

Quantans Hill Wind Farm

Volume 4

NTS

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power

Document history

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1. Introduction

An application has been made by Vattenfall Wind Power Ltd to Scottish Ministers under Section 36 of the Electricity Act 1989 and deemed planning under section 57(2) of the Town and Country Planning Act 1997 for consent to construct and operate Quantans Hill Wind Farm (the Proposed Development). This Non-Technical Summary (NTS) has been produced in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended), (hereafter referred to as the EIA Regulations). It accompanies an Environmental Impact Assessment Report (EIAR) which presents the results of the Environmental Impact Assessment (EIA) undertaken to establish the potential effects that the Proposed Development may create. As per Regulation 5(2)(e) of the EIA Regulations, this NTS provides a non-technical summary of the following:

- (a) a description of the development comprising information on the site, design, size and other relevant features of the development;*
- (b) a description of the likely significant effects of the development on the environment;*
- (c) a description of the features of the development and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
- (d) 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.*

1.1. The Applicant

Vattenfall AB, the ultimate owner of Vattenfall Wind Power Ltd, is a leading European energy company with approximately 20,000 employees, owned by the Swedish state. For more than 100 years Vattenfall has powered industries, supplied energy to people's homes and modernised the way its customers live through innovation and cooperation.

Vattenfall aims to make fossil-free living possible within a generation and is leading the transition to a more sustainable energy system through growth in renewables and climate-smart energy solutions for its customers.

Vattenfall has over 50 wind farms, onshore and offshore, across five countries and pioneered co-locating wind with solar and batteries. Vattenfall has been in the UK since 2008, investing over £3.5 billion in enough wind to power nearly a million British homes. Vattenfall owns the largest onshore wind farm in England and Wales, Pen y Cymoedd, and in Scotland operates wind farms on the Isle of Skye and in Aberdeenshire. At a local level Vattenfall developed the consented South Kyle wind farm, near Dalmellington, lying within both East Ayrshire and Dumfries and Galloway, which, at the time of writing, was under construction and due to begin commercial operation in early 2023.

1.2. Consultants

Natural Power Consultants Limited (Natural Power), the lead consultancy on the project, has been providing expertise to the renewable energy industry since the company was formed in 1995 and is one of the UK's leading renewable energy and infrastructure consultants. As well as development and EIA services, Natural Power also provide expert advice and due diligence consultancy, site construction management and site operation and maintenance.

Natural Power currently employs over 400 people working full time on providing renewable energy services internationally. In Scotland, Natural Power has offices in Stirling and Inverness, and its headquarters 'The Green House' is an award winning, environmentally friendly office building located in Dumfries and Galloway, just 15 km south of the Proposed Development.

Testimony to Natural Power's experience and ongoing commitment to competency and continual improvement, its Planning and Environment department is accredited by the Institute of Environmental Management and Assessment and EIAs prepared by Natural Power display the IEMA quality mark. In addition, Natural Power also operates in

formally accredited health and safety (ISO 45001), environmental (ISO 14001) and quality (ISO 9001) management systems.

Other consultants involved in the EIA have provided independent professional input for Design, Aviation, Noise, Cultural Heritage, Ecology, Ornithology, Forestry, Socioeconomics and photography for the Landscape and Visual Impact Assessment (LVIA):

- Sweco UK Limited and RJ McLeod – Civil engineering design
- Aviatica – Aviation
- MBEC – Ecology and Ornithology
- Hayes McKenzie – Noise
- AOC Archaeology Group – Cultural Heritage
- McKay Forestry – Forestry
- Tom Finnie Photography – LVIA Photography
- Biggar Economics – Socioeconomics



Diagram 1.1: Applicant and Consultant signage (South Kyle Windfarm)

1.3. Terminology

- The 'Proposed Development': the turbines and all associated infrastructure required for Quantans Hill Wind Farm;
- The 'Proposed Development Area': all land within the current application site boundary, including the main wind farm area (refer to EIAR Figure 1.1 or Diagram 4.1 of this NTS for example).

2. Environmental Impact Assessment Report

The Environmental Impact Assessment Report (EIAR) has been prepared in line with the EIA Regulations. The EIAR reports the findings made in the Environmental Impact Assessment (EIA) of the Proposed Development. The scope of the EIA was the subject of a formal scoping opinion from the Scottish Government Energy Consents Unit on behalf of Scottish Ministers. This included input from the Local Planning Authority, which is Dumfries and Galloway Council, and from other consultees including Scottish Environmental Protection Agency (SEPA), NatureScot (formerly Scottish Natural Heritage (SNH)) and Historic Environment Scotland (HES). A scoping opinion was sought from Scottish Ministers in June 2020.

During the EIA process, site visits, surveys and desktop assessments, in line with relevant guidance, were carried out to ascertain the potential impacts of the Proposed Development on the environment and mitigation measures to be made. A review of planning and other relevant policies was also made to inform the assessment process and ensure the Proposed Development adequately considered local and national policy. The EIAR has been prepared in accordance with the EIA Regulations and follows the structure presented in Table 2.1 below. Where relevant each EIAR chapter considers the baseline environment, the likely significant effects for each phase of the development, any required mitigation and cumulative impacts.

Table 2.1: EIAR Structure

Volume	Heading	Description
1	EIAR Chapter 1: Introduction	Presents the Proposed Development and provides a brief overview of the Applicant and the EIAR.
1	EIAR Chapter 2: Site Selection and Design Evolution	Explains the site selection and the design evolution process that has resulted in the Proposed Development.
1	EIAR Chapter 3: Project Description	Provides a detailed description of the infrastructure associated with the Proposed Development.
1	EIAR Chapter 4: Climate Change, Legislative and Policy Context	Identifies the energy and land use policies and outlines the need for the Proposed Development and its benefits within the context of international climate change agreements and European, UK and Scottish renewable energy policy. Includes analysis of the Proposed Development's carbon payback.
1	EIAR Chapter 5: Landscape and Visual Impact Assessment (LVIA)	Provides an assessment of the Landscape and Visual Impacts of the Proposed Development including Residential Visual Amenity and Night-time effects.
1	EIAR Chapter 6: Ecology and Biodiversity	Provides an assessment of the habitats and (non-avian) fauna present within the Proposed Development area and immediate surrounding environment.
1	EIAR Chapter 7: Ornithology	Provides an assessment of the potential effects upon avian species.
1	EIAR Chapter 8: Hydrology, Geology & Hydrogeology	Assesses the effects on the hydrological, geological and hydrogeological environment by the Proposed Development, including private water supplies and peat.
1	EIAR Chapter 9: Cultural Heritage	Provides an assessment of the potential effects of the Proposed Development upon cultural heritage assets.
1	EIAR Chapter 10: Noise	Provides an assessment of the potential noise effects of the Proposed Development.
1	EIAR Chapter 11: Traffic and Transport	Provides an indicative construction programme, load requirements and assesses the potential effects upon the transport network resulting from the Proposed Development.

Volume	Heading	Description
1	EIAR Chapter 12: Forestry	Assesses how the Proposed Development will affect the existing plans for felling, restocking, and proposes suitable amendments to forestry design plan(s) to accommodate the Proposed Development.
1	EIAR Chapter 13: Other Issues	Provides an assessment of the potential effects upon safety, aviation, Ministry of Defence (MoD) interests, communication operations and existing site infrastructure.
1	EIAR Chapter 14: Socioeconomics	Provides an assessment of the potential socioeconomic and tourism effects of the Proposed Development.
1	EIAR Chapter 15: Synergistic effects, Summary of Mitigation and Residual Effects	Assesses the potential synergistic effects created by effects from different subject areas in combination and summarises the proposed mitigation and residual effects of the Proposed Development.
2a	Figures	EIAR Figures except for LVIA
2b	Figures	LVIA Figures only
2c	Figures	LVIA and Cultural Heritage Visualisations
3	Technical Appendices	Provide additional supporting documents and data which inform the EIA.
4	Non-Technical Summary	Provides a high-level summary of the EIA's results in terms that can be understood by a layperson.

The application is also supplemented by an accompanying Planning, Design and Access Statement and a Pre-Application Consultation (PAC) Report.

USB sticks of the entire application material are available on request, free of charge, from Vattenfall. Hard copies of the EIA Report are also available, on request, for £1,400. (telephone: 01563 595 044 / email: quantanshill.windfarm@vattenfall.com).

3. Overview of the Proposed Development

The Proposed Development is located around Quantans Hill, in Dumfries and Galloway, northeast of the village of Carsphairn and east of the A713. It is situated on the predominantly southwest-facing slopes of hills at the southern base of Cairnmore of Carsphairn (797 m) such as Willieanna (431 m) and Knockwhim (498 m). The main tops situated within the Proposed Development area are Quantans Hill (338 m) and Furmiston Craig (324 m). The overall elevation range within the Proposed Development area is from c.185 m to 350 m above sea level. The Proposed Development Area covers an area of approximately 1,800 hectares.

The Proposed Development is located to the north and east of the Water of Deugh, which is part of the Water of Ken/River Dee catchment. There are several tributaries of the Water of Deugh that rise within the site, including the Benloch Burn, which flows south-west, the Knockgray, Polhay/Marbrack and Furmiston Burns flowing generally south through the Proposed Development Area towards the Water of Deugh which is located just outside of the Proposed Development Area, to the south of the B729.

The Proposed Development is situated on land that has historically been dominated by mixed livestock farming in unenclosed areas where sheep and cattle are allowed to wander and graze freely. Stocking levels and grazing management varies between the three landholdings that the site is located within. The western area (Knockgray) is primarily used for year-round extensive sheep grazing, the central area (Marbrack) is grazed by sheep year-round and cattle during the summer months and the eastern area (Furmiston) is grazed by sheep year-round.

The site also contains several scattered areas of small spruce-dominated plantations used as shelter for stock, and a much older wood of mature conifer and broadleaved species at the eastern edge of the site. Further, more

extensive, forest development has been consented, some of which was planted in 2021 and some of which is expected to be planted in 2022.

The Proposed Development is expected to be up to around 92.4 MW in wind generation and up to 50 MW of battery energy storage, and may include the following main elements:

- Up to 14 turbines at a maximum tip height of 200 m, including within the hardstanding arrangement:
 - Temporary storage areas;
 - Permanent turbine foundations; and
 - Permanent crane pads.
- Substation, control building and compound
- Potential for battery energy storage infrastructure of up to 50 MW housed in 11 'shipping container' style units
- 14.65 km of new access tracks, with 31 watercourse crossings identified, largely culverts of varying sizes and two bridges, (watercourse crossings summarised in Appendix 8.1)
- Underground electricity cables
- Anemometry mast
- Signage
- Temporary borrow pits
- Temporary construction and storage compounds, laydown areas and ancillary infrastructure
- Drainage and drainage attenuation measures (as required)



Diagram 3.1: Concrete turbine foundation (South Kyle Wind Farm)

Any public road to the site entrance may be utilised subject to upgrades where necessary. Habitat management which would deliver net biodiversity gain may be undertaken within the Proposed Development Area, although the Applicant has also proposed an alternative offsite regional approach to Habitat Management subject to the approval of consenting authorities. The land where a number of turbines are proposed has been partially forested recently and, at the time of writing, further forest development has been consented and is expected to commence and, as

such, forest felling and replanting may be undertaken to facilitate the Proposed Development. Both planting areas on, or proposed on, the Proposed Development Area comprise largely non-native coniferous species for commercial purposes.

The Proposed Development is expected to have an operational life of up to 35 years. For the purpose of assessment, the Applicant has considered turbines with a maximum height base to tip height not exceeding 200 m.

Figure 1.1 of the EIAR illustrates the Proposed Development's site layout.

Locations (subject to micro siting) and indicative dimensions of the proposed turbines are shown in Table 3.1.

Table 3.3.1: Indicative Turbine details and co-ordinates

Turbine ID	Easting	Northing	Maximum Rotor Diameter (m)	Maximum Tip Height (m)
1	258470.7	594885.6	170	200
2	259026.1	595416.1	170	200
3	257623.6	594845.1	170	200
4	257699.0	595372.0	170	200
5	259785.0	594748.5	170	200
6	258810.6	594380.3	170	200
7	258221.7	593893.2	170	200
8	259127.2	593842.3	170	200
9	259642.3	594169.2	170	200
10	260606.8	594374.4	170	200
11	260797.0	595109.0	170	200
12	261134.6	593850.7	170	200
13	260784.8	593403.9	170	200
14	260426.4	592953.0	170	200

Source: Natural Power

The information provided in this section of the NTS satisfies the requirement of Regulation 5(2)(a) of the EIA Regulations. A more detailed description of the Proposed Development is provided in Chapter 3 of the EIAR.

4. Reasonable Alternatives

The Applicant has studied many sites across Scotland for the potential for wind energy development. Some are not progressed whilst others make it all the way to application stage and constructed following consent.

Desk-based feasibility studies and site visits to the area in the vicinity of Quantans Hill were undertaken at an early stage to understand the potential scope for an onshore wind farm.

The overarching aim of the selection process was to achieve a layout that maximised the efficiency of the Proposed Development whilst limiting the potential environmental impacts. Factors influencing the suitability of the site included:

- Suitable wind speeds;
- Suitable separation distance from dwellings and settlements;
- Proximity to sensitive landscape and visual receptors;
- Reasonably close proximity to viable grid connection;
- Willing landowner(s);
- Potential to use existing infrastructure, as far as practical;
- A feasible route for transporting components to site by the public road network;

- Suitable land area to accommodate generating capacity and civil engineering requirements; and
- No significant environmental constraints preventing development.

The results indicated that this site would be a technically and environmentally appropriate location to develop a wind farm.

4.1. Site Design

Environmental survey of Quantans Hill, for example for birds and other species, peat depth, archaeology and other matters of interest, ran over a period from 2018-21 and also made use of data gathered by a previous developer who also investigated the site in the early part of the 2010s. The data gathered enabled the team to investigate 33 different design iterations before settling on the final design which maximises the efficiency of the Proposed Development whilst limiting the potential environmental impacts. The Proposed Development Area has also been assessed by checking it against a number of strategic constraints. Figure 1.1 of the EIAR, illustrates the site location and layout of the Proposed Development Area, presented below Diagram 4.4.1.

Source: Natural Power

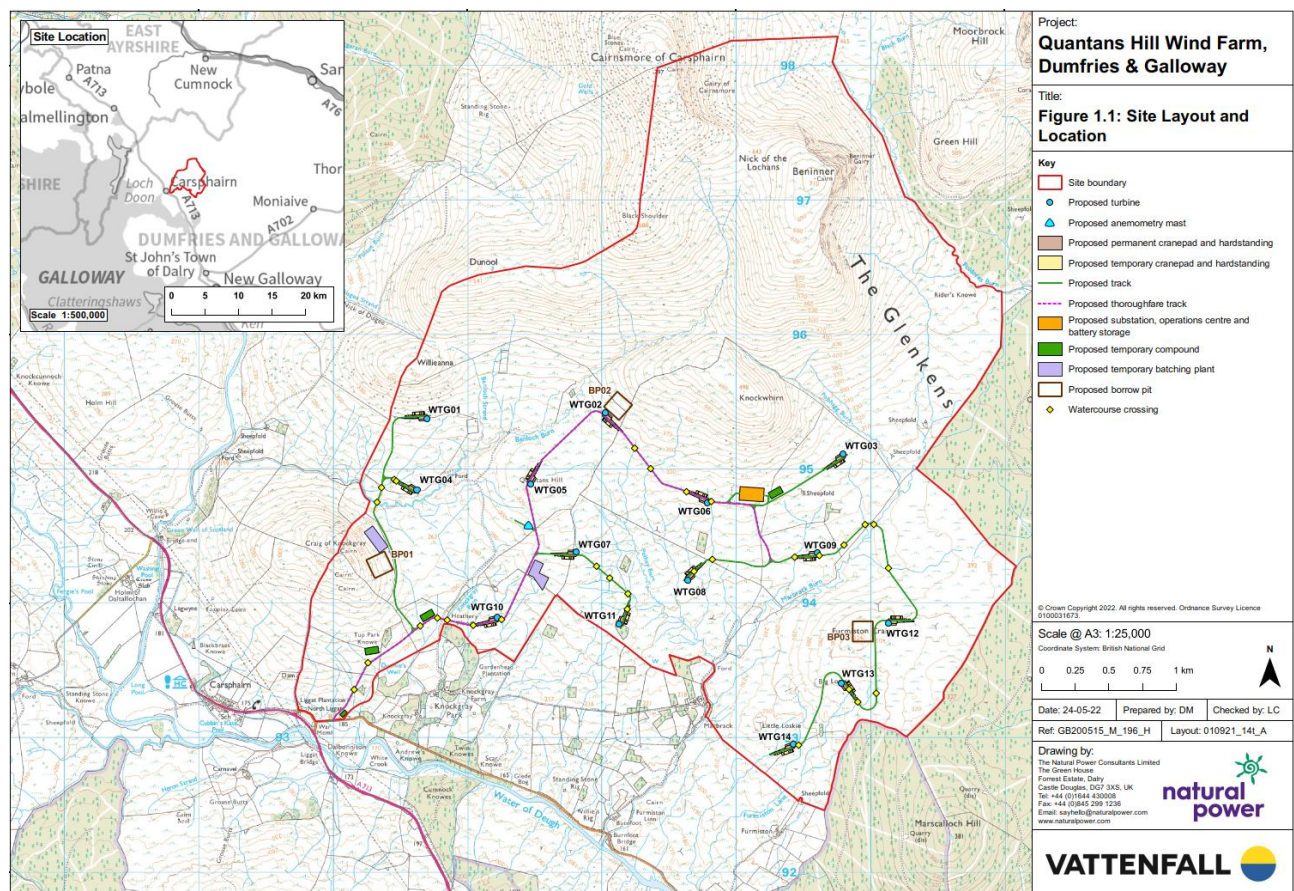


Diagram 4.4.1: Site layout and location (not to scale)

The Proposed Development has been in the design process for a considerable time and the layout has evolved iteratively, including responding to issues raised during and after Scoping, having considered different number and size of turbines; see Chapter 2 of the EIAR for full details. Such changes have been influenced by several factors including economics, stakeholder feedback, planning policy and potential environmental effects.

Diagram 4.2 illustrates the Proposed Development at Scoping stage in 2020. This layout represented what was likely to provide the most benefit in terms of electricity generation, climate mitigation, net biodiversity gain, supply chain, and community benefit (£/MW), but would also be the 'worst case' with regard to potential adverse environmental effects. The Scoping layout, therefore, comprised the largest extent of land and the tallest and greatest number of turbines which was expected to be put forward for consent resulting in an initial proposal for 21 turbines at up to 250 m in tip height.

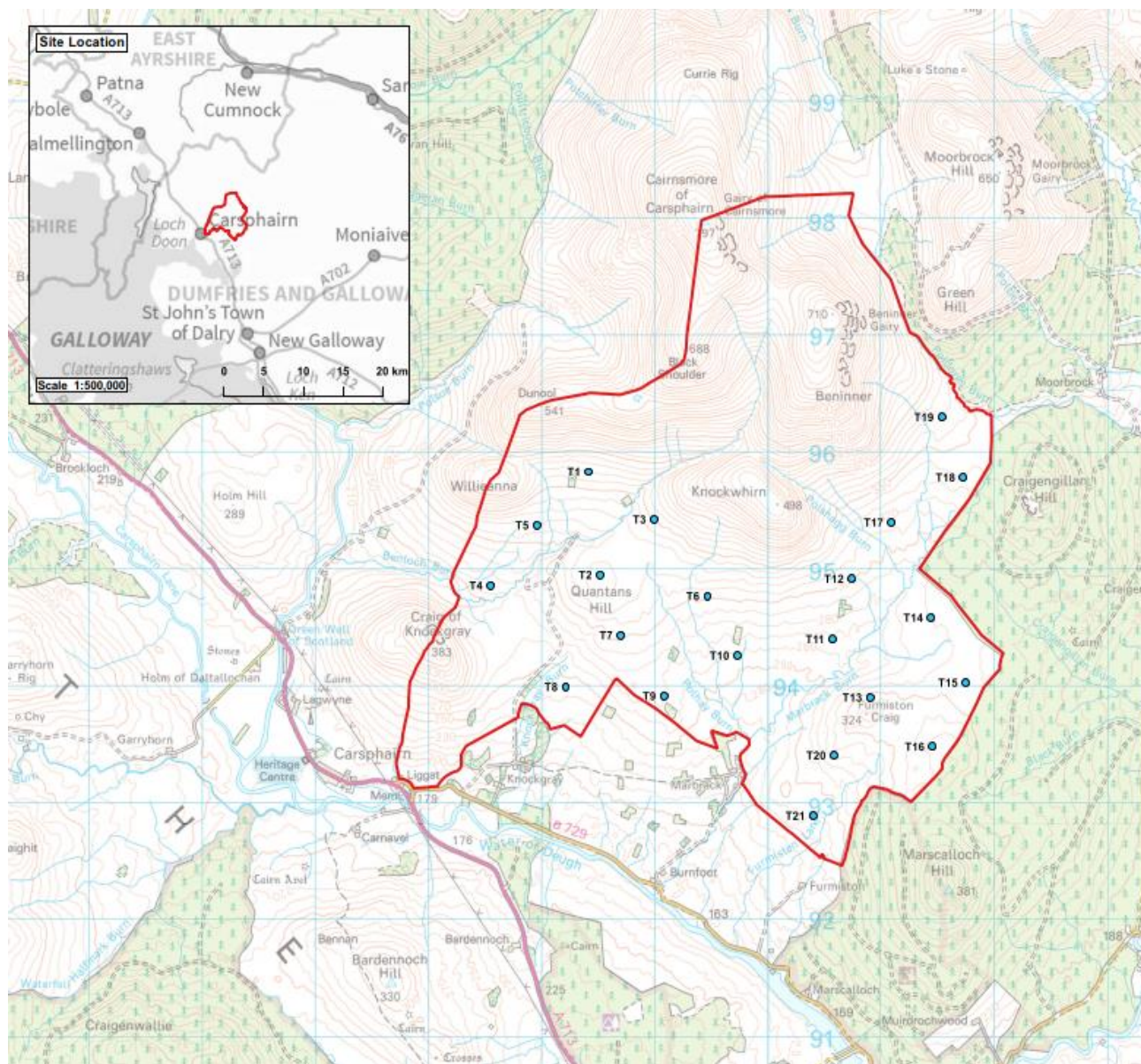


Diagram 4.4.2: Scoping Layout 2020 (not to scale)

Through the design and consultation process, the number of turbines and their proposed height decreased from 21 at up to 250 m tall to 14 at up to 200 m tall, balancing the various site constraints with the scale of development required to be economically viable. The turbines and associated infrastructure, including tracks, borrow pits, anemometer masts, crane pads were introduced, relocated and micro-sited within the Proposed Development Area to account for the various site constraints. The EIAR outlines in extensive detail how environmental matters and stakeholder feedback have influenced the process, however particularly prominent issues which affected the design include:¹

- reducing potential landscape and visual effects by removing turbines and decreasing their height, in particular to avoid encroaching into the more sensitive Upper Dale landscape character unit;
- minimising impacts on watercourses and the aquatic environment, with particular focus on the Benloch Burn as it supplies drinking water to the village of Carsphairn;

¹ A 3-minute long user-friendly video explaining the environmental considerations in site design is available at: <https://www.youtube.com/watch?v=0MKCOXxOoo> (accessed 12 November 2021).

- avoiding the areas of deepest peat, especially peat over 1m in depth;
- reducing impacts on plants and animal species, including bog habitats, waders, and raptors, amongst others;
- Protecting archaeological and cultural heritage features; and
- Adapting the design to bring the wind farm within cumulative noise limits, particularly given the proximity of the Shepherd's Rig proposal

4.2. Planning Policy

4.2.1. Design consideration

According to Scottish Planning Policy criteria, the Proposed Development is located mostly in an “Area with Potential for Wind Farm Development” (Scottish Planning Policy (SPP) Group 3) with localised pockets of land categorised as “Areas of Significant Protection” (SPP Group 2) owing to presence of carbon rich soils/peat. These were taken into account in the design process and avoided as much as possible (see EIAR Figure 8.4 for example). Those parts of the site which fall within Group 2 due to the strategic identification of carbon rich soils have been found after further assessment not to be carbon rich soils. Therefore, the Proposed Development has strategic support in this regard from SPP.

4.2.2. Policy context

International climate policy

Nations including the UK signed the Paris Agreement in April 2016 to make the global plan to limit global warming below 2 °C legally binding and entered into force in November 2016. In addition to the target of keeping global warming below 2 °C of pre-industrial levels, there is a commitment to pursue efforts to limit the temperature increase to 1.5 °C. The UK hosted the UN's Conference of Parties climate summit ('COP26') summit in November 2021 which was an opportunity to demonstrate the UK's climate leadership and provide clear milestones for the next steps in the UK's emission targets climate adaptations, as well as to push forward international commitments.

COP26 finalised the Paris agreement with nearly 200 countries agreeing to the 'Glasgow Climate Pact', which committed to the 1.5 °C target and resolved a number of important outstanding elements of the Paris Agreement.

Domestic climate policy

The Scottish Government is a devolved administration and is responsible for climate change in Scotland. In line with the UK's agreement with the Kyoto Protocol and the Paris Agreement, the Scottish Government brought into force:

- The Climate Change (Scotland) Act 2009;
- The Scottish Energy Strategy 2017; and
- The Scottish Onshore Wind Energy Policy Statement 2022.

The Scottish Energy Strategy includes the aim to meet 50% of Scotland's whole energy demand from renewables by 2030.

The document outlines a vision to drive Scottish Energy Production for 2050 and stresses the importance of renewable energy in achieving a low carbon economy in Scotland.

More explicitly the Scottish Onshore Wind Energy Policy Statement sets out the role of onshore wind in meeting these targets.

Since the publication of these landmark documents, considerable additional weight has been afforded to the matters raised by them through the publication of amongst other things:

- The Climate Change Plan 2018 (and 2020 update)
- The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 setting the target for net zero carbon emissions by 2045
- Net Zero - The UK's Contribution to Stopping Global Warming 2019

- Climate Emergency: Scotland
- Reducing emissions in Scotland Progress Report to Parliament Committee on Climate Change October 2020
- Protecting Scotland, Renewing Scotland: The Government's Programme for Scotland 2020-2021
- The Sixth Carbon Budget, Climate Change Committee, December 2020

In August 2021, the Scottish Government and the Scottish Green Party Parliamentary Group created a shared draft policy programme – the Bute House Agreement – that would see the parties working together to achieve objectives relating to the climate emergency over the next five years. It details commitments to investing at least £1.8 billion over this period in energy efficiency and renewable heating and creating a bigger focus on green jobs.

These documents are the main drivers in steering Scotland towards a low-carbon economy and meeting international targets on climate change and renewable energy generation.

Planning policy

The Planning etc. (Scotland) Act 2006 amended the 1997 Act to put National Planning Framework on a statutory footing. The current edition, the third edition ('NPF3'), was published in June 2014². It sets out a strategy for Scotland's development over the next 20 to 30 years, providing a national context for development plans and planning decisions, to inform wider programmes of government, public agencies and local authorities.

NPF3 confirms the importance of renewable energy to Scotland's energy mix and highlights upgrades to the electricity transmission system infrastructure that are needed to facilitate this development. The vision for Scotland portrayed in NPF3 is that of a successful, sustainable place, a low-carbon place, a natural resilient place and a connected place. These visions put emphasis on the aspirations of Scotland being a leader in low-carbon energy generation, both onshore and offshore, to create a more energy efficient economy with fewer greenhouse gas emissions. The target is to generate the equivalent of Scotland's gross annual electricity consumption from renewable sources by 2020. The 2015 target of 50% was exceeded and recent data has stated that renewable electricity generation has risen from 90% in 2019 and is now equivalent to approximately 97% of Scotland's gross electricity consumption in 2020³.

Preparation of National Planning Framework 4 (NPF4) was delayed by the impacts of COVID-19 but NPF4 was approved by the Scottish parliament in late 2022 following over a year of consultation. It is a material consideration in planning decision-making and supersedes earlier versions of the National Planning Framework, and at the time of writing expected to be adopted in February 2023.

NPF4 introduces centralised development management policies which are to be applied Scotland wide, and also provides guidance to Planning Authorities with regard to the content and preparation of Local Development Plans (LDPs). Once adopted the National Planning Policy's which are contained in NPF4 will take precedence over the policies of the Local Development Plan. LDPs must accord with NPF4 and as such NPF4 will form part of the LDP.

The Proposed Development is classed as a national development under NPF4 and will be assessed by the decision-maker against a number of relevant policies including, but not limited to, Policy 11 (Energy), Policy 1 (Tackling the Climate and Nature Crisis). Generally speaking, significant weight is to be accorded to proposals for additional electricity generation from renewables and electricity transmission capacity as this is "*fundamental to achieving a net zero economy and supports improved network resilience in rural and island areas.*"

Finally, in 2019, **Dumfries & Galloway Council declared a Climate Emergency** and has embarked on baseline studies to inform future policy within the area. The Climate Emergency Declaration is a 12-point plan which aims to set the target of emitting net zero carbon in the region by 2025.

4.3. Wind Resource

Wind speed measurements using temporary anemometer masts have been recorded for the Proposed Development. With the relatively high wind speeds recorded, the Applicant is confident that the Proposed Development can generate renewable electricity at this site on an economically viable basis. The anticipated load

² Available at: <http://www.gov.scot/Resource/0045/00453683.pdf> (last accessed 24/08/2021).

³ Available at: <https://www.scottishrenewables.com/our-industry/statistics> (last accessed 24/08/2021)

factor at Quantans Hill is 38.5%, which compares favourably to the UK average figure for onshore wind of 26.45%..⁴ Load factors are a ratio used in the electricity industry to express the actual electrical output of a power plant compared to its theoretical maximum over a given period (typically a year) and is used to make comparisons of the relative efficiencies of different facets of the same technology (e.g. location or turbine model for onshore wind) or comparing different types of power generating technology.

4.4. Grid Connection

The Applicant has an agreement with the network operator, Scottish Power Energy Networks, for a connection to the National Grid. The grid connection offer is, currently, to connect the project at the existing Holm Hill substation (also known as Kendoon North) approximately 6km west of the Proposed Development which is expected to be via an overhead line. The connection date is proposed April 2027.

The connection itself will be subject to a separate planning application and environmental impact assessment to be undertaken by the network operator.

4.5. Summary

The Proposed Development has been located in a suitable area for wind farm development following a site selection process. The rigorous design evolution has taken place over several years through many changes which have reacted to environmental data gathered on the site, new policies, market dynamics and consultee responses. Through balancing the various site constraints with the scale of development required to be economically viable, the Applicant believes that the Proposed Development provides optimum use of the Proposed Development Area with respect to the potential renewable electricity generating capacity balanced against the potential environmental and other effects.

This section of the NTS has addressed the requirement of Regulation 5(2)(d) of the EIA Regulations in considering reasonable alternatives.

5. Potential Effects and Mitigation

This section of the NTS presents the potential significant effects of the Proposed Development and the measures taken or put forward to reduce the potential significant effects identified (mitigation). In doing so, it addresses Regulation 5(2)(b) and 5(2)(c) of the EIA Regulations.

5.1. Access

It is likely that the turbine infrastructure will be delivered from King George V docks in Glasgow along the public highway which has been used successfully by many other wind farm developments, including South Kyle Wind Farm, which at time of writing is undertaking road strengthening and other works in anticipation of turbine component deliveries, although elements may also be brought ashore at the Port of Ayr. The Proposed Development's primary option for abnormal load access to the Proposed Development Area is from the existing B729 road which leaves the A713 approximately 0.5km to the east of Carsphairn. These roads will be utilised and upgraded where necessary. An assessment of the public road access is provided in Chapter 11: Traffic & Transport.

Upon leaving the B729, the primary option for access to the Proposed Development is through new access tracks. As a result, a new site access junction will be required to facilitate construction traffic and component deliveries.

A Traffic Management Plan (TMP) will be approved by the local planning authorities in consultation with Transport Scotland and Roads Authority and police prior to construction starting on the Proposed Development. This will detail any temporary changes to road furniture, timings of deliveries, the construction routes etc. to minimise its impact.

⁴ Renewable UK, <https://www.renewableuk.com/page/UKWEDEXplained> (accessed on 15 November 2021).

The assessment of potential effects upon traffic and transport is provided in Chapter 11 of the EIAR. It concludes the Proposed Development would lead to a temporary increase in traffic volumes on the study road network during the construction phase and **no significant capacity issues are expected**. A review of the road network has been undertaken to assess the feasibility of transporting the candidate turbines to the site and **no significant issues have been noted**.



Diagram 5.1: Plant in snow (South Kyle)

5.2. Landscape and Visual Impact

Landscape and visual considerations were taken on board at an early stage of the project as these were understood to be key to project progression. Higher ground to the north and to the south west restricts visual envelope of the Proposed Development to the upper Glenkens area.

During the design process, views from residential receptors and the Southern Upland Way (SUW) were key design considerations and turbines were positioned further back from these sensitive receptors to reduce the vertical extent and avoid being overbearing within the view or alter the area such that it becomes an unpleasant place to reside. Whilst it is noted that opinion on wind farms and their visual effects varies and is subjective, for the purposes of assessment it has been assumed all visual impacts are negative. All residential receptors will also have open views clear of wind turbines.

Consideration was also given to other wind farm sites in the surrounding area and cumulative considerations. Establishing a sufficient gap from other wind farms was a factor to prevent amalgamation with other nearby sites. Ensuring the Proposed Development reads in harmony with existing developments in the area is fundamental to considering the potential landscape and visual effects.

Many elements of infrastructure, including the temporary construction compound, substation, control building, and energy storage, have been located to avoid proximity to residential receptors and to avoid ridgelines, steep slopes

and large areas of cut and fill as much as possible. These temporary construction related effects are also subject to reinstatement to remove the most detrimental aspects of impact.

A reduced lighting scheme limiting the number of turbines lit with visible aviation warning lights and the type of light to be used has been agreed with the Civil Aviation Authority (see Chapter 13 for proposed lighting scheme).

Chapter 5 considers the Proposed Development’s residual effects from the operational phase following the mitigation measures which have been incorporated during the design of the proposed layout. Snapshots of the visualisations produced to illustrate the Proposed Development are provided below in Diagram 5.2, Diagram 5.3 and Diagram 5.4 below. The full figures and visualisations which should be referred to for assessment purposes are provided in Volumes 2 (b) & 2 (c) of the EIAR.

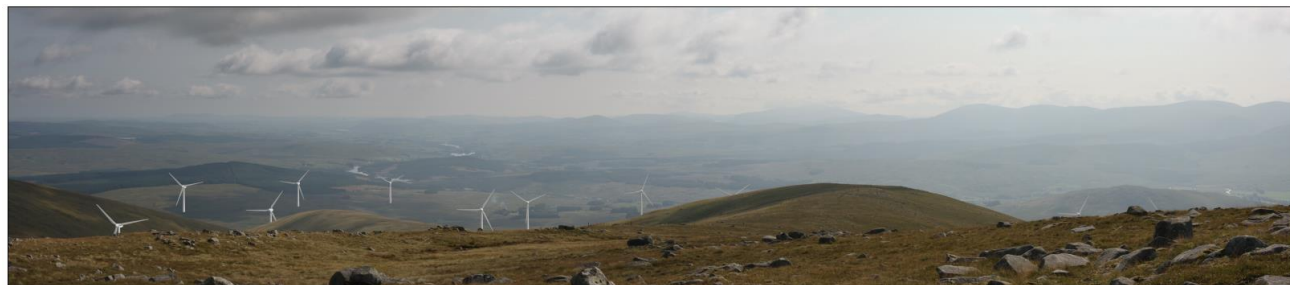


Diagram 5.2: Extract of photomontage visualisation from Cairnsmore of Carsphairn (See Figure 5.16 of the EIAR for complete visualisation)



Diagram 5.3: Extract of photomontage visualisation from Cairnsmore War Memorial (See Figure 5.14 of the EIAR for complete visualisation)



Diagram 5.4: Extract of photomontage visualisation from Manquhill (See Figure 5.34 of the EIAR for complete visualisation)

Table 5.1: Potentially Significant Landscape and Visual Effects

Impact upon:	Potential Significant Effect
Landscape Character	Localised significant effects on 5 of the 51 Landscape Character Types (LCTs) identified within 45 km. This is due to the direct effects upon two LCTs and indirect effects in proximity to the Proposed Development extending to 8 km from the outermost turbines.

Impact upon:	Potential Significant Effect
Landscape Designations	Localised significant effects on 1 of the 36 protected and designated landscapes identified within the 45 km study area. This would be due to the direct effects experienced within an area extending to 8 km from the outermost turbines.
Residential Receptors	18 residential receptor properties were assessed within 2 km of the nearest turbine (4 of which are financially involved with the Proposed Development), 16 are predicted to receive a significant effect however this would not be overbearing or result in the property considered an unpleasant or unattractive place to live. This would be due to screening from landform and woodland combined with distance from the Proposed Development.
Sequential Routes	A number of road receptors, long distance footpaths and local paths were identified within the 45 km study area. The assessment has predicted a small number of these including the A713, B729, Scottish Hill Tracks, Heritage Trails and Core Paths within 5 km of the Proposed Development would receive significant effects to short sections where views can be obtained. Overall, the routes would not receive a significant effect.

Source: EIAR Chapter 5: LVIA

Chapter 5 of the LVIA should be referred to for full detailed assessment of each receptor. It concludes that there would be **several significant effects to both landscape and visual receptors but these would affect a relatively small number of landscape and visual receptors located within Upper Glenkens and the immediate hillsides. Within the wider area, it is not predicted that significant effects would occur to landscape and visual receptors due to a combination of screening from landform and woodland.** The potential significant effects identified are restricted to landscape and visual effects upon a limited number of receptors within close proximity of the Proposed Development. Diagrams 5.2-5.4 present snapshots of photomontages produced to illustrate the Proposed Development, these examples being from Cairnsmore of Carsphairn, Carsphairn War Memorial and Manquhaill Hill including what the Proposed Development may appear like with visible aviation warning lights on.

5.3. Ecology and Ornithology

The Proposed Development is not located within any ecological or ornithological designation. Assessments of the relevant potential effects upon ecology and ornithology are presented in Chapters 6 and 7 of the EIAR respectively. The Proposed Development is assessed to **not have any significant effects** in this regard.

Whilst there are no significant effects predicted, additional controls will be put in place during construction through creation of site-specific Construction Environment Management Plan (CEMP), Species Protection Plan, Bird Protection Plan (BPP) and appointing an Environmental Clerk of Works (ECoW) to monitor adherence to such plans.



Diagram 5.5: Checking camera traps at South Kyle

In addition, a Habitat Management Plan (HMP) is proposed as a benefit of the project to restore modified and damaged bog habitats, although an alternative offsite regional approach is also offered for discussion with the consenting authorities.

5.4. Hydrology, Hydrogeology & Geology

Scottish Water, SEPA, Dumfries and Galloway Council and other engaged stakeholders have been consulted during the EIA and their guidance used in designing the layout to protect watercourses from disturbance and potential effects on water quality during construction and operation. Good practice during construction, adherence to a site-specific CEMP and a site-specific Pollution Prevention Incident Plan (PPIP) as well as appointment of an ECoW have been considered as embedded mitigation and as such **no significant effects** are assessed to result. An assessment of hydrological elements is provided in Chapter 8 of the EIAR.

In addition, a HMP is proposed as a benefit of the project which will improve natural flood management.

5.5. Cultural Heritage

Baseline survey work indicated the Proposed Development has several features of cultural heritage importance.

A full assessment of cultural heritage is provided in Chapter 9 of the EIAR. It concludes that **there will be no significant effects upon cultural heritage**. It also recommends a programme of mitigation works. These would be proposed in a Written Scheme of Investigation and include appointing an Archaeological Clerk of Works to offset any potential loss of low sensitivity cultural heritage features within the Proposed Development Area.

This planning application proposes the establishment of a footpath stemming from the Proposed Development's access tracks to facilitate pedestrian access to Asset 17 (see EIAR Chapter 9 for Asset descriptions). The wind farm's access tracks would also bring users within appreciative distance of Asset X and Asset Y. These footpaths and the wind farm's access tracks could be furnished with interpretive boards and QR codes to increase the readers' understanding and appreciation of some of the cultural heritage assets located on the Proposed Development. Stakeholder feedback has also indicated this could be extended to include an understanding of the etymology of

some of the placenames within the Proposed Development, which shed light on the cultural and natural history of the area.

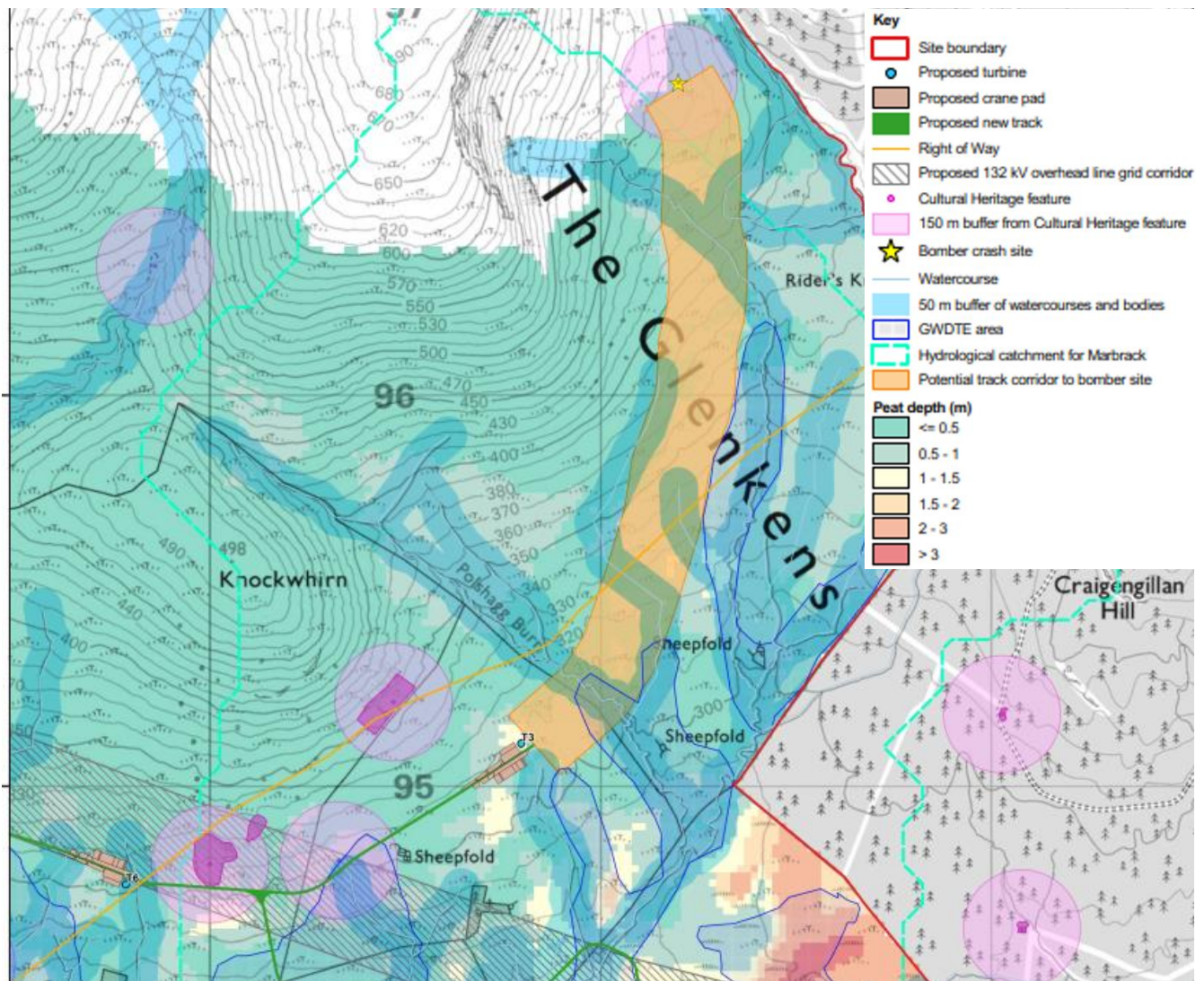


Diagram 5.6: Extract of Proposed Track to Asset 17 (Blenheim Bomber Crash Site)

5.6. Forestry

Whilst large parts of the Proposed Development Area are open, some of the land where turbines will be proposed has recently been planted and further forest development has been consented, although not yet commenced at the time of writing, and as such forest felling and replanting may be undertaken to facilitate the Proposed Development. If this goes ahead, there would be a net loss of woodland area of 13.81 ha, predominantly of non-native conifers planted at typical commercial densities, to accommodate the Proposed Development (3.8% of the total study area).

In order to comply with the Scottish Government's Control of Woodland Removal Policy, compensatory planting would be required to mitigate for the loss of woodland area (**13.81 ha**). The Applicant is committed to providing appropriate compensation to replace the loss of woodland area in terms of the relevant policy requirements as applicable at the time. It concludes that that **neither the extent of felling nor the potential environmental impact of this felling will be significant**.



Diagram 5.7: Keyhole Felling Operations at South Kyle

5.7. Noise

The potential effects upon noise are assessed in Chapter 10 of the EIAR. An operational noise assessment has been undertaken by comparing predicted noise levels for a candidate turbine, based on the indicative dimensions of turbines proposed, for the Proposed Development with the noise limits derived from baseline noise measurements carried out at a number of properties in the vicinity of the Proposed Development. Predicted noise levels are below these noise limits under all wind speed and wind direction conditions, and therefore **the operational noise impacts are not significant**.

Noise from traffic during the construction and decommissioning phases were assessed against the noise limits set out in BS 5228. Noise from construction activities will be below this noise limit and therefore the **noise from such activities is not significant**.

The increase in noise levels due to construction traffic accessing the site was assessed by comparing the noise levels generated including the construction traffic with the predicted road traffic noise levels in the absence of construction activities. The predicted increase is less than 1 dB and therefore there will be no perceptible impact.

The cumulative operational noise assessment shows that there are no significant cumulative noise impacts predicted, and **no significant cumulative construction noise impacts** are expected. This assessment was done on a 'worse case' basis that the proposed adjacent Shepherd's Rig development, which was the subject of an undetermined public inquiry at the time of assessment, was subsequently approved and constructed.

5.8. Aviation

The potential effects upon aviation are assessed in Chapter 13 of the EIAR. The Civil Aviation Authority (CAA) requires any structure equal to and taller than 150 m in height to be fitted with visible aviation warning lighting. The CAA has been consulted and a lighting scheme agreed.

Under the usual planning conditions expected in the consent, if granted, the Ministry of Defence (MOD) would be informed of the dates of commencement, completion, final turbine locations and heights. In addition, infra-red aviation lights would be fitted to the turbines as per Ministry of Defence requirements.

The Proposed Development is assessed to have an impact upon the operational ability of both Lowther Hill and Great Dun Fell Radars. A Radar Mitigation Scheme will be agreed by the Applicant and NATS to address the effects of the Proposed Development on these radars.

In summary, it is concluded in the EIAR that with this mitigation in place there are **no significant residual effects** from the Proposed Development upon aviation interests.

5.9. Telecommunication Networks

Telecommunications and broadcasting network operators were consulted during the scoping exercise. Openreach responded to confirm that the Proposed Development should not cause interference to BT's current and presently planned radio network. The Joint Radio Company Limited also responded to scoping indicating that links would not be affected. It is acknowledged that the turbine layout has changed since Scoping however it appears that these particular assets do not feature within the Proposed Development Area and therefore it is expected that these stakeholders will remain unaffected.

An EE telecommunications mast was identified on the edge of the Proposed Development Area after Scoping. EE have since been consulted and the Applicant received confirmation that Proposed Development layout was unlikely to cause any interference.

With the information available to the Applicant, the Proposed Development does not directly affect microwave fixed links and the potential effect on microwave fixed links is **not significant**. Pre-construction checks would be undertaken to ensure this still remains the case nearer the time of construction.

5.10. Public Rights of Way and Core Paths

The potential effects of the Proposed Development on Rights of Way and Core Paths are also assessed in Chapter 13 of the EIAR. There is a Public Right of Way that traverses the site but does not physically exist in the Proposed Development Area. Nonetheless, the Proposed Development has been designed to ensure a safe passage across the site is maintained.

Although members of the public have the right to roam land in Scotland under the Land Reform (Scotland) Act 2003, there will be restricted access during the construction phase for health and safety purposes. The Proposed Development Area would be managed during the construction phase under the Construction (Design and Management) Regulations 2015. There would be a requirement for the need for signage within the Proposed Development Area to provide safe day-to-day navigation, for emergency vehicles to navigate if required, and to aid comprehensive risk assessment for those visiting and using the site. The exact number of signs required at any of the post locations would be decided post consent, following a full review of the health and safety requirements and would be confirmed in the CMS that would require to be approved by the planning authority prior to the commencement of development.

There are **no direct adverse effects** upon Public Rights of Way or to the Applicant's proposed additional and improved public access to the Proposed Development Area. Paths would be appropriately managed during construction for health and safety purposes.

In addition, the **Applicant proposes funding** which can be used for improvements to outdoor access through the community benefit fund associated with the Proposed Development, should the consent be granted and community agree spending on such improvements.

Furthermore, the Applicant is looking into the potential for a community heritage program linking the recreational access benefits the project is seeking to provide with additional paths, sign posting and interpretation of some key historic features.

5.11. Public Water Supply

One public water supply was identified within the Proposed Development area; the Scottish Water Carsphairn Water Supply. The Applicant consulted with Scottish Water during the EIA process to ensure this asset remains safeguarded.

Embedded mitigation through following best practice, Scottish Water's guidance, and a Pollution Prevention and Incident Plan (PPIP) will ensure there are **no significant adverse effects on public water supply**.

5.12. Shadow Flicker

The potential effects by the Proposed Development are assessed in Chapter 13 of the EIAR. Wind turbines are tall structures which can cast long shadows when the sun is low in the sky. Under certain conditions (e.g. clear skies, enough wind for the turbines to be rotating and a low angle of the sun in the sky), residents of properties close to a wind farm could experience a phenomenon commonly known as "shadow flicker", where the rotating turbine blades pass between the sun and the observer creating an intermittent shadow through window openings. It is, however, part of the nature of long shadows that they pass any particular point relatively quickly and the effect, if present, lasts a short period of time, due to the movement of the sun across the sky. They are generally only observed in the period after dawn and before sunset as the sun is rising and setting.

There are 14 properties deemed to be at risk of shadow flicker. All 14 properties were assessed and none were shown to experience shadow flicker beyond an established threshold deemed acceptable in environmental impact assessment. Therefore, it has been concluded that the Proposed Development would **not cause a significant adverse effect** upon amenity due to shadow flicker.

5.13. Socioeconomics

Socioeconomics is assessed in Chapter 14 of the EIAR. The Proposed Development has the potential to offer positive socioeconomic benefits nationally, regionally and locally. The Proposed Development will generate economic benefits both during its development and construction and during its operation and maintenance. In particular, its development and construction are expected to generate:

- £56 million GVA and 810 years of employment in the UK; including
- £36 million GVA and 480 years of employment in Scotland as a whole; including
- £12 million GVA and 160 years of employment in the South West of Scotland; including
- £7 million Gross Value Added (GVA) and 90 years of employment in Dumfries and Galloway.

The expenditure for the operation and maintenance of the Proposed Development could deliver up to:

- £1.9 million GVA and 31 jobs in the UK; including
- £1.3 million GVA and 22 jobs across Scotland; including
- £0.6 million GVA and support 8 jobs in the South West of Scotland; including
- £0.5 million GVA and support 7 jobs in Dumfries and Galloway.

The Proposed Development will also contribute to the revenue of local government by paying each year around £0.6 million in non-domestic rates. This revenue will then be available for spending on public services.

The Proposed Development has the potential to create job opportunities throughout the construction and operational phases and contribute to meeting the goals of the Dumfries & Galloway Regional Economic Strategy. Employment opportunities will be created during the lifecycle of the project in a relatively rural area and foster their diversification into new industries.

The Applicant is also committed to supporting the long-term ambitions of local communities through local community benefits worth an estimated £13 million over 30 years. The effect that a community benefit fund could have on the economies of Dumfries and Galloway, South West Scotland and Scotland as a whole will depend on the projects that this funding supports and the ability of the funding to leverage in wider support. The Applicant is actively engaging with local community groups to ensure that this funding has the maximum socio-economic benefit to local communities and is identifying investment priorities through a Community Development Strategy. This process is ongoing.

There are not expected to be any significant effects on tourism or recreation assets in the surrounding area. Overall, though there may be some cumulative effects due to the addition of the Proposed Development, it is not expected that these would be significant.

The Proposed Development will contribute towards meeting national renewable energy targets and reducing carbon dioxide emissions to help reach the national carbon net zero target.

5.14. Carbon Balance

Peatland is an important carbon store and the Proposed Development will have an impact on onsite peatlands, despite mitigations proposed to limit disturbance to peat and bog habitats. A carbon balance assessment report has been produced and SEPA's Carbon Calculator completed to determine the carbon payback time for the Proposed Development (see EIAR Technical Appendix 13.1 for full details). The results from the carbon calculator reveal that the net impact of the Proposed Development will be positive overall, as over a 30-year lifespan of the Proposed Development, it is expected to generate over 28 years' worth of clean energy if it replaced fossil fuel electricity generation. In addition, over the expected 28 years that the wind farm is likely to be generating carbon-free electricity, this could result in nearly **3.9 million tonnes of net CO₂ emission savings** when replacing fossil fuel electricity generation.

Since the negative payback period represents approximately 6.7% (2 years) of the operational period (30 years) and the positive contribution is 93.3% (28 years), it is possible to conclude that the positive contribution is statistically significant. The Proposed Development therefore illustrates a **significantly positive** net impact in terms of its contribution towards the reduction of greenhouse gas emissions from energy production.

5.15. Synergistic Effects

An assessment of synergistic effects considers the combination of effects upon different topics together. This is provided in Chapter 15 of the EIAR. It ensures that the assessments provided in the EIAR for each topic are not considered in isolation.

During the construction and decommissioning phases, potential adverse synergistic effects are limited to the Proposed Development Area where there will be heavy plant operations, earthworks, forestry operations and vehicle movements. These could result in potential synergistic effects upon physical and biological receptors including where there are overlaps between ecology, hydrology, and hydrogeology. In isolation each have been assessed in the EIAR as not significant. These effects have been considered together and, through careful initial site design and including embedded mitigation, would be temporary in nature and will be managed through a Construction Environmental Management Plan (CEMP), Pollution Prevention and Incident Plan (PPIP), Peat Management Plan (PMP), Habitat Management Plan (HMP), Traffic Management Plan (TMP), Water Quality Monitoring Plan (WQMP) and/or Decommissioning Plan. These potential effects will also be monitored by an independent Environmental Clerk of Works (ECoW) and, if deemed necessary, a Planning Monitoring Officer enforced through planning condition(s).

Given the limited number and extent of receptors, the limited effects predicted and their temporary nature, the synergistic effects during construction and decommissioning phases are considered not significant.

Potential synergistic effects during the operational phase relate primarily to overlaps between physical and human receptors and are limited to areas which are within or close to the Proposed Development Area where there may be a combination of potential visual, noise and shadow flicker effects.

The EIAR predicts that there are no significant adverse effects in isolation for noise and shadow flicker but there may be potential adverse visual effects upon 16 residential receptors within 2 km of the Proposed Development. All residential receptors may experience temporary adverse synergistic effects in this regard throughout the operational life of the Proposed Development, however, these are assessed to be limited by the meteorological conditions which create these effects and dependent upon the receptor's line of sight with the Proposed Development.

All residential receptors will have open views clear of wind turbines and the synergistic effect is not considered to be overbearing or alter the area such that it becomes an unpleasant place to reside.

The inclusion of habitat management proposed by the Applicant, which will restore degraded peat habitat shall also improve natural flood drainage and habitat for some breeding bird species, thus have a positive synergistic effect in this regard.

5.16. Summary

This section of the NTS has presented the potential significant effects of the Proposed Development and the measures taken or put forward to reduce the potential significant effects identified (mitigation). In doing so, it has addressed Regulation 5(2)(b) and 5(2)(c) of the EIA Regulations.

6. Conclusions

This NTS has provided a non-technical summary of the Proposed Development, which is assessed in greater detail throughout the EIAR. This NTS has presented the information required of the EIA Regulations in a manner that can be readily understood.

The Proposed Development has been located in a suitable area for wind farm development following a site selection and design process. The design stages have taken place over several years utilising a number of iterations in response to environmental data, new policies, market dynamics and consultee responses. Through balancing the various site constraints with the scale of development required to be economically viable, the Applicant considers that the Proposed Development provides the best use of the site with respect to the potential renewable electricity generating capacity balanced against the potential environmental and other effects.

The EIAR presents the potential effects of the Proposed Development as well as potential synergistic effects which consider such effects in combination. Following the use of mitigation, potential significant adverse effects are restricted to isolated landscape and visual effects upon limited receptors within close proximity of the Proposed Development.

The Applicant has proposed enhancements including habitat management which will restore degraded peat habitat, improve natural flood drainage and improve habitat for some breeding bird species. The Proposed Development will provide socioeconomic benefits through continuing employment opportunities it has already provided at the planning stage throughout the lifetime of the project following consent. The Proposed Development will contribute towards meeting national renewable energy targets and have a significant positive effect on reducing carbon dioxide emissions to help reach the national carbon net zero target.



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