

3 Site Selection and Design Strategy

Introduction

- 3.1 This chapter provides details of the approach that has been taken to design North Lowther Energy Initiative (hereafter referred to as 'the Development'). Details of how and why the turbine layout and associated infrastructure have been modified during the iterative EIA process are provided to explain how the Development described in **Chapter 4: Scheme Description** was designed. This chapter also outlines the site selection process that was undertaken by NLEI Ltd.

Site Selection

- 3.2 At the most basic level the need to identify windfarm sites is driven by a willing landowner, technical and environmental considerations, and the Scottish Government's continued support for a low carbon economy and its ambitious targets for renewable energy as part of this. The delivery of these targets presents a significant economic opportunity for Scotland, and even in light of the changes to the way onshore wind is supported at a UK Government level, there is a determination by both industry and Government alike that these targets should be met.
- 3.3 The Development is the product of a combined vision for delivering large scale habitat enhancement, implementing a major renewable energy development and creating the potential for a major investment in the local economy. The project has been driven by these key aims. At the earliest stage of the project, an extensive area of land to the north of the Lowther Hills, extending from Sanquhar in the west to the M74 motorway in the east was identified as a potential Development Area over which the development parties had ownership control. At that stage the Development Area also incorporated a large section of the Muirkirk and North Lowther Uplands Special Protection Area (SPA), which has recorded unfavourable status for a number of years.
- 3.4 The initial development concept comprised the following:
- A very large renewable energy development in excess of 400 MW in an area of high wind speeds, good grid access and outwith national landscape designations;
 - Development in the Upper Nithsdale region, which combined with the Glenmuckloch Pumped Storage scheme, would deliver a significant economic investment and provide a mix of energy sources to help deliver the Scottish Government's ambitious energy targets;
 - An opportunity to deliver a net biodiversity benefit, initially focussed on the North Lowther SPA, which has been recording 'unfavourable' status for over a decade, through an associated outline conservation management plan (**see Appendix 8.6: Outline Conservation Management Plan**) and;
 - Delivery of a community benefit fund that would provide the opportunity to help deliver real economic sustainability to the area.
- 3.5 With access to a landholding of the scale needed to deliver the above aims, Buccleuch, with support from 2020 Renewables identified the Development Area and discussed the initial proposals with the Scottish Government, Scottish Natural Heritage (SNH), Dumfries and Galloway Council (DGC) and other local landowners. Whilst the initial Development Area was partially located within the SPA (part of which is contiguous with the North Lowther Uplands Site of Special Scientific Interest (SSSI)), the area identified for development was otherwise outwith national and international designations. The initial Development Area identified for development was relatively sparsely populated, and where properties and settlements were present there was sufficient scope to allow separation distances to be applied to protect residential amenity. It also had excellent predicted wind speeds and good access to the grid network, both of which are essential for the delivery of an efficient wind energy scheme which is able to compete in the changing electricity market. At the initial project development stage, the likely landscape and visual effects of such a large development were considered. Given the scale of the proposal under consideration

at that time (c.140 turbines), significant landscape effects were anticipated which would result in a change in landscape character from 'Southern Uplands' to a windfarm landscape. It was also noted however that the landscape is of a generally large-scale comprising many of the characteristics indicating the ability to accommodate wind turbines. This would be dependent on turbines following the elevated ridge lines, responding to the landform. The proposal at this stage would have effectively been contiguous with the operational Clyde Wind Farm.

- 3.6 The early stages of site selection indicated that the Development Area would have very good wind speeds and was relatively close to the grid network for an export connection. Both of these factors are crucial in identifying suitable and efficient windfarm sites.
- 3.7 The process that has been followed in refining the Development Area (as shown in **Figure 3.1**) is set out in the national and regional / local considerations below.

National Policy Site Selection Considerations

- 3.8 Scottish Planning Policy (SPP)ⁱ (June 2014) provides support for wind development in principle and encourages local authorities to guide developments towards appropriate locations. SPP is clear, at paragraph 166, that: "proposals for onshore wind turbine developments should continue to be determined while spatial framework and local policies are being prepared and updated. Moratoria on onshore wind development are not appropriate". On this basis, identification for a site for the NLEI was progressed by NLEI Ltd.
- 3.9 Paragraph 154 states that planning authorities "*should support the development of a diverse range of electricity generation from renewable energy technologies – including the expansion of renewable energy generation capacity. It goes on to state that the planning system should "support the transformational change to a low carbon economy, consistent with national objectives and targets, including deriving:*
- 30% of overall energy demand from renewable sources by 2020;
 - 11% of heat demand from renewable sources by 2020; and
 - the equivalent of 100% of electricity demand from renewable sources by 2020".
- 3.10 Paragraph 161 of SPP requires that Planning Authorities set out in the Development Plan a spatial framework identifying those areas that are likely to be more appropriate for onshore windfarms as a guide for developers and communities, following the approach set out in SPP Table 1: Spatial Frameworks. The Development Area is not within a National Park or National Scenic Area (Group 1: Areas where windfarms will not be acceptable).
- 3.11 The original Development Area under consideration was partially located within the Muirkirk and North Lowther Uplands SPA. Despite this SPA being in unfavourable condition, in line with SPP and following discussions with SNH and ornithological advisors for the Development, the decision was taken to limit the extent of the Development to an area outwith the SPA. This resulted in the Development being pushed further south towards the current area and substantially reduced in terms of turbine numbers.
- 3.12 At this time, consideration was also given as to the scale of the Development Area outwith the SPA. This refining of the site selection resulted in a windfarm which would be developed on land to the east and west of Leadhills and Wanlockhead, albeit appropriate separation distances were in place around the settlements. A number of reasons informed the decision not to progress this larger site including the potential for a perception of surrounding the settlements, landowner considerations and the interest of another developer in taking forward a proposal on land to east of Leadhills. In balancing these considerations it was decided to focus the Development Area onto the area currently under consideration.
- 3.13 Small areas within the Development Area are highlighted as "*carbon rich soils, deep peat and priority peatland*" using SNH's broad brush national datasetⁱⁱ. On this basis, these areas of the Development Area would be within Group 2: Areas Requiring Significant Protection. However, following the onsite specific surveys of peat, and the response of the design of the development to these findings, the proposed Development is not within any areas of deep peat or priority peatlands such that it should be considered to be a Group 2 area. On the basis of the SPP classifications and the work undertaken on during the design process, the Development Area is considered to have the properties of a site within Group 3: Areas with potential for windfarm development. Development will not take place within any other areas of significant protection as no infrastructure is proposed to be located within a national or international designated area or an area of wild land and the layout has addressed the issue of

community separation (greater than 2km from cities, towns and villages identified in the Local Development Plan (LDP)).

- 3.14 Further to consideration of site selection within the national policy context, regional and local scale constraints and opportunities were considered at the site selection stage as outlined below.

Regional and Local Level Site Selection Considerations

- 3.15 At a local level, the Development Area has a number of characteristics which make it suitable for a windfarm development, including the following:

- Very high anticipated wind speeds;
- good access;
- development will not take place within any national and international environmental designations protected through national planning policy e.g. National Parks and Wild Land;
- relatively close to existing grid infrastructure (Elvanfoot);
- good separation distances from residential properties and lying outside an areas identified by Dumfries and Galloway as requiring significant protection or being within a cumulative sensitivity zone.

- 3.16 In addition to being free from designations, being located within a Group 3 area in accordance with SPP and being within a landscape considered to be capable of accommodating the scale of turbines proposed, the Development Area offers the ability to develop an efficient windfarm with a capacity factor in the region of 36% compared to a Scottish average of 27%ⁱⁱⁱ. Considering the importance of efficiency in delivering new onshore wind developments given the recent UK Government changes to the support mechanisms available, efficiency is an important factor in the site selection process. This is set out clearly in the Scottish Government's Onshore Wind Policy Statement, issued in January 2017ⁱ, which recognises the importance of efficiency as a consideration in the consenting process. It must therefore follow that wind speeds and efficiency should be an important factor in selecting a site.

Site Feasibility

- 3.17 Following identification of the Development Area and throughout the site selection refinement process set out above, preliminary feasibility work was undertaken. The feasibility study explored potential constraints and opportunities in relation to planning policy, natural and built heritage, technical (site access, aviation and telecommunications and grid connection), socio-economic and landscape and visual considerations related to development of a windfarm. The feasibility study was based on preliminary layout provided by 2020 Renewables comprising 140 turbines of 130m tip height, developed solely based on potential wind yield. This feasibility stage layout, included turbines located within both Dumfries and Galloway and South Lanarkshire Council administrative boundaries. Additional detailed feasibility work was undertaken, including ornithological surveys in 2014, an access track feasibility study, preliminary aviation appraisal and consultation with NATS and preliminary noise modelling.
- 3.18 This preliminary review shaped the design strategy for the Development and the design objectives are set out below.

The 'Do-Nothing' Scenario

- 3.19 If the Development did not proceed, it is reasonable to assume that the management of the Development Area would be likely to continue as at present, largely as an area of open moorland, with pockets of commercial woodland, used for 'farm in hand' grazing and infrequent stalking. It would be unlikely that the Development Area would be subject to another form of investment and economic development at the scale of the proposed Development.

The Design Strategy

- 3.20 The design strategy for the Development aimed to provide a balance between achieving maximum energy yield and creating a legible layout which relates to the landform and scale of the Development

Area and to limit where possible visual effects whilst at the same time avoiding effects on other environmental qualities. This has been informed by relevant design guidance^{iv}.

- 3.21 The starting points for the design considered landform, scale, land use and the landscape and visual pattern. These factors influenced how the proposed Development will be perceived by people from the surrounding area and to what extent the landscape is capable of accommodating the development. The design strategy also comprised a number of design objectives which are set out below. The design strategy has also been developed in accordance with the requirements of PAN 68 – Design Statements^v.

Objectives of the Design Strategy

- 3.22 Informed by the findings of the feasibility study undertaken in 2014, the objectives of the design strategy were as follows:
- to develop a layout which would appear cohesive and be legible in key views as experienced from the surrounding landscape;
 - to develop a layout that reflects the landform of the Development Area where possible;
 - to develop a layout that seeks to match the perceived scale of the turbines, and the scale of the overall windfarm, with the scale of the landscape;
 - to develop a layout that relates well to other windfarms in the local area, as well as being coherent in its own right; and
 - to develop a layout that fulfils the above objectives whilst respecting other environmental and technical constraints including ecological, hydrological and ground conditions (including peat) related constraints identified during the EIA process.

Scope of the Strategy

- 3.23 The design strategy sets out the overall aspiration underpinning the design of the Development. It describes the design starting point, as well as subsequent alterations to layout that were made in response to landscape and visual, hydrological, archaeological, ecological, ornithological, wind yield, ground conditions and other technical considerations, as information emerged through the EIA process.
- 3.24 During the development and evaluation of the layout design iterations, computer modelling was used as a tool to aid design. This included Zone of Theoretical Visibility (ZTV) models were generated and used as a proxy for potential visual effects whilst wireframes were generated to illustrate views from key locations around the Development Area, and used to consider the design iterations including the 'composition of turbines' in views from the surrounding area.
- 3.25 The main components of the Development considered in the design iterations were the turbines. Infrastructure features such as on site access tracks, hardstanding areas and borrow pits, being less visible beyond approximately 2-5km and limited to locations where elevated views across the Development Area are possible. These were designed to meet civil engineering requirements taking account of onsite environmental constraints, whilst seeking to avoid/minimise visibility from the surrounding areas. Given the extent of the existing infrastructure currently used for farming and forestry within the Development Area, including access tracks and borrow pits, part of the design strategy was to make best use of these where practicable to reduce the footprint of new infrastructure. Further iterations to the turbine layout, following detailed engineering review involved minor alterations to turbine and infrastructure locations, which were reviewed against all constraints.

Design Principles

- 3.26 Based on a review of the Development Area and its landscape context and scoping consultation responses, as well as advice contained in good practice guidance, including SNH's *Siting and Designing Wind Farms in the Landscape*, the following design principles were adopted and considered throughout the design process.

General Design Principles

- Avoid dense clusters of overlapping turbines. Arrange turbines as far as possible to form an evenly spaced group or array when seen from key viewpoints.
- Place turbines so as to mimic the profile of ridgelines when these are perceived as skylines from the surrounding area. Avoid outlying turbines or stray tips which stand apart from the rest.
- Select an appropriate wind turbine, or turbines (tower height and blade diameter) for the Development Area, which will generally appear to relate to the scale with the landscape.
- Remove, relocate or amend the turbine tower height of turbines which appear more elevated than the majority in key views, and those which appear as outliers, and thus, disproportionately, extend the horizontal spread of the Development.

Site Specific Design Principles

- 3.27 Following the identification of constraints and key issues identified through the EIA process and consultation, site specific design principles were identified and applied as part of the iterative design process. These included:
- To avoid on-site constraints, including hydrology, ecology, ornithology, archaeology, topography and other technical constraints.
 - To consider the underlying topography of the Development Area and elevated plateaux of the Southern Uplands.
 - Ensure turbines are located on ridges avoiding the steep sloping valleys which dissect the uplands.
 - To improve the appearance of the Development when seen from the wider area, but in particular from the following locations:
 - Crawick Multiverse;
 - Wanlockhead;
 - the B740;
 - Sanquhar and Nithsdale; and
 - Menzies Pass.
 - To increase set-back from B740 valley to avoid the potential for visual dominance of turbines from the road and properties along it.
 - To minimise visibility from Wanlockhead (all viewpoints, but particularly focussing on the museum viewpoint – VP03, which is considered to be at the centre of the village).
 - To increase the setback from the Southern Upland Way (SUW) to at least 150m.
 - To consider the wider cumulative scenario and reduce the overall visibility of the Development with other schemes from key viewpoints.

Site Constraints

- 3.28 The final layout as presented in **Chapter 4** takes into account the design aspirations outlined above. A number of technical and environmental constraints have been considered in the iterative design process including:
- ornithology (breeding sites and flight activity);
 - distance to watercourses;
 - presence of recreational routes (including the SUW);
 - proximity to residential properties (in relation to noise and residential visual amenity);
 - geological conditions (including peat and areas of previous mining activity);
 - topography (including slope angles and potential for land instability);
 - telecommunication infrastructure;

- archaeology.

Infrastructure

- 3.29 The infrastructure required was designed and arranged in such a way as to avoid the identified onsite constraints. The majority of the infrastructure layout was designed following the turbine layout design, however some minor iterations to turbine locations were necessary to facilitate the optimum onsite infrastructure requirements. Access track routes in particular have been designed to minimise water crossings and to avoid constrained areas within the Development Area, including steep slopes and followed a design rationale to re-use existing tracks where possible, whilst avoiding using (and minimising crossings of the SUW).

Turbine Design

Scale

- 3.30 It is recognised by the Scottish Government that there is a pressing need to produce considerably more energy from renewable sources. As such, there is therefore a need to plan for considerably larger scale wind energy development, as well as other forms of renewable energy. With the need to 'think big', comes the need to think where development of such a scale could be accommodated. Given that the scale of the hills on the Development site is large, and the DGWLCs concludes that landscape characteristics potentially indicate capacity for large turbine typologies, it is considered that the Development Area has the ability to accommodate a large typology development, with a large number of large turbines, which could make a significant contribution to renewable energy needs.

Turbine Colour

- 3.31 The Scottish Natural Heritage (SNH) guidance paper, *Siting and Designing Windfarms in the Landscape (2009)*, states that "As a general rule for most rural areas of Scotland, a single colour of turbine is generally preferable ... a light grey colour generally achieves the best balance between minimising visibility and visual impacts when seen against the sky ... paint reflection should be minimised ... for multiple windfarm groups or windfarm extensions, the colour of turbines should generally be consistent". The turbines proposed for the development are to be a non-reflective pale grey colour, to be consistent with other existing and proposed windfarms.

Forestry Design

- 3.32 Forestry was considered throughout the development design process to seek to minimise loss of woodland and maximise opportunities to improve the woodland mix across the Development Area i.e. increase the percentage of native species. Informed by feedback from Forestry Commission Scotland (FCS) and other consultees at Scoping, the 42 turbine scoping layout was revised and a site meeting was held with FCS in December 2016 to discuss and agree the forestry related design considerations for the 35-turbine proposal. These are summarised below:
- locating turbines in areas where the potential for woodland removal is minimised based on the existing Forest Plan e.g. areas of open ground/close to upper tree lines;
 - locating near to existing forest roads and rides to reduce crop loss to infrastructure;
 - key-holing turbines into crops where there would be least requirement for wind resource felling based on the current forestry felling phases (in young crops or in compartments due to be felled imminently);
 - reducing key-hole requirements to accommodate turbines and associated bat protection zones;
 - accounting for topography to minimise crop keyhole requirements;
 - retention of woodland canopies in close proximity to turbines.

3.33 In tandem with this approach, a detailed, iterative process was undertaken between the forestry consultants and wind resource engineers, to model the scale and timing of wind resource and tree canopy interactions with changing canopy heights across the woodlands at five year intervals over the 25-year lifespan of the turbines. This process sought to optimise wind resource while minimising effects on forestry. The resulting woodland felling and replanting proposals (as detailed in **Chapter 4**) were developed in line with discussions with FCS, as they balance a range of factors, including consultee feedback, tree heights and age structure over time, as well as landscape and topography at individual turbine locations, while minimising effects on felling and replanting plans in the approved Forest Plan and ultimately limiting the requirement for woodland removal.

Modifications to Scheme Design

- 3.34 On this basis and as described above, an initial 140 turbine design, based purely on technical and operational efficiency criteria i.e. wind yield, was developed by 2020 Renewables.. The initial 140 turbine layout represented the 'maximum development scenario' with a potential installed capacity of over 400MW. The scale of the Development Area encompassed a number of landowners and straddled the boundary between Dumfries and Galloway and South Lanarkshire Councils, whilst also incorporating a large part of the Muirkirk and North Lowther Uplands SPA, currently in un-favourable conservation status, with associated opportunities for habitat enhancement.
- 3.35 However, at an early stage in the design process, informed by initial ornithological advice and preliminary discussions with consultees, the scale of the development was reduced, comprising removal of turbines from the SPA and from the land to the north and east of Leadhills.
- 3.36 Subsequently, as a consequence of the EIA process, there have been a further fifteen rounds of modifications to the design, to avoid or minimise environmental effects without compromising the overall design strategy. These modifications have been made as a result of the findings of the baseline survey work and consultation undertaken with consultees and the public. The modifications have been made to:
- reduce prominence from closest settlements and residential properties, to avoid/minimise effects on residential visual amenity;
 - ensure the development complies with ETSU-R-97 noise limits (including cumulatively);
 - minimise effects on ornithology and ecology;
 - avoid known archaeological features;
 - avoid historic mining areas;
 - to minimise loss of woodland;
 - avoid areas known to have instability risks;
 - avoid areas of relatively deeper peat;
 - minimise the number of onsite watercourse crossings and proximity to watercourses;
 - reflect a minimum 150m distance to the SUW (equivalent to tip height based on the Scoping layout).
- 3.37 During the design and modification process, consideration was given to a revision to the design rationale with regards to number and tip height of turbines. A layout of 17 turbines with a 135m hub height and 198m tip height was developed to test a development with a fewer turbines of a greater capacity. This 17 turbine layout avoided visibility from Crawick, avoided most visibility from Wanlockhead and avoided all visibility from the Mennock Pass. However, the increased size of the wind turbines required presented significant challenges in delivering the turbines to the Development Area. Although some 'multi-part' turbine blades are available this is not a common design for wind turbines. Turbines of this height also represented a substantial increase in scale from those already under consideration and would be among the tallest onshore turbines proposed in Scotland. Whilst the landscape of the Development Area has features that lend themselves to accommodating large scale wind turbines, NLEI Ltd considered that this represented too great a step change in the design. Combined with the technical issues posed by the taller turbines and longer blades, turbines of this scale were not progressed further and efforts were focussed on the turbines around 150m to tip.
- 3.38 A summary of the modifications to the design of the Development is provided in **Table 3.1** below and these are illustrated in **Figure 3.1**. These modifications have included the relocation and reduction in the

number of turbines, amendments to the proposed turbine dimensions and the siting and relocation of access tracks and associated infrastructure.

Table 3.1: Modifications to the Development Design

Layout Number	Layout Details	Purpose of Modification
Layout 1 (Preliminary turbine layout)	140 turbines Hub 80m Rotor 100m Tip 130m	Initial design maximising potential wind yield of site with an installed capacity exceeding 400 MW. Turbines located within a number of landownerships straddling the boundary of Dumfries and Galloway and South Lanarkshire Council areas. Included turbines located within the Muirkirk and North Lowther Uplands Special Protection Area (SPA), and included potential for habitat enhancement within the SPA.
Layout 2	53 turbines Hub 100m Rotor 120m Tip 160m	Reduction in turbines from 140 to 53 and increase in turbine height from 130m tip to 160m to maximise wind yield. Turbines removed from the SPA following initial ornithological advice and preliminary discussions with consultees. Turbines removed from land to the north, east and south of Leadhills to avoid visibility from properties in Leadhills village. Landscape led design reflecting predominantly the ridges within the Development Area and taking account of steep slopes. Purpose was to maximise yield and turbine size whilst reflecting the topography of the Development Area. Initial infrastructure (track) design taking account of technical requirements only.
Layout 3 (Layout for public exhibition on 30 th September 2015 and Scoping)	42 turbines Hub 90m Rotor 120m Tip 150m	Reduction in turbines from 53 to 42 and reduction in height to 150m tip to: <ul style="list-style-type: none"> - take into account breeding bird survey results including hen harrier flight activity; - avoid slopes of more than 12 degrees. - reduce levels of predicted operational noise at closest residential properties; - improve balance of layout in views from key viewpoints including SUW, Wanlockhead and Leadhills.
Layout 4	40 turbines Hub 90m Rotor 120m Tip 150m	Reduction in turbines from 42 to 40 and relocation of turbines to: <ul style="list-style-type: none"> - maintain at least 500m from hen harrier nest and black grouse lek and avoid areas with relatively high hen harrier flight patterns; - ensure lower noise limits can be met for predicted operational noise and minimise potential residential visibility effects experienced at properties west of the Development Area near Nether Cog and Spoth; - reduce visibility from properties and those travelling on the B740 and maintain layout design from viewpoints to the west; - increase separation distance to BT telecommunication link traversing the Development Area.

Layout Number	Layout Details	Purpose of Modification
Layout 5	35 turbines Hub 90m Rotor 120m Tip 150m	Reduction in turbines from 40 to 35 and relocation of turbines to: <ul style="list-style-type: none"> - reduce visibility from B740 corridor and minimise potential visual effects in viewpoints to the west; - maintain appropriate turbine separation distances; - increase distance from onsite archaeological assets; - increase set-back from Nithsdale and reduce visibility from Crawick Multiverse (VP10) and Wanlockhead Museum (VP03); - increase distance to black grouse leks and hen harrier, goshawk and short-eared owl nests.
Layout 6 (presented at public exhibitions on 28 th /29 th September 2016)	35 turbines Hub 90m Rotor 120m Tip 150m	Relocation of turbines to: <ul style="list-style-type: none"> - avoid encroaching within 50m of watercourses; - avoid SUW by at least 150m; - reduce overall visibility from Wanlockhead; - avoid steeper slopes; - reduce visibility and noise levels at nearest residential receptors; - minimise loss of blanket mire habitat; - increase distance to merlin and hen harrier nests; - maximise distance to onsite archaeological constraints; - increase distance from JRC telecommunications link; - maintain appropriate separation distances. - avoid areas with evidence of historical mining. Modification to initial infrastructure design: <ul style="list-style-type: none"> - removal of Access Point C near Wanlockhead to avoid steep slopes, traffic utilising the B797 through Leadhills and Wanlockhead and avoid historical mining areas, and identification of alternative internal access track between turbines 14 and 19; - removal of borrow pits to avoid proximity to nesting birds and visibility from key viewpoints; - removal of track following SUW and linking T17 with T22 to reduce visibility from SUW; - removal of alternative access track between T8 and T18 to reduce visibility from SUW; - realignment of access tracks to avoid onsite archaeological constraints; - movement of tracks to avoid steep slopes and areas of deeper peat.
Layout 7 (final layout as shown in Figure 4.1)	35 turbines Hub 89m Rotor 120m Tip 149m	Relocation of turbines to: <ul style="list-style-type: none"> - avoid areas of slope instability and lower factor of safety (FoS); - maintain balance of design; - reduce visibility from Mennock Pass; - reduce visibility from B7040 Hass (VP5); - reduction in tip height to avoid CAA requirement for lighting. Modifications to infrastructure design to: <ul style="list-style-type: none"> - refine borrow pit search areas from nine to five to locate within forestry and use previous quarry sites and minimise visibility (including from the SUW) where feasible;

Layout Number	Layout Details	Purpose of Modification
		<ul style="list-style-type: none"> - movement of construction compound from Stood Hill closer to turbines 10-14 to reduce visibility from Lowther Hill and potentially Wanlockhead and increase distance to hen harrier nest; - movement of construction compound south of turbine 4 south-west towards T3 to reduce visibility from Cogshead and the SUW and avoid deeper peat; - realignment of tracks to avoid steep slopes and watercourses.

Scheme Design Conclusion

- 3.39 The application layout is based on the design strategy described above. In particular, the strategy seeks to create a design that reads coherently with the landscape, taking account of cumulative issues and other technical constraints, whilst meeting the aims of the development and National Policy.
- 3.40 The design strategy has considered the characteristics of the Development Area, in particular its topography, scale, land use, how the area is seen from the surrounding area, and the national and local policy context. The design also considered a wide range of onsite constraints, including ecology, archaeology, and engineering aspects, that influenced the development of the design layout.
- 3.41 The scale of the landform across the Development Area is generally large-scale, with broad, high hill ridges, and is of a scale that can accommodate large wind turbines following the elevated ridgelines. The Development Area has a good wind resource and has good access, including access to existing grid infrastructure. The layout has a cohesive design that is legible in views from the surrounding area, with turbines responding to the landform in scale and placement on the ridges.
- 3.42 The Development underwent a number of design iterations in response to onsite environmental constraints, consultee responses and economic and yield considerations to arrive at the proposed layout. The design of the Development has struck a balance which responds to its location and whilst there will be significant effects on landscape and visual amenity, these are to a certain extent inevitable with all commercial scale developments.

ⁱ Scottish Government, (2014), 'Scottish Planning Policy', Available [online] at: <http://www.scotland.gov.uk/Resource/0045/00453827.pdf>

ⁱⁱ Carbon and Peatland 2016 map <http://www.snh.gov.uk/planning-and-development/advice-for-planners-and-developers/soils-and-development/cpp/>

ⁱⁱⁱ Department for Business, Energy & Industrial Strategy (2017). National Statistics Energy Trends: Renewables. Renewable electricity capacity and generation (ET 6.1). Available [online] at <https://www.gov.uk/government/statistics/energy-trends-section-6-renewables>. Accessed 27/04/2017. 27% is the average load (capacity) factor for wind energy in Scotland for the years 2012-2016

^{iv} Scottish Natural Heritage. (2014). Siting and Designing Windfarms in the Landscape (Version 2)

^v Scottish Government, (2003). Planning Advice Note 68: Design Statements