPA);
  - Overhead line (OHL) restrictions: avoidance of buffer from OHL; and
  - Noise: removal of turbines close to the northern site boundary, increasing distance from properties on roadside.

2.8.23. The revised turbine number and locations are set out in Table 2.1:

Table 2.1: Design 2 Layout Changes

Turbine	Original Easting	Original Northing	Turbine	Design 2 Easting	Design 2 Northing
1	252380	607120	1	254378	608840
2	253104	607599	2	254864	608392
3	253208	605395	3	252662	606106
4	254646	609159	4	253126	607690
5	254472	608671	5	254342	607974
6	254864	608279	6	252412	606718
7	252590	605927	7	253251	606466
8	254114	606746	8	253401	605786
9	252816	608035	9	254049	606859
10	251805	606345	10	Removed	Removed
11	253391	605892	11	Removed	Removed
12	252363	606632	12	Removed	Removed
13	253173	606354	13	Removed	Removed
14	253696	605256	14	Removed	Removed
15	254045	605752	13	Removed	Removed
16	253862	606223	16	Removed	Removed
17	254585	607861	17	Removed	Removed

Source: Natural Power

Design 3: Design Chill (January 2024)

2.8.24. Based on further correspondence with technical teams, the Applicant amended the layout to produce Design 3, Changes that were made are summarised below:

- Turbine locations were located to minimise impact on watercourses and areas of deep peat;
- Topography was considered alongside the feasibility of hardstanding and track locations near potential turbine placements;
- Two turbines (T10 and T11) were added in following further wind resource and noise assessment. The addition of two turbines did not exceed any noise limits and therefore the layout was able to maximise generation with minimal environmental impact.

2.8.25. Each alteration was reviewed in detail by the specialist team to ensure that changes avoided constraints and did not undermine mitigation work done to date.

2.8.26. The revised turbine number and locations are set out in Table 2.2:

Table 2.2: Design 3 Layout

Turbine	Design 3 Easting	Design 3 Northing
1	251586	606353
2	251796	606892
3	252126	606495
4	252210	605653
5	252292	607281
6	252614	606862
7	253406	606364
8	253283	605872
9	253962	606846
10	254043	605697
11	252533	606114

Public Consultation (April 2024)

2.8.27. Detailed analysis of written feedback from the second round of public consultations can be found in the PAC Report.

Design 4: Design Freeze (April 2024)

2.8.28. Access tracks were added in accordance with design engineers and constraints including topography and the location of watercourses, peat and overhead line (OHL). Utilisation of the existing South Kyle Wind Farm access tracks, where feasible, aims to minimise potential environmental impact.

2.8.29. Site access from the publicly adopted highway is via the existing South Kyle Wind Farm. The existing access has been designed to accommodate deliveries for larger turbine components and its re-use will minimise potential environmental impact.

2.8.30. This concluded the design process, and the Proposed Development was frozen at 11 turbines of up to 200 m, associated infrastructure and up to 50 MW battery energy storage within the substation compound. Volume 2a Figure 1.1: Site Layout contains a detailed site layout with associated infrastructure for the Proposed Development after design freeze. This final layout is considered a well-balanced design from surrounding viewpoints and receptors, whilst also giving due consideration to other key environmental constraints and sensitives, as well as construction limitations and is the layout which is applied for and this EIAR describes.

Table 2.3: Design Freeze Layout

Turbine	Easting	Northing	Max Tip Height (m)
1	251586	606353	200
2	251796	606892	200
3	252126	606495	200
4	252210	605653	200
5	252292	607281	200
6	252614	606862	200
7	253406	606364	200
8	253283	605872	200
9	253962	606846	200
10	254043	605697	200
11	252533	606114	200

Source: Natural Power

2.8.31. The final maximum tip height is proposed at up to 200 m for all turbines. At this stage of a project the final turbine model is not known and there is a range of possible turbines that could fit the maximum turbine height criteria selected. As the specific turbine model has not yet been selected but is expected to be a horizontal axis machine with three rotor blades. Current models have approximately 8.4 MW generating capacity and by the time the project is constructed, such machines may be capable of generating more. Further information on turbine dimensions is discussed in Volume 1, Chapter 3: Project Description and included in EIAR Volume 2a,Figure 3.1: Indicative Turbine Specification. It is expected that detail of final turbine dimensions and appearance will be a requirement of a condition to be agreed with EAC prior to commencement of construction.

2.9. Conclusion

2.9.1. The Proposed Development has been subject to a detailed and iterative design process. Alternative layouts and access routes have been considered. The final design has sought to balance the technical requirements of the Applicant with the environmental considerations highlighted by consultees and the public during early consultation. The residual impacts of the design process are considered in the technical EIAR chapters.