Chapter 2

Site Description and Design Evolution

SCOTTISHPOWER RENEWABLES

Table of contents

Figures

Chapter 2

Site Description and Design Evolution

2.1 Executive Summary

1. The proposed Development is located between the village of Tarbert, to the north east, and the village of Skipness, to the south, situated within the northern part of the Kintyre Peninsula in Argyll & Bute. The nearest turbines are located approximately 5.7 km south of the village of Tarbert and 3 km north of the village of Skipness. The land is centred on National Grid Reference (NGR) NR 88732 63637 as shown on **Figure 1.1**. The Site is located within the forestry areas of Skipness and Corranbuie. Skipness and Corranbuie are separate areas, but both are owned by Forestry and Land Scotland (FLS) and therefore, considered one potential multiple technology development site.

2. The Site met numerous criteria that SPR use to select renewable energy development projects. Importantly, the Site offers good wind potential for wind turbines, it also can accommodate wind turbines and associated infrastructure without affecting sites designated for their natural or heritage interests such as Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), Special Protection Area (SPA) and designated and undesignated heritage assets. As most of the Site is a commercial forest, there is good access and an existing network of forestry tracks that could be incorporated into the proposed Development.

3. SPR designed the proposed Development taking into account operational requirements and environmental and landscape constraints. In particular, landscape studies and proximity to residential receptors. As information on the environmental, landscape and technical constraints has been collected by the EIA team through site surveys, technical studies and consultation, this information has been used to review and refine the design of the Site. The location and sensitivity of all identified environmental receptors have been mapped, and appropriate buffers were agreed between the technical specialists and project engineers, which allowed the site design to be finalised. This approach has ensured the proposed Development would avoid the most valuable environmental areas and significantly reduce potential impacts through design-based mitigation.

4. SPR initially investigated development scenarios up to 38 turbines, and with turbines up to 198 m to tip height prior to detailed EIA studies. These were subsequently modified to a 13-turbine layout of up to 200 m to tip during the scoping phase. The current and final layout includes 13 turbines of up to 180 m to tip, along with locations of ancillary infrastructure such as ground mounted solar arrays, a battery energy storage system (BESS) and associated infrastructure, substation and access tracks. The final layout was informed by detailed multidisciplinary assessment and considered environmental constraints, balanced by technical requirements.

5. Taking these constraints into account and considering the construction requirements of such a project, SPR has developed a design which it believes is best suited to the Site and its surroundings.

6. The final design layout comprises a layout of 13 turbines, up to 180 m (to vertical turbine blade tip), and hardstandings, a solar installation (with a land footprint of 7.05 ha), a BESS, substation, 23.4 km of access track (10.4 km of which is new), ten watercourse crossings, three new borrow pits, underground power cables, two temporary construction compounds and a permanent anemometry mast.

2.2 Introduction

7. This Chapter provides a description of the proposed Development. This description covers the site context and outlines how alternatives have been considered for the proposed Development. It describes the site selection process, outlines the site design process and describes the renewable energy technology alternatives considered.

8. The principles of the EIA process require that site selection and project design should be iterative and constraints-led, to ensure that potential negative environmental impacts, as a result of the proposed Development, are avoided or minimised, where reasonably possible. Schedule 4 (2) of the EIA Regulations, requires the consideration of reasonable alternatives in terms of development design, technology, location and the size and scale of the proposed Development. Regulation 5 (2)(d) of the EIA Regulations requires that an EIA report should include: "*a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment*.".

9. This Chapter draws on issues considered in more detail in the relevant technical Chapters (**Chapters 7 to 16**). However, it does not pre-empt the conclusions of the later Chapters. Instead, it explains how potential environmental effects, which have emerged early in the EIA process and through the studies by the EIA team, have informed the design of the proposed Development.

10. This Chapter of the EIA Report is supported by the following figures provided in Volume 3a: EIA Report Figures:

- Figure 1.1: Site Context;
- Figure 2.1: Environmental Designations;
- Figure 2.2: EIA Design Iterations;
- Figure 2.3a: On-site Constraints - Heat Map; and
- Figure 2.3b: On-Site Constraints – Ecology
- Figure 2.3c: On-Site Constraints – Ornithology
- Figure 2.3d: On-Site Constraints – Cultural Heritage
- Figure 2.3e: On-Site Constraints - Hydrology
- Figure 2.4: Peat Depth

11. The final design for the proposed Development is described in **Chapter 3** and is shown on **Figure 3.1.**

2.3 Site Context

2.3.1 Site Description

12. The proposed Development is located between the village of Tarbert, to the north east, and the village of Skipness, to the south, situated within the northern part of the Kintyre Peninsula in Argyll & Bute . The nearest turbines are located approximately 5.7 km south of the village of Tarbert and 3.0 km north of the village of Skipness. The Site is located within the forestry regions of Skipness and Corranbuie, centred on National Grid Reference NR 88732 63637, as shown on **Figure 1.1**. The Site lies wholly within the administrative boundary of Argyll and Bute Council.

13. The Site is dominated by the Corranbuie Forest (1065ha) and the Skipness Forest (1165 ha), and the land consists predominantly of commercial forestry. The topography of the Site is variable and undulating and is dictated by five small hills within the forested areas: Cnoc nan Caorach (254 m AOD), Cruach Bhreac (351 m), Cruach na Machrach (346 m), Guallan Mhor (303 m) and Meall Donn (276 m). Between the hills, the land is generally below 14% slope, with the exception of some land in the north Corranbuie area and throughout the south west of the Skipness area.

14. The proposed Development would be visible from several Landscape designations. Most prominent amongst them are the North Arran National Scenic Area (NSA) and Special Landscape Area (SLA), and the Argyll and Bute Council Areas of Panoramic Quality (APQ). Tarbert Woods is the closest natural heritage designation and is a Special Area of Conservation (SAC) (see **Figures 7.1** and **8.1**). The Local Nature Conservation Site West Loch Tarbert adjacent and to the west of the Site, while 0.8 km north west and 0.5 km to the west is the Glen Ralloch to Baravalla Woods Site of Special Scientific Interest

(SSSI). The nearest Special Protection Areas (SPAs) are Knapdale Lochs SPA & Kintyre Goose Roosts SPA, respectively 8.3 km and 14.9 km away. The Sound of Gigha proposed SPA (pSPA) is 0.2 km away.

15. The main transport routes within the immediate area include the A83 trunk road which serves the Kintyre peninsula between Tarbert and Campbeltown. The A83 passes the north-western end of the Site. The B8001 runs along the western end of the Site. There are no roads on the eastern or western ends of the Site. Islay and Jura can be accessed by ferry at Kennacraig Ferry Terminal, approximately 3.8 km west of the Site. The Isle of Arran can be accessed by ferry at Claonaig Ferry Terminal, approximately 4.2 km south west of the Site. The Kintyre Way walking route traverses parts of the Site.

2.3.2 Surrounding Area

16. The immediate area surrounding the Site is characterised by land used for commercial forestry surrounded by more open moorland at the northern end of the Kintyre peninsula. The two closest settlements, from the nearest turbine, are Skipness (3.0 km south west) and Tarbert (5.7 km north).

17. There is a relatively low population density within the immediate vicinity with few properties located within 2km of the Site.

18. The closest environmental designations within 10 km of the Site, from the nearest section of the application boundary, are shown on **Figure 2.1** and summarised in **Table 2.1** below. The heritage assets within 5 km of the Site, from the nearest section of the application boundary, are summarised in **Table 2.2.**

2.3.2.1 Ecological Designated Sites

Table 2.1: Ecological Designated Sites within 10 km of the Site

Ecological Designated Sites	Name	Distance from Site
Site of Special Scientific Interest (SSSI)	Tarbert to Skipness Coast Claonaig Wood Artilligan and Abhainn Strathain Burns Ardpatrick and Dunmore Woods Arran Northern Mountains Knapdale Lochs	Adjacent to Site 4.7 km south west 6.2 km north 6.5 km west 9.0 km south 8.3 km north west
Special Area of Conservation (SAC)	Tarbert Woods	Adjacent to Site
Special Protection Area (SPA)	Knapdale Lochs	8.3 km north west

2.3.2.2 Heritage Assets

Table 2.2: Heritage assets within 5 km of Site

Heritage Asset	Name	Distance from Site
Scheduled Monuments	Skipness Castle and Chapel (SM13225)	2.2km south
Category A Listed Building	Cour House	13.5 km south west
Category B Listed Building	Weighbridge Cottage, Tarbert Harbour	1.3 km north
Category C Listed Building	Pier House, Pier Road, Tarbert	1.3 km north
Garden and Designed Landscape (GDL)	Stonefield Castle Hotel (GDL350)	2.8 km north
Conservation Area	Tarbert (CA479)	1 km north

2.4 Site Selection

19. SPR uses a range of criteria to select sites for the development of renewable energy projects. As part of the growth plans for the development of renewable energy projects, SPR is continually assessing sites. This pipeline of potential sites, which is

commercially sensitive, are not considered to be alternative sites to this proposed Development. Alternative sites are not considered further in the EIA Report.

20. However, in selecting sites, the criteria used by SPR to develop commercially viable projects include the following:

- suitable wind conditions for the installation of wind turbines;
- suitable solar irradiance for the installation of solar arrays;
- availability of nearby grid connection with available capacity to accept new renewable energy generation;
- favourable topography and access to enable the construction of projects;
- planning policies which support the development of renewable energy;
- avoidance of significant environmental constraints where possible on site and/or immediately surrounding, including protected sites for conservation and heritage, protected species and their habitats and deep peatlands;
- avoidance of the most sensitive landscapes; and
- areas that are sparsely populated to protect the residential amenity of residential areas and households.

21. A review of the site selection requirements for the Site found the following:

- initial desk-based assessments onsite suggest that there is likely to be a good wind and solar resource and the Site is available for a renewable energy development;
- the site itself has open and expansive characteristics considered appropriate for wind turbine development;
- Construction of a commercial scale renewable energy development is technically feasible within the context of the topography of the Site;
- the grid network in the west coast of Scotland has been identified by SPR as requiring balancing services that would be suited to a BESS which would complement the ground mounted solar arrays and wind turbines;
- there are no planning policies which, in principle, preclude wind energy or renewable energy development. The Site is partly located within an area which is considered to have potential for windfarm development subject to other policy considerations. Further information on this is provided in **Chapter 4**;
- there are several areas of flat/gentle sloping south facing land that are suitable for ground mounted solar arrays;
- the site has reasonably good access from the public road network for construction traffic and wind turbine deliveries, particularly for longer blades which allows consideration of larger turbines to make the best use of the expected wind resource;
- there are no national or international nature designations within the area identified for development; and
- the distances from the nearest residential properties are such that undue noise or visual impacts from on visual amenity can be avoided.

2.5 Technology, Size and Scale

22. As a basis of the design of the proposed Development, it was considered that it would comprise three-bladed horizontal axis turbines, with the incorporation of ground mounted solar arrays and BESS. Other technologies such as Hydrogen Storage (storage and fuel) and Hydro Power were explored but not considered suitable for the purposes of the proposed Development. Further information is provided in **Chapter 14.**

2.5.1 Wind Turbines

23. Allied to a significant resource availability in the Argyll and Bute region, onshore wind continues to be the cheapest form of renewable energy and the Site has been predominantly selected for its potential to generate energy from wind turbines. Additional to this, the challenge is to meet the Scottish Government targets within a context of limited Government support mechanisms for onshore wind. The supply of smaller wind turbines across Europe is already reducing, due to lack of demand as manufacturers are recognising the world market is shifting to larger machines with development work focussing on larger turbines to secure higher yields. The tendency is to install wind turbines at higher tip heights (e.g. 175 – 240 m to blade tip). Therefore, it is highly unlikely that a range of smaller turbines (e.g. 120 m) would be available at competitive prices by the time the proposed Development is ready to be constructed, if consented.

24. Larger turbines need to be considered if onshore wind development is to continue to make a contribution to both the UK and Scottish Government's renewable energy targets, particularly the recent announcement of net zero CO_2 emissions by 2045.

The Scottish Government's Onshore Wind Policy Statement (December 2017) also challenges the industry to develop the first 'subsidy free onshore windfarm' which will only be possible if taller turbines are installed.

25. Initial proposals that were shared with consultees and the public via the EIA scoping process (May 2020) was for turbines up to 200 m to tip. Following discussions/correspondence with the Local Community Council, NatureScot and Argyll and Bute Council, as well as feedback from initial landscape and cultural heritage assessments, SPR amended the final design to a lower tip height (180m). Compared to smaller wind turbines the amount of concrete per MW produced would be less, and similarly the length of new access track required per MW produced would also be less. Fewer but taller wind turbines would also reduce any forestry felling by increasing the rotor clearance above the tree canopy reducing the impacts upon existing forestry operations. Overall, whilst it was considered that taller wind turbines were the most appropriate and would better contribute to the Scottish Government's climate change targets, the assessment of landscape impacts was a limiting factor on the selected height of wind turbines.

26. The final selection of the turbine tip height of up to 180 m was considered to represent the best balance of capturing wind resource and design in the landscape. These considerations and the final selection of turbine height are described in **Section 2.6.2** of this Chapter.

2.5.2 Solar

27. The global horizontal irradiation (GHI) for the general location of the Site is calculated to be around 900 kWh/m^2 which although is slightly less than the UK average of 1,000 kWh/m^2, is still within levels considered viable for the proposed Development.

28. One area of the Site was found to be suitable for the installation of ground mounted solar arrays which presented an area large enough for a minimum of 5 MW of installed solar arrays. It was considered that ground mounted solar arrays should be investigated further and could co-exist with wind turbines. Key to investigating the positioning of solar arrays were the suitability of ground conditions, the presence of peat, landscape and visual impacts, ornithological activity and the quality of habitats on the Site. An environmental and technical review of potential solar locations identified on the Site was undertaken and a preferred area best suited to the Site and its surrounding areas was selected.

2.5.3 Battery Energy Storage System (BESS)

29. There is a national requirement to balance the peaks and troughs associated with electricity supply and demand to avoid strains on transmission and distribution networks and to keep the electricity system stable. A BESS is therefore proposed as part of the proposed Development to support the flexible operation of the National Grid and decarbonisation of electricity supply.

30. The BESS would store electrical energy through the use of batteries, contained alongside inverters within a self-contained compound, adjacent to the onsite control building to allow easy connection to the grid.

2.6 Design Evolution

31. This section of the EIA Report addresses the consideration of alternatives and evolution of the design that SPR has gone through from first considering both Skipness and Corranbuie forestry parcels to arriving at the proposed layout and scale of the proposed Development on the Skipness Forest.

2.6.1 Consideration of Alternatives

32. According to the EIA regulations, the EIA Report should include: "*a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment*."

33. With respect to the proposed Development the alternatives considered were as follows:

- different turbine and infrastructure layouts/locations within the Site;
- different turbine heights/dimensions; and
- different routes between the development infrastructure within the Site.

34. The renewable energy design and layout was adapted and altered in response to environmental constraints and consultation feedback. The proposed Development went through a series of four broad design iterations. Changes to the layout included decreasing the number of turbines, changing turbine positions, siting of ancillary infrastructure, and routing of access tracks.

2.6.2 Design Evolution Approach

35. The layout and design of the proposed Development follows an iterative design and environmental constraints led process aimed at optimising a renewable energy development that minimises environmental impacts but meets the commercial requirements of SPR. An iterative design approach works in tandem with the EIA process, whereby the design process facilitates incremental changes in layout and design resulting from a continually developing understanding of environmental constraints. This iterative approach allows potential environmental constraints, as they are identified, to be avoided or minimised through alterations in design. This approach is referred to within this EIA as mitigation 'embedded' into the proposed Development or simply 'embedded mitigation'. Further information on embedded mitigation is explained within each technical Chapter of this EIA Report.

36. As part of the approach, numerous design principles and environmental measures have been implemented and incorporated into the proposed Development as standard practice, including the following:

- consideration of the underlying character and scale of the landscape;
- layout and spacing of wind turbines relative to key viewpoints;
- minimising impacts on peat;
- sensitive siting of the proposed infrastructure incorporating appropriate buffer distances from environmental receptors to avoid or reduce effects on the environment;
- considering the size and scale of the proposed Development appropriate to the location and proximity to residential areas;
- minimising removal of plantation/tree cover to accommodate renewable energy infrastructure;
- seeking opportunities within the Site to provide biodiversity enhancements;
- re-using existing forestry tracks as much as possible to access proposed turbine locations;
- design of the tracks and hardstandings to minimise cut and fill, reducing landscape and visual effects as well as costs;
- inclusion and design of borrow pit(s) to minimise the amount of the material required to be imported to the Site; and
- potential for up to 50 m micrositing of infrastructure during construction to ensure the best possible location is chosen based on detailed Site investigations.

37. Throughout the design evolution of the proposed Development layout, a key driver was the consideration of potential landscape and visual effects on receptors and how the proposed Development would relate to the existing landscape character and the cumulative pattern of development. Particular regard has been given to evaluating the scale and number of turbines proposedwith the proportions of the existing landscape. The landscape and visual effects potentially caused by the proposed Development have been considered extensively from key receptors during the design of the proposed Development.

38. Siting and Designing Windfarms in the Landscape (Version 3a) SNH (now NatureScot) states that:

"In a wind farm, turbines can be arranged in many different layouts. The layout should relate to the specific characteristics of the landscape - this means that the most suitable layout for every development will be different. For a small wind farm, this might comprise a single row of wind turbines along a ridge; while, for a larger development, a grid of wind turbines is often taken as the starting point, with the turbines spaced at minimum technical separation distances."

39. Other key drivers throughout the design evolution of the proposed Development layout were the consideration of noise on the nearest noise sensitive receptors, and of cultural heritage. Consideration of noise involved an analysis of the noise and limits at the nearest properties at key stages throughout the design process to ascertain what implications there might be and if any embedded mitigation may be required. Consideration of cultural heritage included designing the layout to ensure that no element of the proposed Development physically affected any known identified heritage assets, and amending the layout to ensure that impacts on the setting of sensitive cultural heritage assets outwith the Site were minimised.

40. The solar development area has been selected using a similar approach to the wind turbine layout by applying technical and environmental constraints to the Site. The principal criteria for solar development has been the identification of flat land and/or ideally south facing slopes. The general design parameters used have been as follows:

- Slope (less than 5 degrees for north facing slopes and no more than 10 degrees for south facing slopes);
- Watercourses (10 m buffer);
- Availability of visual screening
- Avoidance of significant shading
- Avoidance of the need for tree removal as far as is practicable;
- Availability of suitable access to site;
- Avoiding extending the physical footprint of the proposed Development out with the envelope established by other elements of the infrastructure.
- Potential synergies with the proposed wind and supporting site infrastructure; and
- Avoidance of sensitive habitats and deep peat.

41. The substation and BESS also have similar requirements positioning on flat land and avoiding sensitive habitats areas and deep peat. The same is true for the construction and maintenance compound but with its position ideally located as near as possible to the entrance and the location of the first wind turbine on entering the site.

42. The onsite access tracks have been designed to use existing tracks as far as possible; whilst minimising cut and fill requirements in order to reduce the amount of ground disturbance, amount of material required for construction, loss of sensitive habitats and landscape and visual effects, particularly during construction. Where felling is required to accommodate the access corridor then effort has been made to extend the access corridor to the downwind edge of neighbouring forestry to avoid the creation of new wind exposed edges. This approach should ensure that felling is minimised and the future health and productivity of crop is protected. Reducing the felling would also minimise the production of waste materials and potential sources of pollution. The access track itself in certain locations will also act as the firebreak and therefore obviate the need to cutting firebreaks elsewhere.

43. Although the use of existing tracks on site minimised the need for new tracks, borrow pits were also considered as required as a source of rock to be used in the construction of the tracks, hardstandings and foundations. The locations of borrow pits took due cognisance of on-site constraints, targeting areas where the most suitable and accessible deposits of rock are likely to be available, and in locations with closest proximity to proposed infrastructure. The total number and size of borrow pits was selected to make a valid contribution to the estimated volume of rock required to construct the tracks, hardstandings and foundations. For the borrow pits, the key drivers influencing the design have been: the suitability of rock; the proximity of the rock to the surface; avoidance of peat, watercourses and other sensitive environmental receptors; whether borrow pits would be visible from outside the Site; and the proximity of the proposed borrow pit locations to existing and proposed infrastructure on the site (e.g. access tracks).

2.6.3 Design Evolution

44. SPR has been investigating the potential for a renewable energy development at Earraghail since 2018. However, following environmental surveys and consultation feedback, the Site now comprises a smaller area (1455.67 ha) focussed within the Skipness forestry parcel, as shown in **Figure 2.1** and with advances in technology now incorporates ground mounted solar arrays and a battery energy storage system.

45. Within that context, the proposed Development has gone through five principal iterations of the layout, which have been developed at different stages in the project design process. Layouts A to D are shown on **Figure 2.2**, and illustrate the four interim layouts and visually illustrates how the design and application boundary has evolved through the design stages of the EIA process. Layout E (final layout) is shown in **Figure 3.1**. A summary of the evolving layouts and design and the reasons for the changes are presented in **Table 2.3**, below.

Table 2.3: Description of Design Evolution Stages

Layout	Turbine numbers	Tip height	Comments
Layout A (Pre-EIA studies)	38	198 m	Undertaken in May 2019, prior to detailed surveys necessary for the EIA commencing.
Layout B	13	200 m	Informed by environmental constraints data and wind turbine parameters instructed by SPR. This layout formed the basis of the EIA Scoping Report submitted in May 2020.
Layout C	14	200 m	Modified in response to all relevant field data collated for the Site, scoping and public consultation responses, alongside further advanced onsite environmental surveys and visual analysis
Layout D	14	180 m	Informed by detailed multidisciplinary assessment, and including locations of ancillary infrastructure, following consultation with statutory consultees and public consultation.
Layout E (Proposed Consent Application Layout)	13	180 m	Design incorporating advice received following initial drafting and review of detailed assessments and responses received via the EIA Gatecheck process.

2.6.3.2 Layout A: Initial Layout – Pre EIA Studies

46. In May 2019, a preliminary environmental, engineering and planning appraisal of the Site was conducted, and which identified the potential for a development of up to 38 turbines of 198 m to tip. Additionally, the study also identified the Site had the potential for energy storage in the form of battery and hydrogen, and Electric Vehicle (EV) charging.

47. The initial layout is presented in **Figure 2.2a**.

2.6.3.3 Layout B

48. Layout B, shown in **Figure 2.2b**, represents the first subsequent iteration of design, comprising 13 turbines at 200 m to tip within the southern area of the Site. Following results from one year of ornithological surveying in the area, discussions with NatureScot and Argyll and Bute Council and initial advice regarding potential landscape and visual impacts, the layout excluded the areas to the north.

49. The layout was based on further consideration of the initial layouts between RSK and SPR's wind resource team and factored in the on-site environmental constraints identified by that stage and wind turbine parameters instructed by SPR.

50. This layout formed the basis the EIA Scoping Report.

2.6.3.4 Layout C

51. Following the establishment of Layout B, a series of internal design workshops were held whereby the layout was further scrutinised in light of site-specific field data relating to deep peat, watercourses, private water supplies, habitats, and protected species. Where relevant, any feedback received via scoping, consultation with stakeholders and the outcome of a public consultation event held in the summer of 2020 were also considered. The evolving design was then subject to an appraisal of potential landscape, visual and cultural heritage effects and a number of variants of the design considered.

52. The design principles were defined as follows:

- accord with the current Argyll and Bute Council LDP and Landscape Wind Energy Capacity Study (LWECS) as far as possible;
- minimise landscape and visual impacts while maximising the production of renewable energy;
- minimise extent of development visible along the northern slope of the Kintyre peninsula;
- minimise potentially adverse cumulative effects of the proposed Development in combination with other nearby windfarms in operation or construction, that have been approved, or that are awaiting determination;
- avoid significant impacts upon habitats and ecological features;
- aim to reduce or avoid impacts on the setting of designated heritage assets, where possible

- avoid siting infrastructure on areas of deep peat;
- reduce the amount of felling and accommodate any Land Management Plan for the area;
- minimise and, where possible, avoid the loss of priority habitats and species, and create opportunity for habitat enhancement;
- protect watercourses from the potential impacts of constructing the proposed Development;
- ensure the proposed Development can be engineered and constructed safely; and
- improve public access to the general area.

53. The decision to add another turbine was made because the movement of other turbines to avoid environmental constraints created space for a turbine in an area that was not environmentally or technically constrained and would allow suitable separation between other turbines.

54. In formulating Layout C, as the turbine locations were becoming more 'definitive' in light of emerging constraints, potential locations for ground mounted solar arrays were identified that would be subject to further scrutiny prior to design freeze (Layout E below). This design is seen as Layout C in **Figure 2.2c**.

2.6.3.5 Layout D

55. Following the establishment of Layout C, an opportunities workshop was held to identify potential enhancement measures that could be incorporated into the design. This included:

- Borrow Pit locations;
- promoting onsite archaeological resources;
- habitat enhancement for impacted species/habitats;
- suitable areas where compensatory planting could be substituted for peat restoration or linked with the sessile oak woodland SSSI in the eastern part of the Site;
- improvements along the Kintyre Way (in consultation with the Kintyre Way SCIO); and
- extending the existing circular walking route from Tarbert into the Site.

56. The arrangement of turbines for Layout D is shown in **Figure 2.2d**. With respect to solar infrastructure, the area identified on **Figure 3.1** was selected for potential development. This location was chosen as it:

- is located on relatively flat and south-facing terrain;
- allows for avoidance of peat deposits and need for plantation removal, as it is located in areas of clear-fell;
- is a location that avoids and/or minimises potential impacts on known environmental resources;
- would be affected by minimal shadowing from both vegetation and proposed turbine locations; and
- is located close to proposed turbine locations so any felling requirement for the solar array would improve the wind resource for those turbines.

57. Several proposed locations were identified and discussed for the BESS, onsite construction compound and substation. The final location was selected as it was within the area of the proposed turbine array, met the required safety distances from the turbines, was not located close to existing borrow pits operated by FLS on the Site, did not impact on sensitive habitats, sites or watercourses, and was predominantly screened from out-with the Site.

58. With respect to other ancillary infrastructure, a key focus was access track design/layout, as well as the number and positioning of borrow pits, construction compounds, and substation. As part of the design process, these elements were designed in accordance with the following design principles:

- Utilising existing forestry access tracks as far as practicable
- Minimisation and/or avoidance of deep deposits of peat
- Where deep peat cannot be avoided by access tracks, adoption of 'floating road' design
- Minimisation of water crossings
- Avoidance or minimisation of impacts on environmental resources
- Location of borrow pits where rock resource is most evident at surface and/or making use of existing ones
- Reduce potential 'trafficking' across the Site with placement of borrow bits and construction compounds
- Identification and selection of an optimal location for the onsite substation taking account of turbine and solar infrastructure

59. A further stage of public consultation was undertaken over the winter of 2020 – 2021 (November 2020 – January 2021), and the results used to inform the further refinement of the design resulting in Layout D, including a reduction in the height of turbines proposed, moving turbine 10 further north to reduce visual impacts potentially experienced from the south (e.g. Skipness and the north of Arran) and to reduce impacts on the setting of the designated assets of Skipness Castle and Kilbrannan Chapel.

60. The resulting design was then subject to a targeted peat depth investigation, along with a joint site visit to all locations by a project engineer and principal hydrogeologist to take account of local ground conditions, peat depth, topography and the presence of bedrock at or near the surface.

2.6.3.6 Layout E– Proposed Consent Application Layout

61. Following the outcome of the further site investigation, the Energy Consents Unit's Gatecheck process (see **Chapter 6** for further detail on the Gatecheck process), and initial drafting and review of detailed assessments to inform the application for consent, the design was consolidated and finalised. The principal changes incorporated at this stage were to remove Turbine 10 from the layout and amend the location of Turbine 5. These changes reduced the visibility of the proposed Development from the residential receptors in and around Skipness, as well as reduced the visibility, number and prominence of turbines when viewed from Kilbrannan Chapel, a scheduled monument and a property in the care of Scottish Ministers, alongside Skipness Castle.

62. Finally, once the location of all infrastructure and proposed elements of development were confirmed, the application boundary comprising the Site was drawn in around the proposed Development. This was undertaken in order to demonstrate the proposed Development avoided sensitive habitats, and to clearly show that turbines would not be located in the Corranbuie forest area.

63. This design as seen in **Figure 3.1**, constitutes the final 'Design Freeze' or proposed consent application layout that forms the basis of this application for consent.

64. Individual assessment chapters report their design input in further detail and respond to specific matters, in particular pertaining to the scale of the proposed turbines and the landscape fit of the scheme.

2.7 Layout and Design Constraints

65. The proposed Development, which is described in detail in **Chapter 3**, is the result of the previously described design evolution process. This section describes in more detail how this layout and design has been determined and outlines the environmental and technical constraints which have been taken into account.

66. The key constraints which were considered during the design process included:

- identified landscape and visual constraints;
- presence of ornithology, protected habitats and species;
- presence of cultural heritage features;
- location of residential properties – proximity to noise sensitive receptors;
- ground conditions (including peat);
- forestry;
- access feasibility;
- presence of power lines and telecommunications links;
- area topography, including gradients, exposure, watercourses and land use;
- Aviation;
- compatibility with aviation interests; and
- key recreational and tourist routes.

67. In order to progress the design of the renewable energy development, a 'heat map' styled constraints plan (**Figure 2.3a**) was developed whereby each constraint was assigned a red, amber or green category depending on their significance. On site constraints can be seen in further detail in **Figure 2.3b**.

68. A description of how the various environmental and technical disciplines have contributed to the design through detailed assessment is described below. Information in respect of the survey work undertaken is provided in the technical Chapters of this EIA Report (**Chapters 7 to 15**).

2.7.1 Wind Analysis

69. Wind analysis and efficiency modelling has been carried out by SPR from project inception and throughout the design evolution process of the wind turbines to identify the areas of the Site likely to produce the highest yields and ensure the commercial viability of the scheme.

70. For turbines to work as effectively as possible, they must be suitably spaced relative to the predominant wind direction. If they are too close together in this direction, the wake effects from the wind turbines located on the upwind edge of the array will create turbulent air for the next row and so on through the array, reducing overall energy output. Additionally, turbulent air increases the strain placed on the turbines, which could shorten the lifespan of the turbines. Conversely, if wind turbines are located too far apart the opportunity to maximise the capacity and, thereby, electricity generation from a site is reduced.

71. There is no industry standard for spacing, only manufacturer recommendations and rules of thumb. Six times rotor diameter on the predominant wind direction against four times rotor diameter cross wind (6D x 4D) is a common starting point. This is understood to provide a reasonable compromise between turbine proximity and site capacity without unduly compromising turbine operation. The proposed Development may, however, employ turbines which are not yet on the market. Therefore, a more flexible methodology utilising wind yield modelling was used to find the right balance of turbine efficiency and productivity over a wide variety of potential rotor diameters.

2.7.2 Landscape Character and Visual Amenity

72. The design of the wind turbine layout is a vital part of the landscape and visibility effects of a renewable energy development. Its appearance considered on its own in the context of the surrounding landscape and cumulatively were important considerations. Landscape and visual input to the design was informed NatureScot's (then SNH) Siting and Designing Wind Farms in the Landscape Version 3a (2017), experience and drawing on fieldwork observations. In addition to those design principles established above, the following key landscape and visual sensitivities were identified as key factors for consideration in the design:

- potential for influence on designated landscapes including the North Arran NSA/Wild Land/SLA, Kyles of Bute NSA and Argyll & Bute Council Areas of Panoramic Quality;
- scale and context of the receiving landscape;
- potential cumulative effects with nearby developments;
- potential visibility from settlement and recreational receptors on the Kintyre peninsula (Skipness/Tarbert), South Cowal (including Portavadie and Ostel Bay), Isle of Bute; North Arran and South Knapdale;
- potential visibility from key land-based routes including the A83, B8001, B842, B8024, the Kintyre Way through the site;
- potential visibility from recreational users of inland waterways including ferry routes, channelled views within Loch Fyne and Kilbrannan Sound; Kyles of Bute and outer Loch Fyne.

73. The final proposed Development layout has considered the following:

- reasonably consistent and balanced relationship when seen from the surrounding area, particularly when seen in views from the south (Skipness and Arran) and east (e.g. Cowal Peninsula);
- minimises impacts upon views from Skipness and key views from the surrounding area;
- sufficient separation from the smaller scale landscape of Rocky Mosaic and Hidden Glens to avoid adverse scale comparisons;
- reasonable degree of setback from the sensitive receptors; and
- non-significant effects on visual amenity for nearby settlements, as well as most dispersed properties in proximity to the Site.

74. Where possible, proposed excavation for access tracks and other infrastructure has been minimised and the location of the substation and construction compound have been reviewed, and the selected option has been chosen in order to minimise visual effects.

75. The landscape and visual effects of the proposed Development are addressed further in **Chapter 7**.

2.7.3 Ecology and Ornithology

76. Ecological surveys have been carried out across the Site since 2019, including a Phase 1 habitat survey, a National Vegetation Classification (NVC) survey and protected species surveys (including bats, pine marten, badger, otter, water vole, red squirrel). Sensitive ecological features, including habitats present within the Site and species which use the Site and appropriate buffers, have been avoided. The proposed Development avoids ecological features of greatest sensitivity, such as Annex 1 peatlands. In addition, the recommended habitat standoff distances from blade swept path to key habitat features have been incorporated into the design to reduce collision risk to bats.

77. Ornithology surveys have been carried out across the Site and surrounding area since September 2019, including vantage point watches; scarce breeding birds (for raptors, divers and any other species listed in Schedule 1 of the Wildlife and Countryside Act 1981); and winter walkovers for non-breeding birds. Suitable buffers were considered during the design evolution process and areas have been specifically avoided to minimise the impact on sensitive species.

78. Areas with potential to be Groundwater Dependent Terrestrial Ecosystems (GWDTE) were also examined. Several areas of GWDTE were identified within the application boundary. All potential GWDTE were considered to be sensitive and have been avoided as far as practicable by careful design.

79. The ecology and ornithology effects of the proposed Development are addressed further in **Chapter 8** and **Chapter 9**.

2.7.4 Hydrology and Hydrogeology

80. In accordance with good industry practice, a 50 m buffer zone has been applied around all watercourses on the Site for wind turbines and a 20 m buffer zone around the solar development area. This reduces the risk of runoff, loose sediment and potential pollutants entering watercourses. In some cases, the use of existing tracks, already within 50 m of drainage ditches, have been identified as the best option for design, minimising the need for new tracks. In a few other locations, the balance of constraints has required use of a narrower buffer zone (See **Chapter 8** for further detail). Watercourse crossings have been minimised as far as practicable; and where possible, existing crossings would be used. Existing crossings may be upgraded or replaced as appropriate.

81. Data on private water supplies (PWS) was obtained from Argyll and Bute Council and was not identified as a constraint to development.

82. The hydrology and hydrogeology effects of the proposed Development are addressed further in **Chapter 10**.

2.7.5 Peat Depth

83. The majority of the Site is underlain by Class 5 soils; these represent areas of commercial forestry plantation on peat soils and have a lack of peatland vegetation. Part of the northern section of the Site, north and west of the proposed turbine area, is underlain by Classes 1 and 2, which are considered to be nationally important carbon-rich soils, deep peat and priority peatland habitat. These areas are deemed likely to be of high conservation value. Part of the southern-most Site is underlain by Class 3, indicating that occasional peatland habitats can be found here. Mineral soils have been identified along the eastern edge of the Site.

84. Site visits have confirmed the presence of peat and peatland habitats (**Chapter 8**). Peat probing and habitat surveys were undertaken in 2020 and 2021 and show that the peat is of variable condition and depth across the Site, with deeper peat occurring at Càrn Chaluim, Loch na Machrach Mòire, Eas a' Chromain and Cnoc na Mèine. Other areas of the Site are characterised by peaty soils and mineral soil. The peat probing data is discussed in **Technical Appendix 10.1.**

85. A review of the peat depth data and habitat mapping, in conjunction with slope gradients, allowed areas of deep peat (typically greater than 2.0 m) and those areas of less modified peat to be avoided where possible through the evolution of the design. Where possible, proposed wind turbines, ground mounted solar arrays and site infrastructure would be located within areas with no peat or with peat less than 1.0 m deep. Where access tracks cannot avoid areas of deep peat, floating tracks have been incorporated into the design (see **Figure 10.8** of **Chapter 10**). Further details of peatland habitat loss and habitat management proposals for restoring modified peatland habitat can be found in **Chapter 8**.

86. **Figure 2.4** shows proposed site infrastructure along with peat depth information and aims to show that wind turbines and infrastructure have been carefully designed to avoid areas of deep peat.

87. The proposed Development has also been designed to avoid any areas which may be subject to peat slide risk. The ground condition constraints that were considered in the design of the proposed Development were:

- identification of peat depths in excess of 1.5 m – to minimise incursion, protect from physical damage, minimise excavation and transportation of peat, reduce potential for peat instability and minimise potential soil carbon loss;
- identification of slope angles greater than 5°- to minimise soil loss and potential instability; and
- avoidance of areas where initial peat stability concern was identified where possible – to avoid areas with possible instability issues and associated indirect effects on surface water.

2.7.6 Archaeology and Cultural Heritage

88. Archaeology and cultural heritage constraints were identified at an early stage of the design process, and hard and soft buffers were established around them based on their relative importance/sensitivity, so that they could be avoided during the design process.

89. The buffers and interpretation of heritage assets' importance/sensitivity were further assessed during the course of the design and EIA process, in particular informed by archaeological site visits undertaken to establish the quality of the preservation of the remains within the Site.

90. Through the EIA scoping process and subsequently, the EIA team engaged with key heritage consultees such as Historic Environment Scotland to agree a basis for the assessment. Key messages arising from the consultations undertaken were fed back to the design team so that amendments could be made to address the feedback were possible. In particular, the applicant modified the design between Layouts D and E, by removing Turbine 10 and moving Turbine 5 further to the north, thereby reducing the impact on the setting of Skipness Castle and Kilbrannan Chapel (see **Figures 2.2** and **3.1**).

2.7.7 Noise Sensitive Receptors

91. For the purposes of early constraints mapping, avoidance buffers of 1 km were applied to residential properties in the vicinity of the Site. These buffers were refined further during the design process based on expert noise advice in order to reduce the risk of impacts on residential receptors.

92. An initial review of the baseline data surveyed for other windfarm schemes, and which are publicly available in the assessments for those schemes, suggests that existing baseline levels have been sufficiently defined for the purposes of an assessment of operational noise in accordance with ETSU-R-97 and best practice. Noise modelling was undertaken using this data for the proposed turbine layout at various stages of the design process, to predict the likely sound level which would result from the proposed Development at nearby residential properties.

93. The difference between measured background noise levels and predicted noise levels needs to be compliant with ETSU-R-97: 'The Assessment and Rating of Noise from Wind Farms' (Department for Trade and Industry (DTI), 1996) to avoid a significant impact. Applying design criteria in accordance with ETSU guidance ensures that no exceedances of acceptable noise levels would occur for the proposed Development.

94. The noise effects of the proposed Development are addressed further in **Chapter 13**.

2.7.8 Forestry

95. The current land use of the Site is predominantly commercial forestry with areas open moorland habitat between the two FLS sites of Corranbuie to the north and Skipness to the south. Forestry forms an integral part of the proposed Development as some trees would need to be felled, before planned plantation felling, around infrastructure positions to allow for construction of the development. **Technical Appendix 15.1** has been developed to show which woodlands would be felled to facilitate the proposed Development, which of the felled areas can be restocked and the plans for compensatory planting.

96. This Site is largely stocked with middle aged conifers and the aim will be to carry out keyhole felling to accommodate the turbines wherever possible to avoid adverse environmental impacts; this will also minimise both the amount of felling and the area of Compensatory Planting that may be required, while at the same time incorporating areas of new native woodland planting. Further details on the proposed approach towards forestry management is provided in **Appendix 15.1**.

2.7.9 Telecommunications

97. Consultation was undertaken with the relevant telecommunication link operators to inform the telecommunications links within the vicinity of the Site and to advise their position with respect to the proposed Development.

98. Consultation with Ericsson, O2 Telefonica, BT, Joint Radio Company Ltd (JRC) raised no issues which could have potentially affected the proposed Development.

99. The effects of telecommunications on the proposed Development are addressed further in **Chapter 15**.

2.7.10 Shadow Flicker

100. The shadow flicker effects of the proposed Development are addressed further in **Chapter 15**.

2.8 Micrositing

101. In order to be able to address any localised environmental sensitivities, unexpected ground conditions or technical issues that are found during detailed intrusive site investigations and construction, it is proposed that agreement is sought for a 50 m micrositing allowance around all infrastructure. The technical assessments (presented in **Chapters 7 to 15**) have considered the potential for micrositing. During construction of the proposed Development, the need for any micrositing would be assessed and agreed with the onsite Environmental Clerk of Works (EnvCoW).

2.9 Conclusion

102. The EIA process has been an iterative one which has taken into account the identification of all technical and environmental constraints determined through the Environmental Impact Assessment (EIA) process, through consultation with statutory and non-statutory organisations and members of the local community to ensure those constraints could be avoided and potential impacts of the proposed Development avoided or reduced.

103. In summary, the application design and layout represent a proposed Development which achieves the following:

- maximises the renewable energy potential through the development of different renewable technologies;
- introduces development into a large scale modified landscape where it can be accommodated with less impact on landscape character;
- introduces development into an area where wind energy development is present and with which it integrates reasonably well;
- minimises impacts on key views;
- minimises impacts on settlements and residents of scattered dwellings;
- is in accordance with the Argyll and Bute Local Development Plan 2015, and relevant supplementary guidance, particularly the Onshore Wind Energy Supplementary (OWESG) Guidance (2016) and ‘Part 2b’ of the Supplementary Guidance (2017).
- reduces the amount of felling and can be accommodated within the Forest Design Plan for the area;
- minimises and, where possible, avoids the loss of priority habitats and species, and creates opportunity for habitat enhancement, which will be delivered by a Habitat Management Plan;
- protects watercourses from the potential impacts of constructing the proposed Development;
- can be engineered and constructed safely;
- uses as much existing forestry road as possible, reducing the amount of new track and water crossings required for the construction of the proposed Development;
- avoids known designated assets through applying suitable buffers;
- respects the setting of historical assets; and
- minimises disturbance to and removal of carbon stores, such as trees and peat, to improve the carbon balance.

104. The final layout of the proposed Development is described in detail in **Chapter 3** and shown on **Figure 3.1**. The potential effects of the resulting layout are addressed throughout **Chapters 7 to 15** of the EIA Report.

2.10 References

Argyll and Bute Local Development Plan 2015

Carbon and Peatland 2016 Map: SNH: 2016. Available at: https://www.nature.scot/professional-advice/planning-and-development/natural-heritage-advice-planners-and-developers/planning-and-development-soils/carbon-and-peatland-2016 [Accessed 6 November 2020]

ETSU-R-97: The Assessment and Rating of Noise from Wind Farms: Department for Trade and Industry (DTI): 1996.

Onshore Wind Policy Statement: Scottish Government: 2017.

Siting and Designing Wind Farms in the Landscape (Version 3a): SNH: 2017

The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017

ScottishPower Renewables
320 St Vincent Street
Glasgow
G2 5AD

T +44 (0)141 614 0451

EarraghailRenewableEnergyDevelopment@scottishpower.com

SCOTTISHPOWER
RENEWABLES

www.scottishpowerrenewables.com