Chapter 2: Site Description and Design Evolution

Contents

2 Site Description and Design Evolution

2.1 Introduction

2.1.1 This chapter outlines the process undertaken in selecting the site as a potential location for a wind farm. It provides a description of the site and surrounding area and discusses the design evolution process that was undertaken to arrive at the final design described in Chapter 3.

2.1.2 The principles of the EIA process, that site selection and project design should be an iterative constraint-led process, have been followed in the preparation of the design of the Proposed Development. This has ensured that potential negative impacts, as a result of the Proposed Development, have been avoided or minimised as far as reasonably possible throughout the design process.

2.1.3 This chapter draws on issues considered in more detail in the relevant technical Chapters 7 to 17 of the EIA Report. This chapter does not pre-empt the conclusions of the technical chapters but explains how potential environmental effects have informed the design of the Proposed Development.

2.1.4 The Proposed Development is described in Chapter 3 and is shown on Figures 3.1 and 3.2. This chapter is supported by a Design Statement (DS) which is submitted as a supplementary report to this application.

2.2 Site Selection and Consideration of Alternatives

2.2.1 National Planning Framework 4 (NPF4) was adopted by the Scottish Government on 13 February 2023 and sets out the overarching spatial strategy for Scotland to 2045. The foundations for the spatial strategy as a whole are the global climate emergency and the nature crisis. NPF4 supports a large and rapid increase in electricity generation from renewable sources to meet Scotland's net zero emissions targets. It identifies that onshore wind energy development proposals will be supported in principle except for where these are located in National Parks and National Scenic Areas.

2.2.2 NPF4 identifies that there are significant opportunities to capitalise on the natural assets of Scotland to significantly reduce greenhouse gas emissions through increased renewable energy generation. The Proposed Development would make a valuable contribution to help Scotland meet its renewable energy and electricity production targets while supporting emissions reduction to combat global heating in the current climate emergency.

2.2.3 Regulation 5 (2) (d) of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations 2017) requires that an EIA report should provide: *"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."* (Scottish Government, 2017).

Do Nothing Alternative

2.2.4 If the Proposed Development is not constructed, the land would continue to be used for rough grazing. This option would have no beneficial impact with regards to the production of renewable energy, offsetting of greenhouse gas emissions or contribution to Scotland's renewable energy and net zero targets. As set out in the outline Nature Enhancement Management Plan (NEMP) (Technical Appendix 8.5) if the Proposed Development was constricted there would be opportunities for restoration and enhancement of blanket bog which will enhance the biodiversity, flood storage and carbon sequestration/ storage of the site. Further enhancement works are proposed which would include improvement in the quality of a habitats on-site (with subsequent benefits for wildlife like invertebrates), increasing nesting and foraging opportunities for wildlife, including birds and bats on-site, improving habitat connectivity through the site, and providing benefits to aquatic wildlife through riparian tree planting. These measures would have multi-faceted benefits for biodiversity and would improve habitat connectivity and networks in, and through, the site. On the basis of the potential beneficial environmental effects arising from the Proposed Development, the do nothing alternative is not considered to be the best environmental option. A section 36 application is therefore submitted to the Scottish Government Energy Consents Unit (ECU) to seek to contribute to Scottish targets and deliver more green electricity whilst also contributing to biodiversity enhancement measures on the site. The Proposed Development would generate approximately 64.8MW and would generate enough electricity to power the domestic electricity needs of approximately 56,642 average UK households per annum. The carbon balance calculations establish that the Proposed Development could result in the saving of approximately 82,986 tonnes of carbon dioxide equivalent emissions per annum if a grid mix of electricity generation were used as the counterfactual position. This means a total of over 4.1 million tonnes of carbon dioxide over the 50-year operational period. Further details of the Carbon Calculator are provided in Technical Appendix 16.1.

Site Selection

2.2.5 When taking into consideration the different constraints, it is estimated that around less than 10% of Scotland is suitable for wind farm development. The Applicant undertakes a detailed feasibility of all sites identified as potentially suitable for onshore wind farm development. This feasibility assessment takes into consideration:

- the proximity of residential receptors;
- the wind resource;
- the presence and proximity of internationally, nationally and locally designated sites (for landscape, archaeology, ecology, hydrology and geology);
- the potential for protected species and/or habitats (including deep peat);
- turbine delivery routes;
- the location of other wind farm developments in the area; and
- the local planning policy status for the area.

2.2.6 The Applicant only takes forward 2% of potential sites through to development once an initial feasibility assessment has been undertaken.

2.2.7 The site is centred on National Grid Reference (NGR) E-242260, N-862627 and located approximately 1.5 km north-east of the village of Garve, Ross-shire within the administrative jurisdiction of The Highland Council (THC). The site is located on open moorland with a small area of forestry, approximately 1.6 km east of the A835. Loch Garve and Loch Luichart lie to the south-west at 1.5 km and 3.3 km, respectively.

2.2.8 Land cover across the site is predominantly bog, acid grassland, heather, heather grassland, thin peaty soils and freshwater lochans. Land cover surrounding the site is predominantly coniferous woodland to the west, south and east, with small pockets of remnant broadleaved woodland to the west and south-west. Montane habitat to the north-east of the site denotes the Ben Wyvis massif range rising from the lower moors. Glaciated rocky outcrops (metamorphic) and knolls are evident at higher elevations, and have been subject to glacial smoothing where exposed.

2.2.9 A number of factors were considered when selecting the site for the Proposed Development including:

- the presence of a very good wind resource (determined by initial desk based studies);
- the availability of the site for wind energy development;
- the site was subject to a previous onshore wind application, Carn Gorm, in 2014;
- no planning policies which, in principle, preclude wind energy development;
- no internationally or nationally designated sites within the site boundary;
- suitable ground conditions with limited areas of deep peat;
- suitable access point from the adjacent A835; and
- existing tracks on the site which would help mimise the length of new track required.

Technology, Size and Scale

2.2.10 Onshore wind continues to be the lowest cost form of renewable energy generation; however, the challenge is to meet the Scottish Government's ambitious 2045 Net Zero targets (see Chapter 4) within a context of limited UK Government financial support for onshore wind. The ability to maximise the potential yield from the site through turbine choice at the point of procurement is important for the financial feasibility of the Proposed Development in a time of increasing financial uncertainty, and to maximise the yield of the Proposed Development within set height constraints. Without the ability to optimise the Proposed Development in such circumstances, it may adversely affect the viability of the Proposed Development.

2.2.11 The supply of smaller turbines across Europe is already reducing due to lack of demand as manufacturers are recognising that the world market is shifting to larger machines and are focussing their development work on increasing capacity and efficiency of the turbine technology to secure the highest yield.

2.2.12 During the period leading up to any consent and ultimately construction of the Proposed Development, it is expected that the design and manufacture of commercial wind turbines will evolve and result in a wider choice of turbines than is currently available.

2.2.13 It is clear, therefore, that larger turbines (tip heights and rotor diameters) need to be considered in order to ensure a scheme's viability and constructability. In order to gain the maximum energy yield from the site, wind turbines up to 220 m to tip height were initially considered potentially viable and feasible in terms of delivery of components to the site.

2.2.14 However, despite the continuing move towards larger turbines on the grounds of economic viability and available technology, it is also important to consider the site and its surroundings to understand what size of turbine may be appropriate.

2.2.15 Multiple elements of the site and its surroundings were appraised when considering the most viable turbine size that could be appropriate. These included:

- The proximity of nearby residential receptors, potential residential visual amenity, and noise issues.
- Proximity to areas categorised as 'Wild Land'.
- Proximity to Local Landscape Areas (LLAs).
- Sensitivity to visible aviation lighting.
- The ability to get wind turbine components to the site.
- The scale of the local topography and surrounding hills and landscapes.
- The landscape character type.
- The sensitivity of the landscape to tall turbines.

2.2.16 Taking the above inputs and considering them alongside the desire to get the maximum energy yield from the Proposed Development, it was concluded following further design work and constraints mapping that the site could accommodate wind turbines up to 200 m to tip height. Turbines over 200 m were considered more likely to have an increased impact on landscape and visual receptors, residential amenities and the setting of heritage assets due to their scale in the landscape.

2.2.17 Following further consultation, and environmental constraints mapping, in particular with regard to landscape and visual concerns, four of the nine turbines heights to blade tip were reduced further, to 180 m resulting in a scheme with heights ranging from 180 m to 200 m.

2.3 Site Location and Description

2.3.1 The site (the area encompassed by the application boundary) is located in Ross-shire, in the Highlands of Scotland. The site measures approximately 1,003 hectares (ha) and is comprised of open moorland with a small area of forestry. Land cover across the site is predominantly bog, acid grassland, heather, heather grassland, thin peaty soils and freshwater lochans. Land cover surrounding the site is predominantly coniferous woodland to the west, south and east, with small pockets of remnant broadleaved woodland to the west and south-west. Montane habitat to the north-east of the site denotes the Ben Wyvis massif range rising from the lower moors. Glaciated rocky outcrops (metamorphic) and knolls are evident at higher elevations, and have been subject to glacial smoothing where exposed.

2.3.2 The site is located on an elevated plateau within the Landscape Character Assessment Area No.331 - Rounded Rocky Hills Landscape Character Type (LCT), Ross and Cromarty (c.20ha). The site is characterised by moderate elevation rounded hills, steep sided slopes and rocky moorland intersected by low curving glens, lochs and straths. The maximum elevation of this LCT is approximately 300-600m above sea level.

2.3.3 The Rounded Rocky Hills landscape is large-scale and upland with simple landform and landscape patterns. The plateau of the site forms a 'shelf' from which landform falls away steeply to the west into Strath Garve, the valley of the Black Water (Allt an Dubh), and rises to the east into the Rounded Mountain Massif of Carn Gorm, Tom na Caillich, An Cabar and, ultimately, the summit of Ben Wyvis.

2.3.4 The site boundary encompasses three lochans – Loch an Tuirc (west); Loch na Gearra (east); and Loch a Bhealaich (Figure 3.1 Site Boundary). Loch an Tuirc drains to the Allt an Torra-Bheithe, essentially discharging into Loch Garve (Alltan Dubh/Black Water). The route of the Black Water confluences with Allt a Mhuillinn approximately 1.9 km to the west, before reaching Loch Garve. The Rogie Burn drains the slopes of Ben Wyvis range approximately 1.4 km to the east, which also confluences with Black Water. The River Conon and Black Water meet approximately 7.8 km north of Marybank.

2.3.5 The landscape is generally uninhabited in the site and surrounds, with the exception of settled glens and straths including Gorstan, Garve and Tarvie to the west and south-west; and Strathpeffer, Jamestown and Contin to the east and south-east.

2.3.6 Aside from the surrounding conifer plantation and elevated rocky moorland, there are small occurrences of agricultural land use south of Gorstan, a railway station and small primary school at Garve and dispersed lodges and B&B accommodation. The primary road network connecting Inverness and the South with Ullapool and wider Sutherland runs from south-east to the north-west (A835). The Wester Ross route from Garve (A832) continues for approximately 72 km bypassing Loch Luichart, Achasheen and Loch Maree before reaching the north-west coast near Gairloch.

2.3.7 The closest residential receptors are located in the north-western part of the site, and the distance to the nearest turbine (T6) would be approximately 1.7 km to the property called Tigh Fiodha Larder (Figure A7.2.1 in Technical Appendix 7.2 Residential Visual Amenity Assessment).

2.3.8 There are no core paths within the application site, the closest path network is located through the ancient woodland to the west of the site, and to the south extending eastwards along the extent of Ailean Dubh (Black Water), towards Strathpeffer and Contin. Large linear extents of Ancient Woodland Inventory (long-established, of plantation origin) bound the site to the west; to the south; and south-east (seminatural origin) at the base levels of surrounding slopes.

2.3.9 The south-eastern part of the site lies within the southern extremity of WLA 29 Rhiddoroch – Beinn Dearg – Ben Wyvis.

2.3.10 Special Landscape Areas (SLAs) are areas of land considered to be important at a local level, as designated by The Highland Council (THC). Detailed citations for each of the 27 SLAs that lie within THC administrative area are provided in 'Assessment of Highland Special Landscape Areas' (THC in partnership with NatureScot, 2011). These citations describe each SLA in terms of its *"key landscape and visual characteristics, the special qualities for which it is valued, its key sensitivities to landscape change, and possible measures for its enhancement."* The closest SLA to the Proposed Development is Ben Wyvis SLA, which covers the north-eastern corner of the site, extending approximately 1 km within the site boundary at its furthest (Figure 7.4a).

2.3.11 There are no statutory designated sites within the site boundary. The closest statutory designated sites are as follows:

- Carn Gorm Site of Special Scientific Interest (SSSI) – 0.2 km to the east (geological interest, Moine Supergroup, igenous pegmatite).
- Ben Wyvis SSSI, Special Area of Conservation (SAC), Special Protection Area (SPA) – 1.6 km north-east.
- Loch Ussie SSSI – 7.4 km south-east.
- Lower River Conon SSSI, SAC – 6.4 km south-east.
- Cromarty Firth SSSI, Ramsar – 11.6 km south-east.
- Achanalt Marshes SSSI – 12.8 km south.
- Fannich Hills SSSI, SAC – 13.5 km west.
- Beinn Dearg SSSI, SAC, SPA – 12.8 km north-west.
- Conon Islands SAC – 6.3 km south-east.
- Moray Firth and Inner Moray Firth SPAs – 1.7 km south-east.
- Glen Affric to Strath Conon SPA – 3.8 km south-west.
- Novar SPA – 14.5 km east.
- Morangie Forest SPA – 24 km north-east.

2.3.12 The wider cumulative context of surrounding wind farms is shown on Figure 7.14b. with the projects included in the cumulative assessment listed in Table 2.1.

2.3.13 The cumulative situation changes frequently as applications are made, refused or withdrawn, and the layouts of submitted application wind farms are changed, and it is therefore necessary to decide on a cut-off date when the sites and layouts to be included are fixed. The final list of sites to be included was agreed with THC on 14th November 2024, and this is therefore the cut-off date for the cumulative assessment. Any changes in the cumulative situation after this date are not incorporated in the assessment.

Table 2.1 – Wind Farms Included in the Cumulative Assessment (45 km Radius)

Wind Farm Name	Status	Number of Turbines	Turbine Dimensions	Approx. Distance to Proposed Development
Abhainn Dubh	Application	9 turbines	149.9 m to blade tip	9.5 km
Achany	Operational	19 turbines	100 m to blade tip	41 km
Acheilidh	Application	12 turbines	200 /230 m	42 km
Achany extension	Consented	18 turbines	149.9 m to blade tip	43 km
Auchmore 1&2	Operational	2 turbines	79 m to blade tip	13 km

Wind Farm Name	Status	Number of Turbines	Turbine Dimensions	Approx. Distance to Proposed Development
Beinn Tharsuinn (including Beinn an Oighrean)	Operational	19 turbines	80 m/99.5 m to blade tip	25 km
Bhlaraidh	Operational	32 turbines	125 m/135 m	40 km
Bhlaraidh extension	Consented	15 turbines	180 m	40 km
Coire na Cloiche	Operational	13 turbines	99.5 m to blade tip	23 km
Corriemoillie	Operational	17 turbines	125 m	8 km
Corrimony	Operational	5 turbines	100 m	37 km
Chrathaich	Application	14 turbines	149.9 m	40 km
Fairburn	Operational	20 turbines	100 m	9 km
Farr	Operational	40 turbines	101 m	42 km
Garvary	Application	24 turbines	180 m	41 km
Glen Kyllachy	Operational	20 turbines	110 m	43 km
Kirkan	Consented	17 turbines	175 m	7 km
Lairg	Operational	3 turbines	100 m to blade tip	44 km
Lairg II	Consented	10 turbines	150 m/180 m/200 m to blade tip	42 km
Loch Liath	Application	13 turbines	180 m/200 m	36 km
Lochluichart and extension	Operational	23 turbines	125 m	9 km
Lochluichart Extension II	Consented	5 turbines	149.9 m	10 km
Meall Buidhe	Consented	8 turbines	144.5 m/149.9 m to blade tip	31 km
Moy	Operational	20 turbines	126.5 m	42 km
Novar and extension	Operational	50 turbines	55.5 m/99.5 m	13 km
Rosehall	Operational	19 turbines	90 m to blade tip	41 km
Strathoykel	Application	11 turbines	200 m	35 km
Strathrory Redesign	Consented	7 turbines	149.9 m/160 m/ 180 m to blade tip	36 km

2.4 Design Concept and Approach

Constraints Led

2.4.1 In EIA, constraint identification should continue throughout the design process in order to take cognisance of new, more detailed surveys revealing additional limitations or required changes to the development. This allows the findings of technical and environmental studies to inform the design of a development and achieve a 'best fit' within the environment of a development site.

2.4.2 This approach has been adopted in respect of the Proposed Development. Where potentially significant effects have been identified, efforts have been made to avoid these by evolving the design of the Proposed Development. This is referred to within the EIA Report as mitigation embedded in the Proposed Development's layout and design, or simply 'embedded mitigation'. Information on embedded mitigation is explained further within each technical chapter of the EIA Report, as appropriate. Several design principles and environmental measures have also been incorporated into the Proposed Development as standard practice.

2.4.3 Embedded mitigation includes, but is not limited to:

- Considering the size and scale of the Proposed Development appropriate to the location.
- Use of existing tracks within the site and upgrading these to minimise groundworks.
- Design of access tracks to minimise cut and fill, reducing landscape and visual effects as well as costs.
- Sensitive siting of the proposed infrastructure incorporating appropriate buffer distances from environmental receptors (including nearby residential properties) to avoid or reduce effects.
- Considering the appearance, finish and colour of wind turbines and the control buildings with reference to the now NatureScot (NS) (formerly Scottish Natural Heritage (SNH)) guidance 'Siting and Designing Wind Farms in the Landscape', Version 3a (SNH, 2017).
- Inclusion and design of borrow pits to minimise the amount of the material required to be imported to the site.

- Potential for up to 100 m micrositing of infrastructure during construction to ensure the best possible location is chosen based on site investigations.

Landscape and Visual

2.4.4 Throughout the design evolution of the Proposed Development's layout, a key driver has been the consideration of potential effects on landscape and visual receptors and how the Proposed Development would relate to the existing landscape character and effects on views from nearby settlements, roads and other receptors, including the visual amenity of residential properties. In particular, due attention was given to the scale and number of turbines proposed, and their location within the site. The landscape and visual effects potentially caused by the Proposed Development have been considered extensively from key receptors. The resulting analysis has been an important input into the design evolution process and in particular to the layout design of proposed turbines and the location of infrastructure on the site.

2.4.5 The layout and design of the Proposed Development evolved as part of an iterative design process. An iterative design approach works in tandem with the EIA process and facilitates a receptive design process aimed at reducing the potential landscape and visual effects of the Proposed Development whilst taking into account other site constraints and maximising yield.

2.4.6 The site is located on an elevated plateau of Rounded Rocky Hills landscape to the east of Garve and north-west of the settlement of Strathpeffer. The Rounded Rocky Hills landscape is large-scale and upland with simple landform and landscape patterns. The plateau of the site forms a 'shelf' from which landform falls away steeply to the west into Strath Garve, the valley of the Black Water (Allt an Dubh), and rises to the east into the Rounded Mountain Massif of Carn Gorm, Tom na Caillich, An Cabar and, ultimately, the summit of Ben Wyvis.

2.4.7 While the site and its close surrounds are generally undeveloped, there are some locations in the surrounding area from where people may gain views of the Proposed Development. These include:

- settlements (e.g. Garve and Contin);
- groups of houses and individual residential properties (e.g. Tarvie, Gorstan and Marybank);
- roads (e.g. A835, A832); and
- walking destinations (e.g. Knockfarrel, Kinellan, Ben Wyvis, Cnoc Fyrish).

2.4.8 The appearance of the Proposed Development and how it will affect views from these locations has been given a high priority in the design process. Wider landscape characteristics and visual sensitivities have also been considered in the design process, including potential effects on landscape designations, properties and settlements in the area. The hours of darkness effects of visible aviation lighting have also been considered.

2.4.9 The potential for cumulative effects of the Proposed Development along with existing operational, under construction, consented and application stage wind farms in the study area has been a further consideration throughout the design evolution process.

2.4.10 The location of the Proposed Development within the plateau shelf described above is of key importance to the way that it is accommodated in the landscape and seen in views from the surrounding area. Most importantly, the turbines are located within the shelf of the plateau and do not appear to either encroach down the western slope into Strath Garve or rise up eastwards towards Carn Gorm and into the Ben Wyvis massif.

2.4.11 The final layout has been optimised with regards to the landscape and visual resource as far as possible using the agreed viewpoints for the Landscape and Visual Impact Assessment (LVIA) (see Chapter 7 for further information). The final layout has evolved through a number of iterations, which are described subsequently in this Chapter. The key design principles that have informed these iterations in landscape and visual terms are described in full in the DS.

Efficiency Modelling

2.4.12 Throughout the constraints-led design process, wind and yield analysis was undertaken to ensure changes made to layouts did not unduly affect the output of the Proposed Development.

Stakeholder Consultation

2.4.13 Statutory consultees were invited to input to the design process for the Proposed Development. THC major applications pre-application advice was used for the Proposed Development. A pre-application meeting was held with THC in September 2023, followed by a further design meeting with THC in March 2024.

Feedback from both meetings, along with input from other consultees, such as SEPA in relation to peat and NatureScot in relation to ecological impacts has been incorporated into the design evolution process.

2.4.14 Two rounds of public consultation events were undertaken for the Proposed Development. The first round, held in November 2023, comprised of exhibitions in Contin, Tarvie, Strathpeffer, and Dingwall. The second round, in May 2024, comprised of exhibitions in Contin, Garve, and Strathpeffer. These events allowed members of the local community to comment on the design proposals. Feedback from the public consultation events was incorporated into the design evolution process where possible and is presented in the Pre-Application Consultation (PAC) Report accompanying this application. Further details of the public consultation process can be found in Chapter 6.

2.5 Constraints and Identification Mapping

2.5.1 The design of any wind farm is driven by the key objective of positioning turbines so that they capture the maximum energy possible within a suitable area while minimising the environmental effects.

2.5.2 The designations within the site and surrounding area were identified as the first part of the constraints mapping process. These are shown on Figure 2.1. The known environmental and technical constraints within the site were identified through this early-stage constraints mapping (Figure 2.2). It is important to note that the identification of a constraint does not necessarily result in the exclusion of that area from the potential development envelope; rather it means that careful thought and attention was paid to the constraint and the design followed appropriately. The key constraints which were taken into account during the design process included:

- topography and ground conditions (including peat);
- environmental designations;
- identified landscape and visual constraints;
- proximity to residential receptors (with regards to visual amenity, shadow flicker and noise);
- presence of protected habitats and species;
- presence of watercourses, private water supplies and related infrastructure;
- presence of cultural heritage features;
- aviation and radar constraints;
- recreation resource (no Rights of Way or Core Paths within the site); and
- fixed communications links.

2.5.3 The identification of constraints continued throughout the design evolution process.

2.5.4 A description of how the various environmental and technical specialists have contributed to the design through detailed assessment is described below. Information in respect of the survey work undertaken is provided in Chapters 7 to 16.

Topography and Slope Stability

2.5.5 The topography of the site has meant that gradients greater than 15 degrees have been avoided for the siting of wind turbines.

2.5.6 Slope stability has been taken into consideration to understand whether infrastructure could be located within certain areas of the site. Where slope stability was identified as an issue, these areas were deemed to be unsuitable for infrastructure and have therefore been avoided due to the potential for slope instability and peat slide risk.

Designated Landscapes and Visual Amenity

2.5.7 No international or nationally designated landscapes occur within the site.

2.5.8 However, a small part of the site lies within the local designation of the Ben Wyvis SLA. The Special Landscape Qualities (SLQ) of this SLA are described in a citation contained within the document 'Assessment of Highland Special Landscape Areas' (THC in partnership with SNH, 2011). The Ben Wyvis SLA has one SLQ - "*Dominant Landmark and Uninterrupted Panoramas*" – which is described in five sub-sections:

- *"Standing well above a surrounding range of much lower foothills, Ben Wyvis has a commanding presence with its broad and fairly level summit ridge stretching more than 7kms from Garbat to Loch Glass. It is a dominant landmark feature from many locations, most notably from the south and northwest, including Inverness and the Black Isle. Little Wyvis also appears prominent at a local level.*

- *The summit of Ben Wyvis provides some of the most extensive panoramas in Scotland. These include the wild and dramatic mountain profiles of Wester Ross and Sutherland to the north and west, the indented coastline and settled, fertile lowlands of Easter Ross and the Black Isle to the east, and the distant summits of the Cairngorms and Ben Nevis to the south.*
- *Views of the top and the overall profile of the mountain are limited from the immediate surroundings, due to its massive scale and convex upper slopes. The form of the mountain is most clearly appreciated when viewed from a distance, for example from Inverness and the Black Isle.*
- *Ben Wyvis is a popular Munro due in part to its proximity to Inverness but also because it is a relatively straightforward walk with a broad, easy ridge from which the panoramic views can be appreciated. It is also popular for cross-country skiing.*
- *With the exception of Wyvis Lodge, the odd shieling hut, and the very occasional boundary wall and rough track there is virtually no visible evidence of human occupation in the SLA."*

2.5.9 The effects of the Proposed Development on these aspects of the SLQ have been considered throughout the design process, and embedded mitigation has ensured that effects are reduced as far as possible, as described in the DS.

2.5.10 In addition to the SLA, the south-eastern part of the site lies within the southern extremity of WLA 29 Rhiddoroch – Beinn Dearg – Ben Wyvis. The status of WLAs is clearly set out in paragraph 8 of NatureScot guidance (2020/2023), which states "*WLAs have not been identified on scenic grounds and are not a statutory designation*." However, WLAs are referred to in Policy 4g of NPF4, which states that (emphasis added):

"Development proposals in areas identified as wild land in the Nature Scot Wild Land Areas map will only be supported where the proposal:

i. will support meeting renewable energy targets; or,

ii. is for small scale development directly linked to a rural business or croft, or is required to support a fragile community in a rural area.

All such proposals must be accompanied by a wild land impact assessment which sets out how design, siting, or other mitigation measures have been and will be used to minimise significant impacts on the qualities of the wild land, as well as any management and monitoring arrangements where appropriate. Buffer zones around wild land will not be applied, and effects of development outwith wild land areas will not be a significant consideration."

2.5.11 An assessment of effects on wild land is included in the LVIA (Chapter 7 of the EIA Report), and a full description of the mitigation applied in included in the DS. In summary, the Proposed Development will affect those parts of the WLA where wild land qualities (WLQs) are not expressed to their optimum and where other external influences have resulted in a diminution of their strength. There is very limited theoretical visibility of the Proposed Development from areas where the WLQs are more strongly expressed, and where it is visible, it is likely to be seen in the context of other wind farm development, which ensures that it will not introduce an entirely new influence on attributes and responses.

2.5.12 Whilst removing all visibility from the WLA is not possible, the Proposed Development has been specifically designed to mitigate and minimise its effect on the WLA as a whole. Mitigation (including mitigation by siting and design) is of key importance in the accommodation of the Proposed Development on the periphery of the WLA without an unacceptable effect on the overall integrity of the WLA.

2.5.13 Where possible, proposed excavations for new sections of access tracks and other infrastructure have been minimised. The location of the substation compound and temporary construction compounds have been given particular consideration in relation to reducing potential landscape and visual effects.

2.5.14 A summary of mitigation by design for the environmental constraints relevant to each technical topic are provided in Table 2.2.

Table 2.2 – Summary of Embedded Mitigation

Environmental Topic	Environmental Constraint / Potential Effect	Embedded Mitigation	Residual Effects Assessment
Landscape and Visual	Potential landscape and visual impacts are a key issue and have been considered throughout the design iteration process. This is discussed in further detail in the DS.	The design iterations of the Proposed Development has taken account of: • views from nearby residential properties; • views from other settlements, roads and core paths;	The landscape and visual effects of the Proposed Development are addressed further in Chapter 7: Landscape and Visual Impact **Assessment**, and in the DS which is submitted as a separate document to

Environmental Topic	Environmental Constraint / Potential Effect	Embedded Mitigation	Residual Effects Assessment
		• potential effects on Landscape Character; • potential effects on designated landscapes; • potential effects on WLAs; • hours of darkness effects of visible aviation lighting and • cumulative effects. Embedded mitigation of landscape and visual effects is achieved through the iterative layout design process, which considers the number of turbines, their dimensions, and their positioning within the site. Infrastructure is also considered. The overall reduction in the number of turbines from 14 to nine, the reduction in tip height of some turbines to 180 m, and the containment of the turbines in a compact group on one part of the site has been instrumental in its accommodation in the landscape setting.	support this application.
Archaeology and Cultural Heritage	Effects on archaeology and cultural heritage assets identified across the site, and upon the setting of assets within 10 km and one asset beyond 10 km.	The infrastructure and turbine layout have been designed to avoid direct impacts to archaeology assets identified during the baseline assessment and archaeological blanket walkover where possible.. The reduction of turbines to nine from fourteen, and reducing the height of four ;turbines to 180m in tip height (while five remain 200m) has also lowered the scale of setting impacts on cultural heritage.	The archaeological and cultural heritage effects of the Proposed Development are addressed further in Chapter 11: Archaeology and Cultural Heritage.
Ecology	Effects on: • annex 1 and priority habitats; • peatland habitats; • watercourse habitats and water voles; • bat collision risk; and • badger.	• The design of the Proposed Development has taken account of: • minimising land-take, impacts on deeper peat and the number of watercourse crossings, reducing the loss of moorland habitats and potentially sensitive fish habitats; • minimising effects on areas of key habitats; • maximisation of use of existing tracks (floating tracks to be used where peat depth >1 m, where appropriate); • avoidance of new watercourse crossings as far as possible (with any necessary crossings sensitively designed to allow continued free movement of water and aquatic wildlife); • where access track does cross watercourses,	The ecological effects of the Proposed Development are addressed further in Chapter 8: Ecology.

Environmental Topic	Environmental Constraint / Potential Effect	Embedded Mitigation	Residual Effects Assessment
		where possible, the track has been aligned to cross watercourses at 90 degrees (perpendicular) to direction of flow, to minimise disturbance during works in the vicinity of the watercourse through maximising separation between parts of the access track and watercourses; • minimum 50 m buffer from watercourses and waterbodies with exception of some access tracks, with the length of access track within 50 m of such features minimised; • minimum 50 m buffer between turbine blade tip and edge habitats (e.g. watercourses, forestry), and from trees/structures that have potential to support roosting bats; • avoidance of watercourses supporting water vole with a minimum 10 m buffer between the Proposed Development, and signs of water vole (latrines); • avoidance of badger setts (works to be >30 m from any sett, and high impact works such as blasting at least 100 m from a sett); and • reduction of the number of proposed turbines through scheme evolution will benefit ecological species that use the site, given the reduction in habitat loss. Furthermore, the reduced footprint will have obvious beneficial impacts on the habitats themselves.	
Ornithology	Effects on: • Schedule 1 species, incl. red kite, barn owl and golden eagle; • breeding black grouse; • breeding ptarmigan; and • breeding waders (incl. curlew, greenshank and golden plover)	• The design of the Proposed Development has taken account of: • minimum 750 m around black grouse leks and ptarmigan breeding territory from proposed turbines, and typically for all aspects of the Proposed Development including the on-site tracks; • minimum 100 m (but exceeds 750 m) around barn owl nest site from proposed turbines, and	The ornithological effects of the Proposed Development are addressed further in Chapter 9: Ornithology.

Environmental Topic	Environmental Constraint / Potential Effect	Embedded Mitigation	Residual Effects Assessment
		minimum 50 m from the on-site tracks; • sensitivity, where practicable, to the most suitable golden eagle habitat with turbines offset from upper ridge/peaks in order to reduce potential impacts (e.g. from collision risk or displacement); • sensitivity to the habitat in the south-west of the site and around Carn Gorn to the east which was most typically used by red kite, with turbines offset from these areas; • avoidance, where practical, of better quality/conditioned moorland/peatland in order to benefit ground-nesting wetland species (e.g. waders) and reduce potential for displacement of these species, with proposed turbines offset from breeding areas of these species at a distance which typically exceeds the documented species disturbance thresholds; • key habitat features such as woodland that may be used by key ornithological species, with proposed turbines appropriately offset from these features; • appropriate buffering from waterbodies that may be used by wetland species (e.g. greenshank and teal) in order to reduce the potential for displacement to these species; and • reduction of the number of proposed turbines through scheme evolution will benefit ornithological species that use the site, given the reduction in habitat loss	
Geology Hydrology, Hydrogeology, and Peat	Effects on any deep peat identified across the development site.	A Phase 2 peat survey has been undertaken and has confirmed the presence of areas of deep peat >1m within the flatter lying topographic lows within the main turbine area outwith the areas of steep bedrock outcrop. The more extensive areas of peat were recorded in the north of the Proposed Development to the west of the turbine array T1, T2 and T3 and around T6 with deep peat	The effects of the Proposed Development on peat and soils are addressed further in **Chapter 10: Geology, Hydrology, Hydrogeology and peat.**

Environmental Topic	Environmental Constraint / Potential Effect	Embedded Mitigation	Residual Effects Assessment
		>2.5m recorded Peat deposits were also recorded in the southern area of the Proposed Development to the west of T8 and to the south-west of T9 as peat >3m recorded. There are localised hollows of peat across the Proposed Development. These pockets of deeper peat are to the south-west of T7 and north of the proposed substation, with peat >3m mapped. Pockets of peat located to the north of T1 and at the temporary construction compound record depths of >2m. The Phase 2 survey data has been used to support extensive design work to minimise disturbance to soils and peat and avoid areas of deep peat (>1.0 m) where possible. All excavated peat and soils can be re-used appropriately and safeguarded within the Proposed Development. The following areas have been avoided: • the main areas of extensive deep peat, requiring potentially large volumes of excavation; • areas of peatland in near natural condition ; • areas of moderate to steep slopes (where site infrastructure might increase the chance of peat instability); and • areas of sensitive habitat.	
Hydrology, Hydrogeology, Geology and Soils	Effects on watercourses and hydrological and hydrogeological receptors across the site. •	the design of the Proposed Development has taken into account: • A minimum 50m buffer to watercourses and waterbodies within the site has been applied. • use of existing tracks where possible and minimise the requirement for watercourse crossings. • Private water supplies and potential areas of Ground Water Terrestrial Ecosystems (GWDTEs) have been mapped and taken account of in the design of the Proposed Development.	The hydrology and hydrogeology effects of the Proposed Development are addressed further in Chapter 10: Geology, Hydrology, Hydrogeology and peat. In addition, Pollution Prevention Measures are described as part of the Outline Construction and Environmental Management Plan (CEMP) in Technical Appendix 3.1. Developing and implementing a Pollution Prevention and Incident Plan and ensuring that all personnel (including sub-consultants and sub-contractors) understand and are aware of procedures to be undertaken should an environmental incident occur. This would sit as an additional appendix in the final CEMP.
Traffic and Transport	The following sensitivities related to Traffic and Transport have been considered:	Construction Traffic Management Plan (CTMP) which identifies measures to potentially reduce the	The traffic and transport effects of the Proposed Development are

Environmental Topic	Environmental Constraint / Potential Effect	Embedded Mitigation	Residual Effects Assessment
	• severance; • road vehicle driver and passenger delay; • non-motorised user delay; • non-motorised user amenity; • fear and intimidation of and by road users; • road user and pedestrian safety; and • hazardous / large loads.	number of construction vehicles, the consideration of construction programming, routing and identification of an individual with responsibility for managing traffic and transport.	addressed further in Chapter 13: Traffic and Transport. The chapter reaches the conclusion that effects of the increased traffic during the Proposed Development's construction phase are deemed to be Not Significant subject to a CTMP including some specific measures.
Noise and Vibration	Potential effects at nearby residential receptors due to construction and operational noise and vibration with potential for cumulative impact.	The turbines of the Proposed Development are located at least 1.7 km from the nearest property (which is financially involved) and it has been designed to reduce the potential for noise and vibration effects on nearby properties by following relevant national standards and design guidance.	The noise and vibration effects of the Proposed Development are addressed further in Chapter 11: Noise and Vibration.
Shadow Flicker	Potential effects of shadow flicker on residential receptors.	The Proposed Development includes distancing of at least 1,882m from any turbine to most of the inhabited properties. There is an allowance included for 100m micro-siting, and 1,882 m allows for a separation of at least 11 - rotor diameters from most properties (1,882 = 11 * 162) + 100m as shown in Figure 16.2 Shadow Flicker Study Area). Three residential properties have been identified which fall within the 1,882m study area. A shadow flicker assessment has been conducted which concluded that the annual hours of shadow flicker anticipated at these properties are under the significance threshold of 30 hours.	Shadow flicker effects are assessed in Chapter 16: Other Environmental Considerations.

2.6 Design Evolution

2.6.1 Geographic information system (GIS) constraints mapping was used to identify the areas within the site which may be suitable for wind turbines and associated infrastructure. All known constraints gathered throughout the EIA process were used to inform the evolution of the location of the proposed turbines and associated infrastructure. During design optimisation, the locations of infrastructure and track design was refined in order to minimise the volume of earthworks and cut and fill required to construct the Proposed Development.

Turbine Layout Evolution

2.6.2 The design optimisation process was iterative, with each design involving a review of wireline visualisations from key landscape and visual receptors, consideration of setting impacts on cultural heritage assets, potential noise effects on residential properties, impacts to peat, hydrology, ecology and consideration of the energy generation seeking to maximise wind yield.

2.6.3 Turbine tip heights explored during the design process ranged from 180 m to 220 m, including the use of varied tip heights across the site.

2.6.4 Four of the key design iterations for the Proposed Development are shown on Figure 2.3 and detailed in Table 2.3.

Table 2.3 - Design Iterations

Layout	No. of Turbines	Description and summary of design changes
A (Scoping Layout)	14	• Presented in EIA Scoping Report, June 2023. • Tip heights of up to 200 m. • Layout A took into account initial desk-based observed constraints including ecologically important sites, sites of archaeological and/or cultural heritage importance, residential properties, watercourses and slopes. • Desk-based constraints were augmented by the results of field-based survey work to Layout A. At Scoping, approximately 2 years of ornithological surveys had been undertaken. Further survey work undertaken included phase 1 habitat and National Vegetation Classification (NVC) Survey and initial peat depths surveyed for the Carn Gorm Wind Farm Peat Stability Assessment Site visits were undertaken to commence the identification of landscape and visual receptors.
B (First exhibition)	11	• Layout B (November 2023) was presented during an initial round of public and online consultation. • Three turbines were removed to reduce impacts on landscape and visual receptors. • Wirelines of the remaining turbines were viewed from viewpoints and several turbines were moved to provide a more coherent layout within the landscape. • Three turbines were moved to avoid hydrology and bat buffers. • Three turbines were moved to avoid GWDTE buffers. • One turbine was moved to avoid a telecommunications link buffer. • Three turbines were moved to less steep ground. • Several turbines were moved to areas of shallower peat.
C (Design Chill)	9	• Layout C (May 2024) is the design chill which was presented at the second round of public exhibitions and the Gatecheck Report. • The layout was examined in relation to wind yield constraints as a 4 x 3 rotor diameter circle was used to assess wake separation rather than a 5 x 3 rotor ellipse as was the case for the previous designs. • Two turbines were moved to minimise wake separation overlap. • Two turbines were removed to reduce impacts on landscape and visual receptors. • Four turbines were reduced in height to 180 m to reduce impacts on landscape and visual receptors.in particular the views from the west from Garve, the A835 and A832. • Wirelines of the remaining turbines were viewed from viewpoints and several turbines were moved to provide a more coherent layout within the landscape. • In discussions with the landscape advisor at THC, T5 was moved further to the north-east to move it further onto the plateau, reduce visibility of the turbine base (which was resulting in perceived encroachment) and increase the connectivity with the rest of the turbines and the coherence of the overall design. • .The main changes in comparison to Layout B are as follows: ○ a reduction in the number of turbines from 11 turbines to 9 turbines; and ○ a reduction in the overall height of four turbines from 200 m to 180 m
D (Design Freeze)	9	• Layout D (November 2024) is the design freeze on which the EIA, the results of which are reported in this EIA Report, has been undertaken. • The locations of turbines T1, T6 and T7 were optimised by small movements into areas of shallower peat while taking account of other relevant constraints. • Turbine hardstandings and tracks were re-orientated to avoid areas of deeper peat.

Layout	No. of Turbines	Description and summary of design changes
		• Track orientations were adjusted to minimise cut and fill as far as possible. • Borrow Pit 4 was removed from the layout to avoid impacts on priority peatland. • The footprint of Borrow Pit 2 was adjusted to move it off the top of the nearby hill and to minimise areas of deep peat (>1m) being extracted. • The substation was located to the south-west of T7 to make use of topographical screening and reduce landscape and visual impacts as far as possible. • The shape of Temporary Construction Compound (TCC) 1 at the site entrance was changed to minimise cut and fill as far as possible. • An additional section of track was added from T9 to link up with track to the north of T5. This is considered to provide recreational enhancement by enabling a circular walk to be undertaken on the site.

Other Site Infrastructure

Site Access and Site Tracks

2.6.5 Access to the site would be afforded by the existing access point off the A835, as set out on Figure 3.1

2.6.6 A number of different track layout options were considered as part of the site design process. The key aim was to maximise the use of the existing tracks on-site to minimise the amount of land taken and disturbance to habitats.

2.6.7 In the final track layout, approximately 3.3 km of existing tracks on the site have been utilised thereby minimising the amount of new tracks required to be built for the Proposed Development to approximately 11.6 km.

2.6.8 All access tracks have been designed with cognisance of the topography of the site to ensure constructability and permit the safe delivery of turbine components and associated parts.

Turbine Foundations and Hardstanding Areas

2.6.9 The turbine foundations and adjacent crane hardstanding and laydown areas have been located and orientated appropriately to ensure they are positioned on peat which is as shallow as possible and to minimise the amount of cut and fill required. Peat stability has also been taken into account in the location of this infrastructure.

2.6.10 The Phase 2 peat surveys showed the more extensive areas of peat were recorded in the north of the Proposed Development to the west of the turbine array T1, T2 and T3 and around T6 with deep peat >2.5m deep recorded. Peat deposits were also recorded in the southern area of the Proposed Development to the west of T8 and to the south-west of T9 with peat >3m deep recorded. There are localised hollows of peat across the Proposed Development. These pockets of deeper peat are to the south-west of T7 and north of the proposed substation, with peat >3m mapped.

The Phase 2 survey data has been used to support extensive design work to minimise disturbance to soils and peat and avoid areas of deep peat (>1.0 m) where possible. Excavated peat and soils can be re-used appropriately and safeguarded within the Proposed Development.

Borrow Pit Search Areas

2.6.11 Borrow pits would be required as a source of rock to be used in the construction of the tracks and hardstandings. On-site borrow pit search areas have been identified based upon a review of geological mapping and site reconnaissance by an engineer and geological specialist, in order to reduce the need to transport large quantities of aggregate. The location of each borrow pit search area was considered and refined with respect to the site infrastructure and environmental constraints. Further information is set out in Technical Appendix 3.2.

2.6.12 During design optimisation, the locations of infrastructure and track design were refined in order to minimise the amount of earthworks and cut and fill required to construct the Proposed Development. The extent of the three borrow pit search areas has been selected to meet the estimated volume of rock required in the construction of the proposed tracks and hardstandings.

2.6.13 Post consent, further intrusive geotechnical investigation would be carried out to identify the expected yield and rock quality at each of the three borrow pit locations.

Temporary Construction Compounds

2.6.14 Three temporary construction compounds would be required for the duration of the construction phase. The temporary construction compound locations are shown on Figure 3.1.

2.6.15 One construction compound would be located by the site entrance at with one in the north of the site and a third one is adjacent to the substation compound.

Siting

2.6.16 These locations are considered appropriate as they:

- have appropriate topography;
- have limited visibility to the surrounding area;
- avoid sensitive habitat areas ensuring that appropriate buffers from known features would be maintained; and
- are conveniently located where storage areas would be required.

Substation

2.6.17 The Proposed Development would be connected to the electricity network via an on-site substation control building and located within the substation compound .

Siting

2.6.18 The location is considered appropriate as it:

- Avoids the environmental constraints outlined elsewhere in this chapter as far as possible.
- Is located within the interior area of the site to avoid visibility from key viewpoints and receptors, and to minimise effects on views, landscape character and landscape-related designated areas.

2.6.19 The substation and construction compounds would be located greater than the topple distance from the proposed turbines. The internal site collector cables would be underground within the site from each turbine to the control building, therefore avoiding visual impact.

2.7 Micrositing

2.7.1 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 the consent includes provision for a 100 m micrositing allowance for the Proposed Development.

2.7.2 The technical assessments in Volume 2, Chapters 7 to 16 of the EIA Report, have considered the potential for horizontal micrositing and it is considered that the Proposed Development could be microsited within 100 m without resulting in potential significant effects, except within watercourse buffers or where notable deep peat is identified. Within this distance, any changes from the consented locations of greater than 50m would be subject to approval of the Environmental/Ecological Clerk of Works (EnvCoW)[1] and other relevant consultees (e.g. THC, SEPA, NatureScot) as required and in consideration of other known constraints. It is anticipated that the agreed micrositing distance is likely to form a planning condition accompanying consent for the Proposed Development.

2.8 Conclusion

2.8.1 The design process has been iterative responding to constraints identified throughout the EIA, public consultation and layout design process so that potential adverse impacts from the Proposed Development could be avoided or reduced. Potential beneficial effects through design have also been considered and enhancement of access within the site would be promoted through the creation of a possible circular walk which could be undertaken on the site.

2.8.2 In addition Statkraft commissioned Planning Aid Scotland to conduct an independent engagement process with members of the public to inform an outline Outdoor Management Plan for the proposed Carn Fearna Wind Farm, The engagement process has identified a number of opportunities for enhancing biodiversity and outdoor spaces, including improvements to pathways and signage. The addition of information boards, benches, and wildlife hides could offer further learning opportunities, and wildlife management and the planting of native species could enrich the natural environment, enhancing the experience for both the local community and visitors. Further information is provided in the Outline Outdoor Management Planat Technical Appendix 14.2.

2.8.3 The final layout of the Proposed Development is described in detail in Chapter 3 and shown on Figures 3.1 and 3.2.

2.8.4 The assessment of the potential effects of the final layout is addressed in Chapters 7 to 16 of the EIA Report.

[1] (definition of this role is contained in the outline CEMP (Technical Appendix 3.1)).