Ackron Wind Farm

Design and Access Statement

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Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

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1 INTRODUCTION

1.1 Overview

This Design and Access Statement (DAS) has been prepared to accompany an application by Ackron Wind Farm Ltd (the Applicant) for a planning application (the Application) to the Highland Council (the Council) under the Town and Country Planning (Scotland) Act 1997[1] as amended by the Planning etc. (Scotland) Act 2006[2] for planning permission to construct and operate Ackron Wind Farm (the Development).

The Development will be comprised of up to 12 no. three-bladed horizontal axis turbines up to 149.9 metres (m) with a generation capacity of up to 49.9 megawatts (MW).

The Development would be located on land 1,100 m east of Ackron Farm and Golval Farm (the Site). The Site is located approximately 18 kilometres (km) west of Thurso and 2 km southeast of Melvich in Sutherland, Highland Council. It is approximately 662 hectares (ha) in total and is centred on National Grid Reference (NGR) 291200, 962150.

This DAS will support the submission of the planning application and inform the decision maker, consultees and interested parties of the design iteration of the Development.

The DAS will provide information on the principles and approach that have guided the design process for the Development. It is demonstrated how the area within the Site boundary (the Site) as detailed in Section 2, and its surroundings have been fully appraised to ensure that the final design solution achieves a balance across a range of factors which are required to be addressed. It describes the starting point for the design of the Development, the various factors that have driven and informed the design process, and subsequent iterations to the layout that were made in response to the environmental and technical considerations identified during the EIA Scoping process and in the preparation of the EIA Report.

The DAS should be read as a standalone document in support of the planning application.

1.2 The Development

The Development comprises up to 12 three-bladed horizontal axis turbines of up to 149.9 m tip height. Details on the Development and how the final design was achieved is described in Section 3.

The fundamental purpose of the Development is to generate electricity from a renewable source of energy, offsetting the need for power generation from the combustion of fossil fuels. Consequently, the electricity that will be produced, results in a saving in emissions of Carbon Dioxide (CO_2) with associated environmental benefits.

1.3 The Applicant

Ackron Wind Farm Ltd ('the Applicant') is a wholly owned subsidiary of Statkraft UK Ltd. Statkraft is a leading company in hydropower internationally and Europe's largest generator of renewable energy, producing hydropower, wind power, solar power, gas-fired power, and supplies district heating. Statkraft owns and operates 11 wind farms in the UK and the Nordics with a combined installed capacity of almost 1,000 MW. In 2019, Statkraft acquired 100 per cent of the shares of Airvolution Clean Energy Ltd, including Ackron Wind Farm.

[1] Scottish Government (1997) Town and Country Planning (Scotland) Act 1997 [Online] Available at: https://www.legislation.gov.uk/ukpga/1997/8/contents (Accessed 23/06/2020)

[2] Scottish Government (2006) Planning etc. (Scotland) Act 2006 [Online] Available at: https://www.legislation.gov.uk/asp/2006/17/contents (Accessed 23/06/2020)

2 SITE CONTEXT

The land within the site boundary (the Site) would contain the turbines and associated infrastructure covers an area of 662 hectares (ha), centred on National Grid Reference (NGR) 291200, 962500, approximately 18 kilometres (km) west of Thurso and 2 km south-east of Melvich in Sutherland as shown on Figure 1 in Appendix A, and wholly located within the administrative boundary of Highland Council (the Council).

The Site predominately comprises of open moorland used for rough grazing. There is a small area of improved pasture in the north-west and a woodland grant scheme (WGS3), comprising 13 ha along the lower elevations in the west of the Site which extends outwith the Site Boundary on its north-east edge between the Site and the A897. RDC-Woodland planted in 2013 covers portions of the Site; however, this appears only marginally successful.

The topography of the Site and its immediate vicinity generally slopes westward, as shown in Figure 2 in Appendix A. The elevation of the Site ranges from approximately 163 metres (m) Above Ordnance Datum (AOD) in the north-east of the site near Caol Loch and falls to 30 m AOD along the A897. There are two named knolls: Golval Hill (127 m AOD) and Cnoc an Achadh (123 m AOD).

The Site lies within the Halladale River catchment with Giligill Burn, Akran Burn and an unnamed watercourse flowing from south-east to north-west through the Site. Caol Loch, Loch Akran and Loch Earacha lie outwith the Site, located to the east, south-east, and south-west respectively.

No public roads are located within the Site. The A836 (part of the promoted North Coast 500 [NC500]) lies adjacent to the northern boundary of the Site with the A897 forming the western boundary. There are existing farm tracks within the Site connecting to the A897. An overhead transmission line transects the south-east corner of the Site connecting Connagill Substation in the south-west to Dounreay in the north-east.

There are no residential properties within the Site. The closest residential properties are Ackron Farm and Golval (both financially involved), located 0.9 km west and 1 km south-west of the nearest turbine, respectively.

There are no designations within the Site; however, two Natura 2000 Sites are located adjacent to the east of the Site; the Caithness and Sutherland Peatlands Special Protection Area (SPA) and Special Area of Conservation (SAC). The Site is also adjacent to the Caithness and Sutherland Peatlands Ramsar Site, and the East Halladale Site of Special Scientific Interest (SSSI). These designations are recognised for a variety of habitats features, including blanket bog and wet heathland habitat with wet mire, acid peat-stained lakes and ponds, clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels, and depressions on peat substrate. There are a number of qualifying species including otter, dunlin, black-throated diver, common scoter, grey lag goose, and golden plover.

3 DESIGN STATEMENT

3.1 Highland-wide Local Development Plan (2012) – Policy 67

The final design of the Development has sought to meet with the requirements of Policy 67 *Renewable Energy Developments* which sets out detailed criterion for determining the acceptability of proposals for renewable energy developments. Policy 67 broadly stipulates that renewable energy proposals will be considered favourably where it is satisfied that they are located, sited and designed such that they will not be adversely detrimental overall, either individually or cumulatively (taking account of other developments), having particular regard to the following criteria:

- Natural, built and cultural heritage features;
- Species and habitats;
- Visual impact and impact on the landscape character of the surrounding area (the design and location of the proposal should reflect the scale and character of the landscape and seek to minimise landscape and visual impact, subject to any other considerations);
- Amenity at sensitive locations, including residential properties, work places and recognised visitor sites (in or outwith a settlement boundary);
- The safety and amenity of any regularly occupied buildings and the grounds that they occupy- having regard to visual intrusion or the likely effect of noise generation and, in the case of wind energy proposals, ice throw in winter conditions, shadow flicker or shadow throw;
- Ground water, surface water (including water supply), aquatic ecosystems and fisheries;
- The safe use of airport, defence or emergency service operations, including flight activity, navigation and surveillance systems and associated infrastructure, or on aircraft flight paths or MoD low-flying areas;
- Other communications installations or the quality of radio or TV reception;
- The amenity of users of any Core Path or other established public access for walking, cycling or horse riding;
- Tourism and recreation interests; and
- Land and water based traffic and transport interests.

These matters are also considered in the Section 4 of The Highland Council Onshore Wind Energy Supplementary Guidance (2016, and addendum 2017) (OWESG).

The subsequent section of this statement will tend to the respective parts of the above criteria, demonstrating how the final design is compliant with the terms of Policy 67 in particular.

3.2 Site Selection

The selection of an appropriate site which has the potential to support a commercial wind farm development is a complex and lengthy process. It involves examining and balancing a number of environmental, technical, planning and economic issues. Only when it has been determined that a site is not subject to major known environmental, technical, planning or economic constraints, is the decision made to invest further resources in developing the proposal and conducting an EIA.

In accordance with the EIA Regulations, the design alternatives need to be studied with key reasoning, taking into account the potential environmental effects. The Site was first identified for wind farm development by Airvolution, who undertook a comprehensive site selection exercise to identify potential wind farm locations throughout Scotland. Airvolution identified multiple sites during a site search exercise throughout Scotland. The Site was taken forward as there were previous environment reports covering the Site which indicated:

- A sufficiently high annual mean wind speed across the Site;
- Viable grid connection in close proximity to the Site;
- Suitable port of delivery and road access for delivery of large components;
- Limited populated areas and transport routes within the zone of theoretical visibility;
- The Site is sufficiently distant from the nearest residential properties to ensure compliance with appropriate noise limits, as well as to reduce adverse residential visual amenity and shadow flicker effects;
- The Site itself supports no international or national ecological, landscape or cultural heritage designations; and

- Small portions of the Site characterised as within a Group 3 area in Scottish Planning Policy (2014)[3] with the majority in Group 2 due to peatlands though initial peat and ecology surveys indicated peat was not extensive across the Site.

In terms of policy on a national level, Scottish Planning Policy (SPP) (June 2014) provides support for wind development in principle and encourages local authorities to guide developments towards appropriate locations. Paragraph 161 highlights the requirement for planning authorities to define a *'spatial framework identifying those areas that are likely to be most appropriate for onshore wind farms'* whilst stating 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 Nature Scot (formerly Scottish Nature Heritage, SNH) map of wild land areas; carbon rich soils, deep peat and priority peatland habitat; and an area not exceeding 2km around cities, towns and villages identified on the local development plan.
- 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.

However, a proportion of the Site occupies areas identified as Carbon Rich Soil, Deep Peat and Priority Peatland Habitat (CPP) by the NatureScot Carbon and Peatland Map (2016) which is a high level evaluation for spatial frameworks. On this basis SPP and The Highland Council Onshore Wind Energy Supplementary Guidance (OWESG)[4],[5] defines the Site as largely consisting of Group 2: Areas of Significant Protection[6] due to these nationally mapped indications of where carbon rich soil, deep peat, and priority peatland habitat may be found. As such, further soils and peat investigation was undertaken to confirm the site specific peat parameters which indicated that peat was not extensive across the Site.

The OWESG also seeks to identify a potential strategic capacity for wind energy development of different scales within each of the defined landscape character areas. The majority of the Site, including the extent of which is occupied by the proposed turbines, is located within Sweeping Moorland and Flows (LCT 134) landscape character area in Central Caithness (CT4). The landscape character sensitivity of CT4 to large scale

[3] Scottish Government (2014) Scottish Planning Policy [Online] Available at: https://www.gov.scot/publications/scottish-planning-policy/ (Accessed 07/08/2020)

[4] The Highland Council (2016, and addendum 2017) Onshore Wind Energy Supplementary Guidance. [Online] Available at: http://www.highland.gov.uk/download/downloads/id/16949/onshore_wind_energy_supplementary_guidance-_currently_adopted_suite.pdf (Accessed 10/09/2020)

[5] OWESG (May 2020) Caithness and Sutherland LDP Areahttps://www.highland.gov.uk/downloads/file/22787/framework_map_-_caithness_and_sutherland

[6] The Highland Council (2016) Spatial Framework for Onshore Wind Energy - Inner Moray Firth LDP Area Map. [Online] http://www.highland.gov.uk/download/downloads/id/22788/framework_map_-_inner_moray_firth.pdf (Accessed 11/09/2020)

wind farm development is identified as being '3' out of a scale of 1-4, 1 being the most susceptible to change[7], with some limited scope for larger turbines.

The Supplementary Guidance indicates that there remains some capacity for larger turbines, noting that: 'Turbines should concentrate and consolidate with existing development; maintain open, clear and direct views, which allow the appreciation of the wild landscape, in particular from the A9; and be designed so that the logical relationship between development scale and landscape character is maintained.'

The above is considered to be sufficient in meeting with the broad location requirements set-out in Policy 67 as complemented by the OWESG.

In 2017 the Scottish Government published the Onshore Wind Policy Statement (OWPS) (2017)[8] and Scottish Energy Strategy (SES) (2017)[9] which recognise that increased efficiency and power output in wind turbine technology, has resulted in increases in the size and scale of wind turbines (e.g. increased turbine blade length and resultant increases in overall tip heights). For example, paragraph 23 of the OWPS states that *'we acknowledge that onshore wind technology and equipment manufacturers in the market are moving towards larger and more powerful (i.e. higher capacity) turbines, and that these – by necessity – will mean taller towers and blade tip heights'.*

The ministerial foreword of the OWPS (page 3) and the SES (page 43) also states that 'increasingly – the extension and replacement of existing sites, where acceptable, with new and larger turbines, based on an appropriate, case by case assessment of their effects and impacts' as onshore wind continues to play an important role in meeting Scotland's energy generation and climate change goals.

3.3 Site Design

The design of a wind energy development is driven by the key objective of positioning turbines so that they capture the maximum energy possible within a suitable area determined by environmental and technical constraints.

The key constraints taken into account during the design process included:

- Visibility from sensitive receptors, including nearby properties and settlements, designated landscapes and wild land areas;
- Presence of sensitive habitats and protected species;
- Proximity to sensitive ornithological receptors;
- Presence of watercourses, private water supplies and related infrastructure;
- Presence of cultural heritage features (on-site and visibility from off-site heritage assets);
- Proximity to noise sensitive receptors;
- Presence of peat;
- Ground conditions and topography;
- Proximity to a grid connection and port of delivery;
- Key recreational and tourist routes; and
- Consideration of wind conditions across the Site.

These constraints were identified through desk study, site surveys, analysis and consideration of the responses received from consultees during the EIA process, predominantly during two rounds of scoping but also during informal consultation.

[7] Ibid, page 100.

[8] Scottish Government (2017) Onshore Wind Policy Statement. [Online] https://www.gov.scot/publications/onshore-wind-policy-statement-9781788515283/ (Accessed 11/09/2020)

[9] Scottish Government (2017) Scottish Energy Strategy. [Online] https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/ (Accessed 11/09/2020)

The principles of the design strategy were to maximise the number of turbines and wind energy capture, whilst also minimising significant adverse environmental effects. Therefore, some of these constraints were given a 'hard' constraint value in design that was not breached and others were assigned a 'soft' constraint value that could be flexible with sufficient justification that environmental effects were still considered acceptable. This led to a comprehensive process of constraints mapping. This EIA Report and its conclusions constitute the outcome of the application of the design principles adopted for the Development.

Embedded mitigation was used to minimise any predicted adverse environmental effects, and where applicable to a specific technical assessment, such mitigation is detailed in the relevant chapters within this EIA Report. This was particularly relevant to the avoidance of direct effects e.g. on deep peat and watercourses. By employing an iterative design process, undertaken in conjunction with the EIA process, a number of potential effects were minimised. Mitigation through design was employed to ensure effects such as landscape and visual and indirect heritage effects were minimised.

3.3.1 Site Specific Environmental Considerations

The specific environmental factors considered in the design of the Development are set out below, with their influence on the design discussed.

3.3.1.1 Landscape and Visual

SNH guidance 'Siting and Designing Wind Farms in the Landscape - Version 3a' (2017)[10] notes that "Design is a material consideration in the planning process and good siting and design helps to produce development which is appropriate for a landscape whilst delivering renewable energy".

In accordance with this guidance, the landscape and visual impact of the Development has been a key consideration throughout the design process in line with the provisions of Policy 67. Landscape architects worked closely with the project team to achieve a scale and a design that minimises the potential landscape and visual effects whilst maintaining economic viability. The landscape and visual effects have been a focus of discussions with the Council and NatureScot following the scoping process. Several design workshops were undertaken which sought to create a balanced layout without excessive overlapping or outlier turbines, aiming to minimise unacceptable landscape and visual effects of the Development.

A design workshop was held in October 2019 to refine the design to incorporate the findings of the refusal of the Drum Hollistan Wind Farm by Scottish Ministers on 21st June 2019. As a result of this design review, a particular design strategy was to increase the distance of separation between the Development and the coastal landscapes and North Coast 500 (NC500) with the closest turbine located approximately 2.4 km from the coast and 1 km from the NC500. The design process has sought to 'push' the turbines to the south away from the coast, to allow the turbines to appear within the upland 'field view', separate from the coast.

Additionally, two access options from the A836 (NC500) and A897 were examined with the A897 option selected as it did not require an access junction off the NC500 and minimised visibility of the access track through open moorland in views from the coast and from the NC500.

In addition, the design strategy for the Development has taken into account the following objectives:

[10] SNH (2017) Siting and Designing Wind Farms in the Landscape - Version 3a [Online] Available at: https://www.nature.scot/siting-and-designing-wind-farms-landscape-version-3a (Accessed 26/06/2020)

- To create a turbine layout that reflects the scale of the landscape in which it is located;
- To achieve a balanced composition of the turbines with the landscape and skyline;
- To create a design that takes account of the relevant national, regional and local policy and guidance;
- To reduce visibility to nearby residential receptors as much as possible; and
- To respond to the various constraints identified.

A key design strategy was to create a balanced, cohesive layout from nearby communities of Melvich and Portskerra to the northwest and Reay to the northeast as well as in views from the south along Strath Halladale and from within the East Halladale Flows WLA with the following key viewpoints used to inform the iterative design process:

- Viewpoint 3: A836 Reay;
- Viewpoint 5: A836 Melvich;
- Viewpoint 6: Portskerra; and
- Viewpoint 8: Strath Halladale.

Figures 4-7 in Appendix A illustrate the key design considerations highlighting the changes from the original scoping layout in April 2019 to the final design layout submitted in November 2020.

The visual relationship between the proposed turbines and other wind farms will influence how the Development will be perceived. Table 1 gives details of existing wind energy developments that are in operation within a 30 km radius of the Site at the time of preparing this application (September 2020). These cumulative wind farms, in particular those in close proximity to the Site (e.g. Strathy North and Baillie), were taken into account in the design of the Development when viewed from key locations.

Table 1: Existing Wind Farms within 30 km of the Site

Wind Farm name	Status	Number of turbines	Blade tip height (m)	Approximate distance (km)
Strathy North	existing	33	109	9.8
Baillie	existing	21	110	10.1
Forss Phases 1&2	existing	6	76 or 78	11.9
Bettyhill	existing	2	45	17.1
Achlachan	existing	5	115	25.0
Causeymire	existing	21	100	25.8
Bad a Cheo	existing	13	111	28.2

The landscape and visual effects of the Development, and how these informed the design, of the Development, are fully assessed within **Chapter 6: Landscape and Visual Impact Assessment** of the EIA Report.

3.3.1.2 Ecology

Both desk-based surveys and site visits were undertaken as part of the ecology baseline studies which were key to informing the final design of the site. Desk-based surveys determined the nearby ecological designations and identified historical information relating to the ecological resources within the study area and Site. Site surveys included the following:

- Extended Phase 1 habitat survey;
- National Vegetation Classification (NVC) survey;
- Otter survey;

- Bat habitat suitability survey;
- Bat activity survey;
- Wildcat survey;
- Water vole survey;
- Fisheries survey;
- Red squirrel survey; and
- Badger survey.

The purpose of these surveys was to identify sensitive habitats and species within the Site that should be avoided and subsequently ensure the Development could be designed sensitively in accordance with the ecological receptors located within and nearby the Site.

The final layout was informed by the aforementioned surveys, which ensured that the Development avoided the most sensitive habitats, including areas of deep peat and highly sensitive Groundwater Dependent Terrestrial Ecosystems. To this end, the Development is considered to be in compliance with the species and habitats requirement set out in Policy 67.

The effects on ecological receptors are fully assessed within the EIA Report, **Chapter 7: Ecology**.

3.3.1.3 Ornithology

Surveys were completed over two periods:

- **2014-16**: initial Baseline Ornithology Surveys were completed by RPS between April 2014 and March 2016 (inclusive); and
- **2018 breeding season**: update Baseline Ornithology Surveys were completed by Avian Ecology between February 2017 and August 2018 (inclusive), thus covering early spring as well as the full breeding season (April to August).

The survey programme included the following:

- Year-round Flight Activity Surveys;
- Winter bird surveys (2014-16); and
- A range of breeding bird surveys (2014, 2015 & 2018).

In addition to the field surveys, desk-based studies and consultations were undertaken which also informed the assessments.

The results of the ornithology assessments fed into the site design process with the removal of turbines to the north of Giligill Burn and south of Akran Burn to avoid disturbance of known sensitive ornithology receptors either during construction or operation. The effects on ornithological receptors are fully assessed within the EIA Report, **Chapter 8: Ornithology**.

3.3.1.4 Water Environment

During the EIA process, desktop and site-based surveys were carried out to inspect and identify all water features including private water supplies within the area with potential to be impacted by the Development.

The aim of the design process was to achieve a layout that avoided effects on sensitive hydrological receptors, including private water supplies. The majority of turbines have been sited a minimum of 50 m from the banks of watercourses or water bodies, with the exception of T7 where the crane hardstanding infrastructure extends 8.2 m into the Akran Burn watercourse buffer and maintaining a distance of 41.8 m from the watercourse itself. This is to avoid placing T7 infrastructure within an area of deep peat (> 2 m depth). The arrangement of access tracks has been designed so as to limit the number of watercourses crossings where possible so that only one culverted watercourse crossings

is proposed. The locations of private water supplies have also influenced the track arrangement. Consultation with residents of properties supplied by private water supplies has fed into the site design process and an agreement regarding alternative temporary or permanent water supplies agreed. Adequate consideration has been afforded to ensure the Development is in keeping with the requirements of Policy 67 wherein it states that all development must demonstrate regard towards ground water, surface water (including water supply), aquatic ecosystems and fisheries.

The effects on the hydrology environment as a result of the Development, and how hydrology/peat assets informed the design of the Development, are fully assessed within the EIA Report, **Chapter 12: Hydrology and Hydrogeology**.

3.3.1.5 Archaeology and Cultural Heritage

There are no designated heritage features within the Site; however, there are 22 non-designated features which have been established through a desk-based assessment and site walkover. These are largely concentrated at lower elevations along the waterways, and the design has avoided crossing both Akran and Giligill Burns where the majority of known archaeological features are located. The design has avoided all known archaeological features within the Site, as well as taken consideration of the archaeological potential which is greatest at lower elevations along the waterways, avoiding the key burns of Akran and Giligill.

The proposed layout has taken into account the consultation responses received from Historic Environmental Scotland (HES) and the Council and has sought to reduce changes to the setting of nearby heritage assets through embedded design. This includes locating the access track away from A837 to the north of the Scheduled Halladale Bridge Hut Circles (SM3304) to maintain the setting of the designation. The access will be taken from the A897 further to the south of the monument where existing screening would be maintained to create a visual barrier between the access junction/track and the monument.

Additionally, turbines have not been placed in the northern section of the Site to increase the separation distances from the scheduled Halladale Bridge Hut Circles (SM3304) and listed buildings along the coastal route such as those at Bighouse, Sandside and Reay.

Therefore, the proposal ensures that the Development complies with the terms of Policy 67.

The effects on cultural heritage assets, and how this has informed design are fully assessed within the EIA Report, **Chapter 9: Archaeology and Cultural Heritage**.

3.3.1.6 Noise

A key consideration in the design of the Development was the proximity of the turbines to nearby residential properties, and the noise levels that the Development may generate both in isolation and with known cumulative developments. The turbines were sited in locations that would ensure the Development would not generate noise emissions that would exceed limits advised in national guidance as appropriate, being the limits advised in ETSU-R-97, and the Development satisfies Policy 67 in noise amenity terms.

The effects on the noise environment are fully assessed within the EIA Report: **Chapter 10: Noise**.

3.3.1.7 Peat

A peat depth survey was undertaken across the Site to establish a localised and site-specific baseline for the Development. Peat was found to be deepest in the flatter, topographically low-lying areas of the Site where depths extended to 3.5 m and 4.1 m in

the north-west and south-east respectively, while much of the remainder of the Site had recorded peat depths of between 0.1 m and 1.0 m. Turbines were sited in the shallowest areas of peat where possible with eight turbines located in peat ranging between 0 and 0.5 m, and four turbines in peat ranging between 0.5m and 1.0m.

The effects of the Development on peat deposits are fully assessed within the EIA Report, **Chapter 13: Geology and Peat**.

3.3.2 Site Specific Technical Constraints

Specific technical factors considered in the design of the Development are set out below, with their influence on the design discussed.

3.3.2.1 Wind Resource

A key element to the design process is the wind resource of the Site; the availability of wind resource is affected by various issues such as wind speed, the prevailing wind direction, and local topography. The wind resource was modelled across the Site which fed into the design process. The more elevated areas of Site received the greatest wind resource, which required balancing against the increased landscape and visual effects at higher elevations.

3.3.2.2 Turbine Spacing

The spacing of the turbines is a key consideration in wind farm layout design; turbines need to be arranged a minimum distance apart such that turbulence from a specific turbine does not unduly affect the operation of a turbine which is downwind. The spacing for turbines needs to be larger in the prevailing wind direction and will vary from site to site and between different turbine models. The spacing is directly proportional to the size of the wind turbine rotor, whereby the larger the rotor the larger the spacing between turbines, and the fewer turbines that may be accommodated within a specific area.

The spacing chosen for the Development has been selected based on modelling assumptions and is designed to maximise the energy yield from the Development whist keeping fatigue loads, caused by turbulence, within the turbine manufacturer's design tolerances.

3.3.2.3 Topography and Ground Conditions

The suitability of ground conditions was considered during the design of the Development, which principally considered areas of steep slope and peat.

Where gradients of greater than 14% were identified, these areas were not considered suitable for wind turbines. The presence of steep slopes also served as a key element to the design of the Site infrastructure including access tracks and hardstanding areas, particularly avoidance of the banked slopes of watercourse, namely Akran Burn and Giligill.

3.4 Design and Access Evolution

The final layout as presented in the EIA Report has been the subject of a number of iterations and refinements which mitigate by design predicted adverse effects as far as reasonably practicable. The resultant proposal balances the environmental and technical constraints, whilst producing an economically viable development. Design changes made as a consequence of the key constraints are considered to be mitigation which is 'embedded' in the design.

The key iterations and design evolution process is outlined below and shown in Figure 3 in Appendix A, which demonstrate how the layouts have evolved throughout the EIA process. Figures 4-7 in Appendix A illustrate the key design considerations highlighting

the changes from the original scoping layout in April 2019 to the final design layout submitted in November 2020 for the four design viewpoints:

- Viewpoint 3: A836 Reay;
- Viewpoint 5: A836 Melvich;
- Viewpoint 6: Portskerra; and
- Viewpoint 8: Strath Halladale.

3.4.1 Pre-Application Layout (January 2019): 10-15 Turbines – Maximum Tip Height 149.9 m

The initial site area for the development covered 413 ha ranging from approximately 186 m AOD in the east of the Site, generally sloping westward to 30 m AOD along the A897.

The initial layout maximised potential turbine numbers reflective of known constraints at the time, which were not necessarily subject to detailed site work. The principal constraints during pre-application included the avoidance of known sensitivities i.e. East Halladale SSSI/Caithness and Sutherland Peatlands SPA/SAC/RAMSAR, 50 m buffers around watercourses, and avoidance of areas of steep terrain whilst ensuring suitable separation distances between the turbines to prevent issues associated with turbulence.

At this time, initial consideration was given to the cumulative visibility of the turbines with the Drum Hollistan scheme, which was awaiting decision following a Public Inquiry[11].

The result of taking these constraints into account was a potential 10 - 15 turbine wind farm with a 10 turbine layout presented in Figure 3a in Appendix A.

3.4.2 Scoping Layout (April 2019): Up to 14 Turbines - Maximum Tip Height 149.9 m

Between the pre-application and scoping layouts, the biggest layout change was the reduction of the site boundary (by 315 ha) to exclude the Caithness and Sutherland Peatlands SPA/SAC/RAMSAR and East Halladale Flows SSSI to the east.

The original Scoping Layout (shown on Figure 3b) consisted of 14 turbines with a tip height of up to 149.9 m and a rotor diameter of up to 117 m. The layout was based on 5 x 3 rotor spacing requirements, a prevailing wind of south-west (approximately 225 degrees), and the turbines positioned to avoid immediately apparent constraints (such as 50 m watercourse buffers) listed in Section 3.5.1.

The Development was scoped under the EIA Regulations on the April 2019 layout with the layout as shown on Figure 3b, and a Scoping Opinion was received from the Council in June 2019. Figures 4-7 in Appendix A shows the original scoping layout in April 2019 for the four design viewpoints.

3.4.3 Updated Scoping Report Layout (October 2019): 12 Turbines - Maximum Tip Height 149.9 m

Following refusal of the Drum Hollistan Wind Farm by Scottish Ministers on 21st June 2019, which lies adjacent to the north of the Site, the Applicant undertook a detailed review of the decision, and in turn carried out an early stage design review of the Development.

The Drum Hollistan decision found that the proposed Drum Hollistan wind farm would have a significant, adverse effect "*by virtue of its prominent, elevated location*". The Drum Hollistan decision also highlighted the impacts upon the coastal landscapes, seascapes and tourism routes as key in the determination of the proposal.

[11] Scottish Government, Planning and Environmental Appeals Department reference: WIN-270-9

To provide further opportunity for design changes necessary to address effects identified within the Drum Hollistan decision, the site boundary for the Development was extended to the south and west to encompass a total of 662 ha whilst excluding the designations to the east (i.e. Caithness and Sutherland Peatlands SAC/RAMSAR and East Halladale Flows Wild Land Area).

A design workshop was held in October 2019, after most of the EIA baseline survey work had been completed and the environmental constraints digitised and analysed by the technical assessors. The purpose of this workshop was to refine the design to incorporate the findings of the Drum Hollistan design review.

This design workshop included consideration of extended area added to the Site and aimed to move the turbine array further south. This increased separation from the A836, which is a main tourist route and part of the NC500, and the north coast; two receptors highlighted within the Drum Hollistan decision.

Following the above considerations, the Design Day 1 layout comprised of 12 turbines, with an increased setback from 1.7 to 2.4 km from the coast and 300 m to 1 km from the A836 (an increase of 0.7 km). This layout is shown in Figure 3c in Appendix A.

Due to the changes in the site boundary, the Development was re-scoped in October 2019 under the EIA Regulations, and an Updated Scoping Opinion was received from the Council in December 2019.

3.4.4 December 2019 Revised Layout: 12 Turbines - Maximum Tip Height 149.9 m

A second design workshop was held in December 2019. The key considerations for the design workshop were landscape and visual; focusing upon the aesthetic of the Development from key visual receptors, most notably the settlements of Melvich, Portskerra, and Reay, as well as views from within Strath Halladale and the wild land area.

The turbines were realigned to prevent stacking and create a balanced visual design from the above receptors. The turbine locations selected also considered hard constraints such as hydrological buffers, avoidance of known heritage assets, and peat depths, with the turbines located in areas of < 1.0 m of peat as per the Phase 1 peat survey. These turbine locations were then chilled subject to further detailed peat probing.

Phase 2a peat surveys then took place in December 2019 comprising targeted probing at the chilled turbine locations at 10 m centres as a cross-hair. Following the 2a peat depth survey, turbines were repositioned no more than 40 m from the chilled turbine position to lie on lesser extents of peat whilst avoiding hydrological constraints of 50 m watercourse buffers. This layout is presented as Design Day 2 (December 2019) as shown on Figure 3d in Appendix A.

3.4.5 March 2020 Design Chill Layout: Up to 12 Turbines - Maximum Tip Height 149.9 m)

A third design workshop was held in March 2020 to consider moving T8 north of Akran Burn in order to avoid a long 1.5 km access track crossing the burn for one turbine. The key considerations for the design workshop were focused on peat as well as landscape and visual and considering how the Development would be viewed from the key visual receptors and viewpoints discussed in Section 3.3.1.1.

The main changes from Design Day 2 included relocating T8 to the north and minor adjustments to all other turbines to reflect a more cohesive visibility with consideration for avoiding areas of deep peat and still incorporating the findings and objectives found in the Drum Hollistan review. This layout is shown on Figure 3e in Appendix A.

3.4.6 Final Turbine Design Based on Phase 2 Peat: Up to 12 Turbines - (Maximum Tip Height 149.9 m)

At the end of May 2020, Phase 2b peat surveys were undertaken over the Design Chill layout. Peat Phase 2b peat surveys focussed on probing the chilled infrastructure layout by probing 50 m internals, plus. This resulted in the refinement of several turbine positions to minimise crane hardstanding in peat.

This iteration was re-examined by the technical consultants with no further re-positioning required. This layout was then fixed as the final turbine layout comprising 12 turbines with a maximum tip height of 149.9 m. The final turbine layout is shown in Figure 3f in Appendix A. Figures 4-7 in Appendix A shows the final layout for the four design viewpoints.

Chapter 4: Development Description of the EIA Report details the final layout and all infrastructure required as part of the Development.

3.4.7 Infrastructure Design

3.4.7.1 Internal Track Layout

The internal track layout for the final turbine arrangement was developed so that it meets the following criteria:

- Upgrade of existing tracks where possible (with main access into the upper elevations of the Site via an existing forestry track);
- Minimisation of the variation in the vertical alignment of the tracks;
- Minimising the overall length of tracks;
- Ensuring a safe and efficient layout to facilitate wind farm construction;
- Minimisation of incursion into environmental constraint areas (e.g. deep peat, sensitive habitats, watercourse buffers);
- Minimisation of the number of watercourse crossings and alignment of tracks so that crossings are approximately at right angles;
- Minimisation of tracks through areas of peat greater than 0.5 m in depth. Floating tracks used in areas of deep peat (greater than 1.0m) that cannot be avoided; and
- Consideration of alignment of tracks up the hill slopes when viewed from Melvich.

3.4.7.2 Substation Location

The location of the substation compound, adjoining the main the access track to the west of the Site, was selected for the following reasons:

- Existing woodland strip provides aids in screening visibility from Melvich;
- Peat is shallower (>1 m) than the other land available near the access track; and
- Relatively flat location.

3.4.7.3 Construction Compound Location

The location of the main construction compound, adjoining the main access track into the Site, was selected for the following reasons:

- The compound will be adjacent to the site entrance, reducing the length of delivery vehicle trips and manage deliveries;
- Peat is shallower (>1 m) than the other land available near the access track; and
- The land is an existing hardstanding area associated with the nearby quarry so that it minimises the need for new infrastructure.

3.4.7.4 Met Mast Location

A 250 m buffer was added to the three turbine locations in the south-west of the Site. As prevailing wind is west-south-west direction, it was favourable for the met mast to be located south-west of the test turbines and to the north of Akran Burn. The depth of peat within this buffer was examined and a suitable location determined.

3.4.7.5 Borrow Pit Locations

The borrow pit locations have been selected to avoid known environmental constraints and visibility from key receptors, and were identified following a review of where extractable rock of suitable quality is found. Both are located in an area with rocky outcrops and on the track network.

3.4.8 Final Layout

The Final Layout is the Development, described in the Application Form as *"a proposed wind farm with up to 12 turbines on land 1575 m NE of Ackron Farm, Golval, Forsinard"*. The Development will comprise up to 12 three-bladed horizontal axis turbines with a maximum tip height of 149.9 metres (m) and with a total installed capacity no greater than 49.9 megawatts (MW). The main components of the Development are as follows:

- Up to 12 three-bladed turbines with a maximum tip height of 149.9 m including external transformers (if required);
- Associated foundations, blade laydown areas and crane hardstandings at each wind turbine location;
- Access tracks linking the turbine locations;
- Substation compound incorporating electrical switchgear and wind farm control elements;
- Temporary construction compound;
- Network of underground cabling running adjacent to the access tracks where possible;
- A permanent anemometry mast (up to 92 m);
- Up to two borrow pits; and
- New site access off the A897.

The Final Layout of the Development is shown in Figure 8 in Appendix A. Table 2 specifies the indicative national grid references of the proposed turbines; the turbines will be subject to a micro-siting allowance to allow flexibility for encountering unknown ground constraints during pre-construction and construction.

Figure 8 in Appendix A also shows the location of the ancillary infrastructure necessary for the Development. In summary, the associated elements of the Development, separate to the turbines, hardstanding and access tracks, are to be located at the following approximate locations:

- Temporary construction compound at approximate National Grid Reference (NGR) 289879, 962841;
- Substation and control building at approximate NGR 290428, 962958; and
- Permanent meteorological mast at approximate NGR 291000, 962139.

During the construction period, it is estimated that approximate land take of 16 ha will be required, which includes all temporary and permanent infrastructure. This area includes additional areas beyond the components and infrastructure that would be disturbed by associated earthworks. These areas would be reinstated throughout construction and post-construction. It is estimated that the permanent footprint of the Development following completion of construction will be approximately 7.5 ha.

The Development will require the felling of approximately 1.1 ha of woodland land grant to accommodate the laydown area for T2. This would be replanted onsite or compensated via habitat restoration.

Table 2: Wind Turbine Approximate Grid References

Turbine No.	Easting (x)	Northing (y)
1	291530	962830
2	290904	962411
3	291631	962462
4	291239	962200
5	291727	962074
6	291610	961671
7	291253	961752
8	291080	963294
9	291027	962857
10	291993	962898
11	291411	963226
12	292238	962643

4 ACCESS

4.1 Vehicle Access

4.1.1 Construction Traffic

The Abnormal Load Route Assessment ensured that the longest and widest turbine component (e.g. the blades and tower sections), were able to be accommodated in the road network. The delivery of Abnormal Loads would be via the following route as shown on Figure 9 in Appendix A:

- Port of entry to be Scrabster Harbour (port is a proven turbine component delivery point);
- Proceed southbound on A9 towards Burnside;
- Turn right onto A836;
- Proceed westward on the A836 for approximately 14.9 miles;
- Turn left onto A897; and
- Follow A897 for approximately 200 m to Site access junction.

General Approach for Construction Vehicles would be restricted from travelling directly to the Site from the south via the A897 from Helmsdale[12] and will instead travel via the following route as shown on Figure 10 in Appendix A:

- Traffic is assumed to be originated from the south, northbound on the A9 and approaching the Site from the east via the A836;
- Follow the A9 to Thurso;
- Proceed through Thurso, keeping on A9, towards Burnside;

[12] Exceptions shall be granted to sub-contractors living or staying along the A897 and the B871 roads, to ensure that local accommodation businesses on these roads are not affected by the above restriction. This will also ensure that sub-contractors are not restricted from staying in accommodation along the A897 and the B871.

- At Scrabster junction, keep straight onto A836 towards Tongue;
- As per the ALR route:
- Proceed westward on the A836 for approximately 14.9 miles;
- Turn left onto A897; and
- Follow A897 to Site access junction.

4.1.2 Site Access Junction

Traffic and transport input into design was primarily regarding the access to the Site. Two main access junction options were considered from project inception. Both options were considered throughout the design phase and consulted on through public engagement exercises.

Initial consideration was given to access from the north of the Site where the site boundary borders the A836; however, during turbine iterations, turbines were sited further to the south within the Site to minimise effects upon the coastal landscape and A836 (NC500). In order to further alleviate impacts to these areas and minimise the length of track required on site; a second access option was considered from the west via the A897.

Two access options from the A836 (NC500) and A897 were examined with the A897 option selected as the preferred access as it did not require an access junction off the NC500 and minimised visibility of the access track through open moorland from the NC500.

The proposed access junction for the Development is approximately 200 m from the junction with the A836. The A897 becomes a single-track road with passing places approximately 100 m from its junction with the A836. The second option also allows the main access into the Site to utilise an existing track.

Consultation with the Council's Transport Planning was undertaken during the preparation of the EIA Report to confirm the viability of the second access option. The Council responded that they had no objection in principle to the revised access location proposed, subject to detailed information to demonstrate that the safety and free flow of main road (A897) traffic will not be adversely affected by operation of the new access.

4.2 Other Access

4.2.1 Recreation - Construction

The site does not contain any paths or recreational facilities which are of importance at a local, regional or national level, and access to the neighbouring land will generally be available from other locations surrounding the Site. Given the limited receptors surrounding the Site access to local hills and walks will not be impacted by construction.

Any effects on walking routes will be indirect and limited to visual disturbance for the period of construction. Construction effects on amenity and enjoyment of nearby walks will be localised, as the construction works will only be detectable to route users for short periods along the route. Any effects are considered to be short-term and minor in nature.

4.2.2 Recreation – Operation

The land within the Development will be accessible to the public at all times of the year as per Section 1 and 2 of Land Reform Act (Scotland) 2003. However, temporary exclusions may be needed, for health and safety reasons, during times where essential maintenance is required. Where these are required, clear signage advising of the restrictions will be provided.

The visual effects of the Development on tourism and recreational resources such as the NC500 are assessed in **Chapter 6: Landscape and Visual** of the EIA Report.

It is anticipated that the tracks associated with the Development may also be utilised for access, but is unlikely to result in an increase in formal on-site recreation.

5 SUMMARY

This DAS has summarised the key design issues considered as part of the design process for the Development.

The final layout of the Development consists of 12 wind turbines of up to 149.9 m to tip height with a combined total output of up to 49.9 MW as shown on Figure 8 in Appendix A. The Development also includes ancillary infrastructure consisting of turbine foundations, control building, incorporating the substation, crane hardstandings, underground cabling, external transformer enclosures located adjacent to each turbine, temporary construction compound, a permanent meteorological mast, new on-site access tracks and a new site entrance. The Development represents an effective solution to harnessing energy from the wind, a renewable resource, which will feed into the grid network.

The design of the Development has also been carefully developed considering the technical and environmental constraints identified throughout the EIA process. The design of the Development has been an iterative process resulting in a solution which meets the objective of maximising electricity generation whilst minimise environmental effects. The design of the Development is also considered to meet with the respective provisions of Policy 67 of the Highland-wide Local Development Plan (2012) wherein the location, siting and design, and other considerations including (though not limited to) landscape and visual effects including cumulative effects; safety and amenity; the natural and historic environment; the water environment; access arrangements; construction plans; noise impacts; and mitigation measures, and the associated guidance in the OWESG, have been taken into account in the formation of the final design.

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APPENDIX A: FIGURES