

CONTENTS

INTRODUCTION	1
SITE SELECTION AND CONSIDERATION OF ALTERNATIVES.....	1
SITE LOCATION AND DESCRIPTION	1
SURROUNDING AREA	2
DESIGN CONCEPT AND APPROACH	3
CONSTRAINTS IDENTIFICATION AND MAPPING	3
Landscape and Visual	4
Ecology.....	4
Ornithology.....	4
Hydrology	4
Geology and Peat	5
Noise	5
Cultural Heritage	5
Forestry.....	5
Technical.....	5
DESIGN EVOLUTION	5
Design Evolution Process	5
Turbine Size	7
Access Point.....	8
Borrow Pits	8
Other Ancillary Infrastructure	9
Forestry.....	9
General Measures	9
CONCLUSION	9
REFERENCES	9

FIGURES

Figure 2.1 Site Designations

SITE DESCRIPTION AND DESIGN EVOLUTION 2

Figure 2.2 Initial Site Boundary and Optimised Viewpoints

Figure 2.3 Design Development

Figure 2.4a-y Optimisation Wirelines

INTRODUCTION

- 2.1 This Chapter outlines the process undertaken in selecting the Site as a potential location for a wind farm, provides a description of the Site and surrounding area, and discusses the design evolution process.
- 2.2 The principles of the EIA process state that Site selection and project design should be an iterative constraint-led process, and this procedure has been followed. This has ensured that any potential impacts have been avoided or minimised as far as possible.
- 2.3 This Chapter draws on issues considered in more detail in the relevant technical Chapters (Chapters 7 to 17). This Chapter does not pre-empt the conclusions of the later Chapters, but rather explains how potential environmental effects have informed the wind farm design.
- 2.4 The final design is described in Chapter 3: Description of the Development and is shown on Figure 3.1.

SITE SELECTION AND CONSIDERATION OF ALTERNATIVES

- 2.5 A number of factors were considered when selecting this Site for wind farm development, including:
- high wind speeds;
 - potential to connect to the electricity transmission grid nearby;
 - potential to use existing wind farm infrastructure to serve the proposed development;
 - potential to deliver turbines to the Site without significant road upgrading;
 - sufficient scope to locate the development outwith national and international statutory designations for landscape and nature conservation, including:
 - Ramsar Sites;
 - Special Protection Areas (SPA);
 - Special Areas of Conservation (SAC);
 - Sites of Special Scientific Interest (SSSI);
 - National Nature Reserves (NNR);
 - National Scenic Areas (NSA); and
 - appropriate distance from residential receptors.

SITE LOCATION AND DESCRIPTION

- 2.6 The Site and main turbine area is centred on grid reference NGR 344000,833000.
- 2.7 The Site is located within Clashindarroch Forest, approximately 6km to the south west of the settlement of Huntly, Aberdeenshire and 55km north west of Aberdeen. Nearby settlements include Rhynie, Haugh of Glass and Cabrach. The entire Site is located within the Aberdeenshire

Council (AC) administrative boundary and is owned by Forestry and Land Scotland (FLS).

- 2.8 The area of the Site extends to approximately 1,234ha, with the proposed wind turbines located in the southern part of the Site. Access to the Site is provided from the A920 and would utilise as far as possible the existing onsite access tracks.
- 2.9 The Site lies within an upland landscape which is characterised by a series of rounded hills and interlocking spurs separated by incised river valleys. Topography ranges from approximately 220m Above Ordnance Datum (AOD) to 525m AOD. The western side of the Site forms the most elevated part and is defined by a series of rounded hills which form a distinctive ridgeline, comprising forestry to the east and moorland/farmland to the west. Notable hills along this ridgeline include Red Hill (522m AOD), Grumack Hill (517m AOD), Black Hill (505m AOD), Mount of Haddoch (521m AOD), and Lelds Hill (482m AOD). To the east of this ridgeline, the Site is characterised by a series of rounded hills with interlocking spurs and incised valleys descending towards the River Bogie.
- 2.10 The Site is predominately covered by commercial forestry but has some areas of open moorland and ancient woodland. The forestry is of varying ages and would be felled and restocked at the appropriate time as set out in the current Forest Design Plans (FDP).
- 2.11 There are no statutory ecological designations, no international or national landscape designations and no scheduled archaeological or cultural heritage designations within the Site.

SURROUNDING AREA

- 2.12 The surrounding area is generally rural in nature, with significant areas of commercial forestry to the east of the Site. The River Deveron is also located to the east of the Site.
- 2.13 Nearby statutory ecological and ornithological designations, as shown on Figure 2.1, include:
- Craigs of Succoth Site of Special Scientific Interest;
 - Moss of Kirkhill SSSI;
 - Rhynie Chert SSSI;
 - Hill of Towanreef SSSI and SAC; and
 - The Tips of Corsemaul and Tom Mor SSSI and SPA.
- 2.14 Nearby landscape designations include:
- Deveron Valley Special Landscape Area (SLA) (0km north);
 - Upper Don Valley SLA (approx. 12km south);
 - Bennachie SLA (approx. 13km south east); and
 - Moray Area of Great Landscape Value (AGLV) (0km west).
- 2.15 The Cairngorms National Park (CNP) (including Wild Land and National Scenic Area designations) is located to the south west of the Site (refer to Figure 7.3a for the locations of the landscape designations within the study area).

2.16 Wormy Hillock is the closest designated archaeological asset to the Site and is shown on Figure 2.1.

DESIGN CONCEPT AND APPROACH

2.17 The Applicant's involvement with the Site over the past 10 years, together with the EIA process associated with the Clashindarroch application, has enabled identification of the key constraints and sensitivities of the Site. A review of these previous proposals, together with related planning and consultation responses, has fed into the design considerations for this application. For example, the positioning of turbines along the ridgeline on the east side of the Deveron Valley was judged unacceptable because of the potential for significant landscape and visual effects on the Valley. The relationship of the proposals to the key summit of Tap O' Noth was also cited as another key landscape, visual and cultural heritage consideration.

2.18 The main landscape and visual design considerations that were identified comprised the following:

- selection of a turbine height which could be accommodated by the scale of the landform across the Site and which would be reasonably consistent with the Clashindarroch turbines;
- achievement of a layout which satisfactorily relates to the varied landform across the Site and the Clashindarroch turbines, when seen from multiple directions and elevations around the Site and taking account of the location of key sensitive receptors such as Tap O' Noth and the western ridgeline;
- consideration of the cumulative landscape and visual impacts induced by a wind farm on the Site in addition to the Clashindarroch Wind Farm, as well as other nearby consented wind farms; and
- potential visibility from the closest residential receptors, particularly the Tillathrowie area to the north east and the Deveron Valley to the west.

2.19 The key design objectives for the development of the proposed development, which were agreed with the Applicant following meetings, with consultees, including SNH, Historic Environment Scotland and Aberdeenshire Council, were as follows:

- avoid the ridgeline and upper slopes at the western side of the Site;
- limit proximity to closest residential receptors;
- limit impacts on priority peatland and carbon areas;
- respect other environmental constraints;
- create a scheme which maximises the potential of the Site to generate and store renewable energy; and
- use of the existing infrastructure (tracks and borrow pits on the Site) as far as practicably possible.

CONSTRAINTS IDENTIFICATION AND MAPPING

2.20 The ecological, landscape and cultural heritage designations within and around the Site were identified as the first part of the constraints mapping process; these are shown in Figure 2.1.

- 2.21 Prior to commencement of the design process, a constraints mapping exercise was undertaken whereby baseline data was mapped across the Site. The information which was considered included all the known environmental and technical constraints. The location of a constraint does not necessarily result in the exclusion of that area from the development envelope; rather it means that careful thought and attention should be paid to the constraint and the design altered appropriately.
- 2.22 The identification of constraints continued throughout the design evolution process as more detailed surveys refined the development envelope.
- 2.23 The following text provides information on what was included in the constraints mapping process. Information in respect of the survey work undertaken is provided in the technical Chapters of the EIA Report. The constraints mapping process was undertaken using the Scoping redline Site boundary, as shown in Figure 2.2.

Landscape and Visual

- 2.24 A number of landscape and visual considerations were included during the constraints mapping, comprising:
- avoidance of the western ridgeline to limit visibility from the Deveron Valley;
 - consideration of the relationship to Tap O' Noth which lies 5km to the south east of the Site;
 - relationship to the western ridgeline as a backcloth to the turbines; and
 - proximity to and potential views from residential properties.
- 2.25 Additionally, as noted in respect of the agreed design objectives, a key aim was to consider at all times the relationship of the proposed development with the Clashindarroch turbines.

Ecology

- 2.26 Information from the National Vegetation Classification (NVC) surveys was used to identify plant communities of national importance. This classification helped to inform areas that may be hydrologically fed by groundwater, i.e. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). Potential GWDTEs were identified on the resultant constraints mapping.
- 2.27 The location of species identified during survey works were included on the constraints mapping, this included bats (Ref. 2.1), pine marten, wild cat, badger and otters.

Ornithology

- 2.28 Territories for protected ornithological species were identified and included in the constraints mapping exercise, and this included buffers on nests where appropriate.

Hydrology

- 2.29 A buffer of 50m was applied around watercourses on the Site. This buffer was used to ensure that turbines and infrastructure, other than tracks, were not located in close proximity to hydrological features in accordance with wind farm construction best practice guidelines. This reduces the risk

of runoff and water pollution into existing watercourses.

- 2.30 Private water supplies, Scottish Water's Drinking Water Protected Areas, and licensed water abstractions were also marked on the constraints mapping.

Geology and Peat

- 2.31 Following survey work, information in respect of peat depth was also obtained for the Site. Areas of peat depth greater than 0.5m were included in the constraints mapping. The areas of priority peatland were also identified and included in the constraints mapping.

Noise

- 2.32 For the purposes of constraint mapping, a buffer of 1km was applied to properties in the vicinity of the Site. Noise modelling was undertaken on several of the layouts to understand the potential for noise at nearby properties.

Cultural Heritage

- 2.33 Known archaeological features, including Scheduled Monuments (SMs) and those recorded by Canmore, were included on the constraints map to avoid and minimise any potential direct effects.

Forestry

- 2.34 The Site comprises areas of existing commercial forestry, and some felling of forestry stands via key-holing would be inevitable in order to accommodate the wind turbines. Consequently, although forestry was not considered a 'hard' constraint, the existing Forest Design Plans (FDP) were a consideration during constraints mapping and the design of the wind farm. Technical Appendix 3.2 contains Figures which show the existing forest felling and restocking plans for the Site.

Technical

- 2.35 Slopes greater than 8 degrees are not generally considered to be suitable for the erection and operation of wind turbines; such areas were therefore identified on the constraints map.

DESIGN EVOLUTION

- 2.36 The constraints map was used to inform the evolution of the turbines and associated infrastructure. The way in which the design of the proposed wind turbine layout developed to take account of the identified constraints is described in the following text.

Design Evolution Process

- 2.37 The design optimisation process was iterative, involving review of multiple layouts and related wirelines from key landscape and visual receptor locations in the study area, with adjustments made to turbine locations to minimise potentially adverse landscape and visual impacts in so far as possible, whilst also taking into consideration the other environmental, technical and economic considerations that had been agreed with the Applicant. Figure 2.2 shows the key design viewpoints

used to inform the design optimisation process.

- 2.38 A range of turbine dimensions were considered and discussed as part of the design evolution process. Site visits with wirelines illustrating the various turbine dimensions were undertaken by the landscape team. SLR provided advice and recommendations to the Applicant based on this work. This is reflected in the following text where the various layout iterations are described.
- 2.39 Five key stages in the design evolution, spanning from the Initial Scoping Layout through to the Final EIA Report Layout, are described in the following paragraphs with each of these layouts being presented on Figure 2.3. Wirelines for each of these stages from key viewpoints in the surrounding area are shown on Figures 2.4a-2.4y.

Layout A Scoping

- 2.40 Layout A (Scoping) consisted of 16 turbines at 149.9m to blade tip height. The turbines were positioned directly to the north east of Clashindarroch Wind Farm, appearing as a cluster of ten turbines in the south and two lines of three turbines to the north east. Turbine 1 (T1) was the furthest north and located on the lower slopes of Muckle Black Hill (522m AOD). T2 and T6 were located to the south east of T1 on the top of Carlin Hill (384m AOD) and Little Black Hill (373m AOD) respectively and formed the northern line with T1. The second line of turbines included T3, T12 and T9. T3 was located on the lower slopes of Red Hill (526m AOD) and T12 and T9 sat either side of the top of Craigie Beg (approx. 350m AOD). The main group of turbines in the south covered the tops and lower slopes of Raven Hill (421m AOD), Hill of Finglenny (approx. 400m AOD), lower slopes of Grumack Hill (517m AOD) and near Shank Beditimmer (approx. 370m AOD).
- 2.41 On review of the design viewpoints for Layout A, the turbines in the north east (T1, T6 and T2) appeared to sit separately from the rest of the wind farm and appeared most prominent in views from the north east where visibility is potentially greatest (see Figure 2.4p-u). The blade tips of T5 and T11 appeared just above the ridgeline in views from the west side of the Deveron Valley. In addition, noise, shadow flicker and proximity to the Corrylair property in the north east were also a concern in respect of T2 and T6.

Layout B Design Feasibility Meeting

- 2.42 Layout A was reviewed at a design team meeting, taking into consideration the separation and prominence of the northern turbines and their proximity to Corrylair, and the positioning of turbines near the ridgeline. As a result, T1, T2 and T6 were moved south west and T1 and T5 moved south east. T4 was also moved to reduce potential visibility from the Deveron Valley. An additional turbine (T17) was also positioned within a gap in the main cluster of turbines.
- 2.43 On review of Layout B, it was found that T5 and T11 were still marginally visible from the Deveron Valley, and T1, T2 and T6 were still prominent and sitting apart from rest of group, although this had improved from Layout A. Noise, shadow flicker and proximity to Corrylair was still a potential issue. The addition of T17 also increased the density of spacing in the southern cluster which contrasted with the more open layout of turbines in the north.

Layout C Public Exhibition

- 2.44 Several iterations of the design were made following the design team meeting, and considered the northern turbines, the balance of the wind farm layout as a whole, and its relationship with

Clashindarroch Wind Farm. The layout (Layout C) that was presented at the Public Exhibitions held in June 2016 returned to 16 turbines, with the three northern turbines (T1, T2, and T6) removed and replaced by two new turbines (T18) and (T19) positioned on the lower slopes of Little Black Hill (373m AOD) and Carlin Hill (384m AOD). This resulted in a more balanced and evenly spaced layout, reduced the prominence of turbines in views from the closest residents to the north east, and removed any shadow flicker or noise concerns. Turbines 11, 5 and 3 were also repositioned further down the slope to further minimise any visibility from the Deveron Valley.

- 2.45 On further review of Layout C, and taking into account feedback from the public exhibitions, it was noted that while T18 and T19 improve the balance of the layout over the original northern turbine locations, they still noticeably increased the horizontal extent in views from the south east and north west, particularly in relation to the Tap O' Noth (see Figure 2.4j-l). In addition, these northern turbines appeared to be more backclothed by the Deveron Valley ridgeline than the southern part of the wind farm, and they could be perceived to dominate and/or compete with the scale and character of the landscape. T18 and T19 also caused more notable stacking of turbines in some views, particularly from the north east.

Layout D June 2017 Layout

- 2.46 The design aimed to address the observations made during the review of Layout C and reduced the proposed wind farm to 13 turbines. T17, T18 and T19 from Layout C were removed. This improved the containment of the wind farm group to a similar horizontal extent as the Clashindarroch Wind Farm. The removal of the northern turbines reduced the number of turbines directly backclothed against the ridgeline, and reduced the potential for the intrusion upon, or reduction of distinction of the Tap O' Noth when seen from some viewpoints. The layout also increased the distance of the turbines from residential properties in the north east to approximately 2km at closest, and reduced the prominence of the turbines in views from this direction.

Layout E Final Design Layout 2019

- 2.47 In October 2017, the Applicant took the opportunity to review and consider the project, including its economic viability. A number of layouts and tip heights were considered. This review work was undertaken throughout 2018. Further consultation was undertaken in September 2018. This work resulted in a layout of 14 turbines with a tip height of 180m. The impact of larger turbines was carefully considered and as a result of the analysis undertaken it was considered appropriate to seek consent for larger turbines in order to maximise the potential of the Site. Work was undertaken to ensure that it was possible to deliver the larger turbines to the Site. This resulted in the final layout being confirmed in June 2019.

Turbine Size

- 2.48 As indicated in paragraph 2.38, a range of turbine dimensions were considered and discussed as part of the design evolution process. Against the context of much reduced financial support for onshore wind, the main consideration in deciding the turbine tip height, in addition to environmental impacts, was the uncertainty in terms of a future Contracts for Difference (CfD) auction or another route to the electricity market.
- 2.49 In recent years, the onshore wind industry has experienced the reduction in supply of smaller turbines across Europe due to lack of demand from mainland Europe, where the tendency is to install turbines at higher tip heights (e.g. 175-240m to blade tip). Feedback from turbine

manufacturers confirmed that the supply of smaller turbines is also likely to continue to reduce due to lack of demand from mainland Europe. Therefore, it is highly unlikely that a range of smaller turbines (e.g. 120m) would be available at competitive prices by the time the proposed development is ready to be constructed, if consented. Larger turbines need to be considered if onshore wind development is to continue to make a contribution to both the UK and Scottish Government's renewable energy targets.

- 2.50 The Site experiences particularly high, average wind speeds and so in proposing turbines with tip heights of up to 180m, the Applicant would be able to fully utilise these high wind speeds effectively. It is anticipated that the proposed development would produce 2.5 times as much power as Clashindarroch Wind Farm.
- 2.51 The higher energy capture estimated for the proposed development is the result of the overall positive impact of accommodating much larger rated capacity machines (4MW+) and also the larger rotor diameter (swept area) available at a higher hub height. The resultant improvement in the economics and commerciality of the scheme would enable the Applicant to reduce the cost of energy from the development, giving a positive benefit to consumers in terms of electricity cost.
- 2.52 Turbines with a maximum height of 180m to blade tip have been selected due to the increased yield that can be achieved from taller turbines and also the environmental benefits intrinsic to larger turbines. Using taller turbines means that the overall number of turbines required on a per MW basis is reduced, which in turn reduces the scale of the associated infrastructure required. With larger turbines, the amount of concrete per MW produced is lower than a scheme with smaller turbines, and similarly the length of new access track (km) required per MW produced is also generally less. Fewer but taller turbines also reduces the felling required by increasing the rotor clearance above the tree canopy which reduces the impacts upon existing forestry operations. Broadleaf planting in some areas would be brought forward in terms of the felling plan and thus the associated benefits would be realised sooner. Overall, larger turbines of this scale would help to deliver new onshore wind capacity required to help the Scottish Government meet its climate goals and provide low-carbon power that assists in the reduction of consumer bills.

Access Point

- 2.53 It is proposed to use the existing access point to the Site on the A920 near Craighead and then utilisation of existing forestry tracks where ever practicable.

Borrow Pits

- 2.54 Careful consideration was given to the potential of the Site to accommodate borrow pits as part of the proposed development. Following a site visit, it was considered viable to extend one of the existing onsite borrow pits to source aggregate for the construction of the proposed development. The existing borrow pit had been able to provide around 80% of the construction material for the Clashindarroch Wind Farm. Sourcing stone from the Site would enable a large reduction in transport movements and to some extent the borrow pit can also be visually shielded by existing trees and vegetation. Two additional borrow pit search areas were also identified, to provide an alternative source of stone should it be required.

Other Ancillary Infrastructure

- 2.55 Careful consideration was given throughout the design iteration process to the location of the various ancillary components of the proposed wind farm, including the control building, substation, access tracks and cable routeing. The design throughout the evolution process sought to minimise development within the priority peatland areas and to limit the length of track through these areas of peat or podzol.
- 2.56 The design sought to maximise the use of the existing wind farm and forestry tracks as part of the proposed development.
- 2.57 The proposed substation has been located alongside the existing onsite substation in an appropriate and level location, to ensure that these new buildings and infrastructure are concentrated in a single area and not visually dispersed across the forest. The finish of the buildings would be in keeping with the existing structures or as agreed with Aberdeenshire Council.

Forestry

- 2.58 The design evolution has sought to minimise the requirement for permanent loss of productive forestry. The design has sought to use existing tracks and forest rides to minimise the loss of forestry within the Site. In total, approximately 87 hectares of commercial forestry would be permanently lost.

General Measures

- 2.59 A number of standard mitigation measures and environmental measures have also been incorporated into the design of the wind farm, for instance, it is proposed that the turbines are rendered with a semi-matt grey finish which tends to reduce the distance over which the turbines are visible, especially in dull or overcast conditions. The exact finish of the turbines would be agreed with Aberdeenshire Council prior to construction of the proposed development. These embedded mitigation measures and environmental measures are discussed in Chapter 3: Description of the Development.

CONCLUSION

- 2.60 The final layout of the proposed development is described in detail in Chapter 3 and shown on Figure 3.1.
- 2.61 In line with established guidance, the EIA process has been an iterative one, so that environmental, technical or visual constraints identified throughout the EIA and design process could be avoided and so that the potential impacts of the proposed development could be avoided or reduced.
- 2.62 The assessment of potential impacts of the resulting layout is addressed in Chapters 7 to 17 of the EIA Report.

REFERENCES

- Ref. 2.1: Hundt (2012). Bat Surveys: Good Practice Guidelines, 2nd Edition. Bat Conservation Trust.

SITE DESCRIPTION AND DESIGN EVOLUTION 2
