



Harestanes South Windfarm Extension

EIA Report

Non-Technical Summary



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Harestanes South Windfarm Extension

1 Introduction

1. This document provides a Non-Technical Summary of the Environmental Impact Assessment (EIA) Report for the proposed Harestanes South Windfarm Extension (the Proposed Development). The EIA Report forms part of an application by ScottishPower Renewables (UK) Ltd (ScottishPower Renewables) for consent to construct and operate a proposed extension to the operational Harestanes Windfarm. The application will be submitted under section 36 of the *Electricity Act 1989*.
2. The Proposed Development comprises eight wind turbines up to 200 metres in height from the ground to blade tip when vertical. For the purpose of the EIA, a currently available turbine model is being used which fits these parameters, and which would generate around 5.6 megawatts of electricity, giving a combined electricity generating output of around 45 megawatts, enough power to supply over 32,550 average UK households¹. The application for consent is for up to 50MW to cater for potential future improvements in turbine performance.
3. The Proposed Development is located within the Forest of Ae immediately north of Ae and approximately 13 kilometres north of Dumfries in Dumfries and Galloway. It would cover an area of approximately 1036 hectares. The location and application boundary of the Proposed Development (the Site) is shown in **Figure 1: Site Location Plan**.

¹ Based on an average electricity consumption per household in the UK of 3,729 kWh as quoted in the Department of Business, Energy and Industrial Strategy (BEIS) Sub-national Electricity and Gas Consumption (2019).

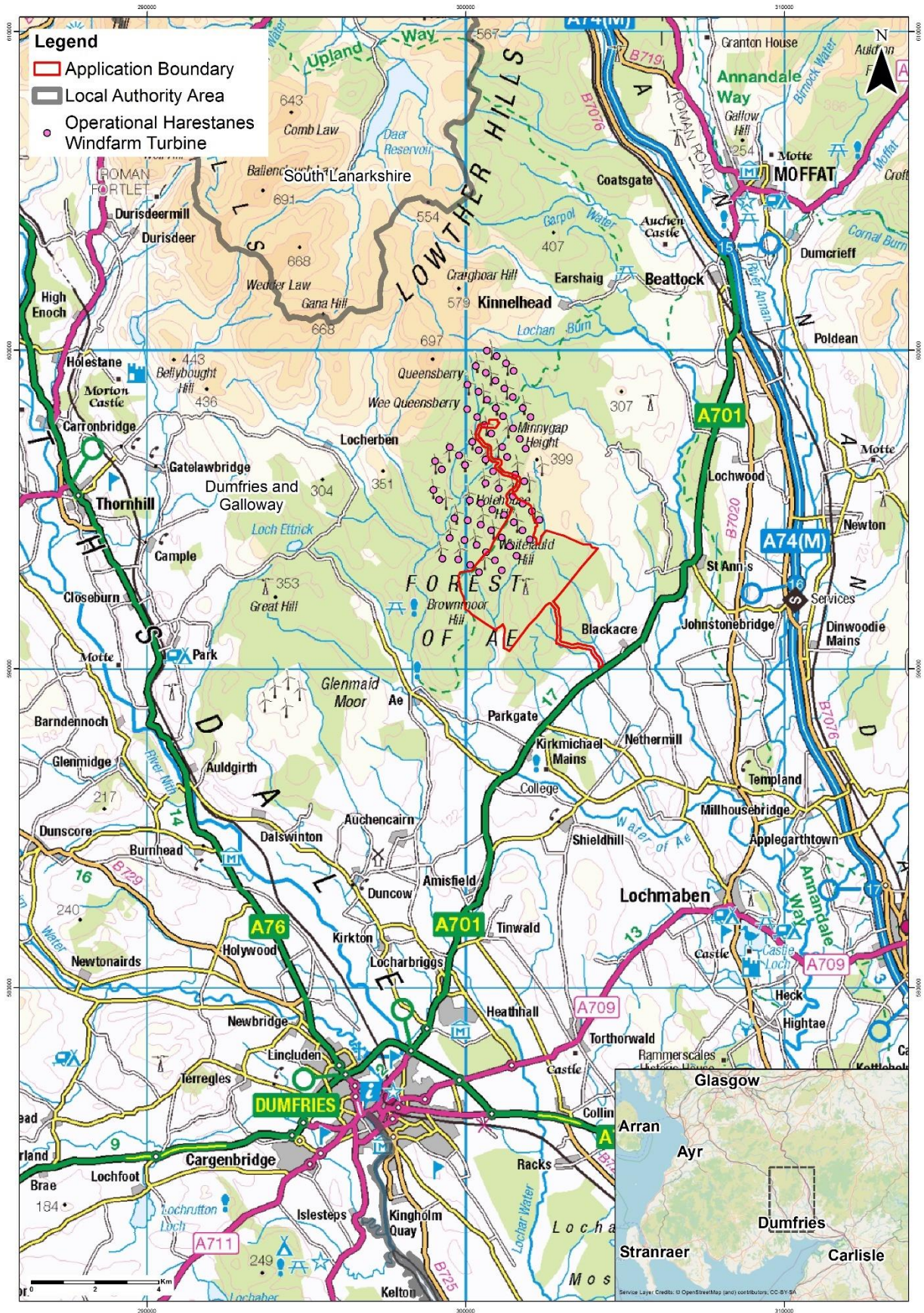


Figure 1: Site Location Plan

1.1 Environmental Impact Assessment

4. Under *The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017* ('the EIA Regulations'), the Proposed Development is considered to have the potential to result in significant effects to the environment. Therefore, an EIA must be undertaken and an EIA Report submitted with the application.
5. The EIA Report describes the existing environmental conditions to identify sensitive assets or features (known as receptors) and the methods used to assess whether environmental effects, either beneficial or adverse, are predicted due to the construction or operation of the Proposed Development. Where appropriate, it also sets out mitigation measures designed to prevent, reduce and if possible, offset any significant adverse environmental effects. Following consideration of mitigation measures, any remaining residual effects are also presented.
6. The EIA has also considered 'cumulative effects' which considers how multiple effects at the same time may affect a receptor. This could be due to effects of the Proposed Development from different environmental topics occurring at the same time, or effects from the Proposed Development happening in combination with effects from other existing, approved, and/or 'in planning' developments.

1.2 Environmental Impact Assessment Report

7. The EIA Report is structured as follows:
 - Non-Technical Summary
 - Volume 1: Main Report
 - Volume 2: Figures
 - Volume 3: Visualisations
 - Volume 4: Technical Appendices

1.2.1 Availability of the EIA Report

8. Hard copies of this Non-Technical Summary are available free of charge from:

Harestanes South Windfarm Extension Project Team
ScottishPower Renewables
9th Floor ScottishPower House
320 St Vincent Street,
Glasgow
G2 5AD

Or via this email address: harestanessouthwindfarm@scottishpower.com

9. A copy of the Non-Technical Summary and EIA Report documents is available for download from the ScottishPower Renewables corporate website at:
10. https://www.scottishpowerrenewables.com/pages/harestanes_south_windfarm_extension.aspx
11. ScottishPower Renewables has a duty to undertake statutory publication of the EIA Report in accordance with Part 5 of the 2017 EIA Regulations and *the Electricity (Applications for Consent) Regulations 1990*. Due to the ongoing Covid-19 situation and the provisions of the Coronavirus Act 2020, Government advice is that hard copies of the application and EIA Report should not be placed on

public display. The application documents are being made available online via the Energy Consents Unit website as normal, and hard copies are being made available to specific statutory consultees

1.3 Representations to the Application

12. Comments concerning the application for consent should be made directly to the Scottish Government via the following communication channels:

Energy Consents Unit website: www.energyconsents.scot/Register.aspx

Email to the Scottish Government, Energy Consents Unit mailbox: representations@gov.scot

Post to the following address:

Energy Consents Unit

Scottish Government
4th Floor
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

1.4 The Applicant

13. The application for consent for the Proposed Development will be submitted by ScottishPower Renewables, which is part of the ScottishPower group of companies operating in the UK under the Iberdrola Group. The Iberdrola Group is one of the world's largest utility companies and a world leader in wind energy. ScottishPower Renewables now only produces 100% green electricity – focusing on wind energy, smart grids and driving the change to a cleaner, electric future. The company is investing over £4m every working day in 2020 to make this happen and is committed to speeding up the transition to cleaner electric transport, improving air quality and over time, driving down bills to deliver a better future, quicker for everyone.
14. ScottishPower Renewables is at the forefront of the development of the renewables industry through pioneering ideas, forward-thinking and outstanding innovation. Its ambitious growth plans include expansion of its existing onshore wind portfolio, investment in new large scale solar deployment and innovative grid-storage systems including batteries. The company is also delivering the Iberdrola Group's offshore windfarms in the Southern North Sea off East Anglia.
15. With over 40 operational windfarms, ScottishPower Renewables manages all its sites through its world leading Control Centre at Whitelee Windfarm, near Glasgow.
16. In addition to the operational Harestanes Windfarm, ScottishPower Renewables currently has three operational windfarms within the Dumfries and Galloway local authority area; Kilgallioch, Wether Hill and Ewe Hill.
17. ScottishPower Renewables is committed to ensuring all renewable energy developments promote and foster environmental sustainability for the social and economic wellbeing of the local communities.

1.5 Need for Development

18. Onshore windfarm developments are viewed as key contributors to achieving the UK Government's renewable energy targets and the drive to reduce UK carbon emissions in line with current targets. The

need for such development is underpinned by the Government's plans to restrict the use of all coal-fired power stations by 2023 and to cease operation by 2025, resulting in the need for over a quarter of the UK's energy generation to be replaced in this period. The UK's climate change ambitions are amongst the highest in Europe and require an 80% reduction in carbon dioxide emissions by 2050.

19. In 2019, the Scottish Government was the first government in the world to formally declare a climate emergency. As part of the plan to address this, the Scottish Government has an ambitious energy strategy and has set targets to generate the equivalent of 100% of Scotland's electricity demand and 11% of non-electrical heat demand to be generated from renewable sources by 2020. Furthermore, the *Climate Change (Emissions Reduction Targets) (Scotland) Act 2019* commits the Scottish Government to achieving 'net zero' emissions by 2045. The interim targets intensify the need to increase the reduction in harmful emissions. The *UK Energy Roadmap* and *The UK Low Carbon Transition Plan* highlight onshore wind as a key contributor to achieving the UK Government's renewable energy targets and transition to a low carbon energy system.
20. The Scottish Government's commitment to 'green recovery' includes plans to "*end our contribution to climate change*". Wind energy would be a key contributor to achieving the aims of a green recovery through the replacement of fossil fuels in energy production.

2 Site Selection and Design

2.1 Site Description

21. The Site is located approximately 13 kilometres north of Dumfries and is within the Forest of Ae which is a commercial forest, owned and managed by Forestry and Land Scotland. Adjacent to the north of the Site is the operational Harestanes Windfarm, which features 68 turbines and has been operating since 2014. The Site has a network of existing forestry tracks, some of which are also used for recreational purposes. To the west of the Site lies one of the 7Stanes mountain biking centres and its trails.
22. The closest groups of properties to the Site are Ae approximately 2.2km to the south west and Parkgate approximately 2.6km to the south. In addition, around the south of the Site are several hamlets, dwellings and farmsteads. The main nearby road is the A701, which runs to the east of the Site and links to the operational Harestanes Windfarm's access track, which is proposed to also be used for the Proposed Development

2.2 Site Selection

23. A number of factors were considered when selecting this location as suitable for a windfarm. One of the main factors was the opportunity to use the existing infrastructure which forms part of the operational Harestanes Windfarm. The proposed approach includes:
 - use of the operational Harestanes Windfarm and forestry access tracks to access the main development area;
 - a direct connection to the operational Harestanes Windfarm substation and onto the wider electrical grid system;
 - re-use of the operational Harestanes Windfarm's construction infrastructure, such as the construction compound area;

- knowledge from the operational Harestanes Windfarm that the area has good wind resource and suitable for a windfarm; and
 - greater understanding and appreciation of the baseline conditions at the Site as a consequence of the construction and operation of the operational Harestanes Windfarm.
24. Other site selection factors considered include:
- the Site is not subject to any international or national statutory designations;
 - there are no planning policies which, in principle, preclude windfarm development;
 - it has good access from the public road network particularly for longer turbine blades which allows consideration of larger turbines to make the best use of the expected wind resource; and
 - the site has no residential properties nearby.

2.3 Design Iteration

25. The design process of the Proposed Development has been iterative and led by the identification of environmental constraints and through consultation. This allows the environment to be considered at the earliest stage in the design to ensure that potential adverse environmental impacts are avoided or minimised, as far as reasonably possible. This includes considering reasonable alternatives for turbine type and specification, location, size and scale.

2.4 Environmental Constraints

26. Environmental and technical constraints of the Proposed Development site were identified at an early stage via site surveys and desktop data collection. If a constraint was identified, careful thought and attention were paid to the constraint and this was factored into the design process.
27. The key constraints which were considered during the design process included:
- the shape of the land;
 - identified landscapes and visual constraints;
 - sensitive and protected habitats and species;
 - ground conditions (including peat);
 - watercourses, private water supplies and related infrastructure;
 - archaeology and cultural heritage assets;
 - proximity and location of residential properties;
 - aviation;
 - key recreational and tourist routes;
 - telecommunications links, power lines and pipelines; and
 - forestry.
28. The identification of constraints continued throughout the design process as more detailed surveys and information was collected.
29. There were six iterations to the design of the Proposed Development. Initially, a 15 turbine design was proposed, however, through the design process this was reduced to the proposed eight turbine design. These iterations were made to avoid potential environmental effects, reflect engineering constraints or as a result of comments received during consultation.

3 Proposed Development

3.1 Design Components

30. The Proposed Development is formed of eight wind turbines up to 200 metres in height from the ground to blade tip when vertical. For the purpose of the EIA, a currently available turbine model is being used which fits these parameters, and which would generate around 5.6 megawatts of electricity, giving a combined electricity generating output of around 45 megawatts. Aviation lighting will be installed on the turbines on the hub and the tower.
31. In addition to the turbines, the Proposed Development would include the following associated infrastructure:
- turbine foundations;
 - crane hardstandings;
 - transformer/switchgear housings located adjacent to turbines;
 - new and upgraded access tracks;
 - new and upgraded watercourse crossings;
 - underground electrical cabling to the operational Harestanes Windfarm substation;
 - permanent anemometer mast and LIDAR² compound;
 - temporary power performance mast;
 - closed-circuit television mast(s);
 - communication mast(s);
 - control building;
 - container to house electrical equipment to facilitate connection to the grid;
 - up to 3 excavation areas (borrow pits) to obtain material for construction; and
 - reuse of an existing construction compound area.
32. The design of the Proposed Development is shown on **Figure 2: Site Layout Plan**.
33. The Proposed Development would also require some forest restructuring works to enable construction and operation of the windfarm. An area of approximately 82.23 hectares of woodland would require to be felled during the construction phase to accommodate the proposed turbines and associated infrastructure; some of which would be restocked. The area of stocked woodland in the study area would decrease by approximately 61.23 hectares. In line with the Scottish Government's Control of Woodland Removal Policy, compensatory planting of an area equivalent to the net loss would be undertaken. ScottishPower Renewables is committed to providing appropriate compensatory planting in accordance with the criteria of the Scottish Government's Control of Woodland Removal Policy. The extent, location and composition of such planting is to be agreed with Scottish Forestry³, taking into account any revision to the felling and restocking plans prior to the commencement of operation of the Proposed Development.
34. There is no proposal to limit the lifetime of the Proposed Development. Therefore, the EIA Report considers the effects of the operational phase of the Proposed Development, without limitation to a defined period of time. Should decommissioning of any of the Proposed Development be required, or

² LiDAR is a method for measuring distances by illuminating the target with laser light and measuring the reflection with a sensor.

³ With regard to ancient woodland compensation, NatureScot would also be consulted.

part thereof, it is considered that the environmental effects of decommissioning would be similar to, or less than, those during construction.

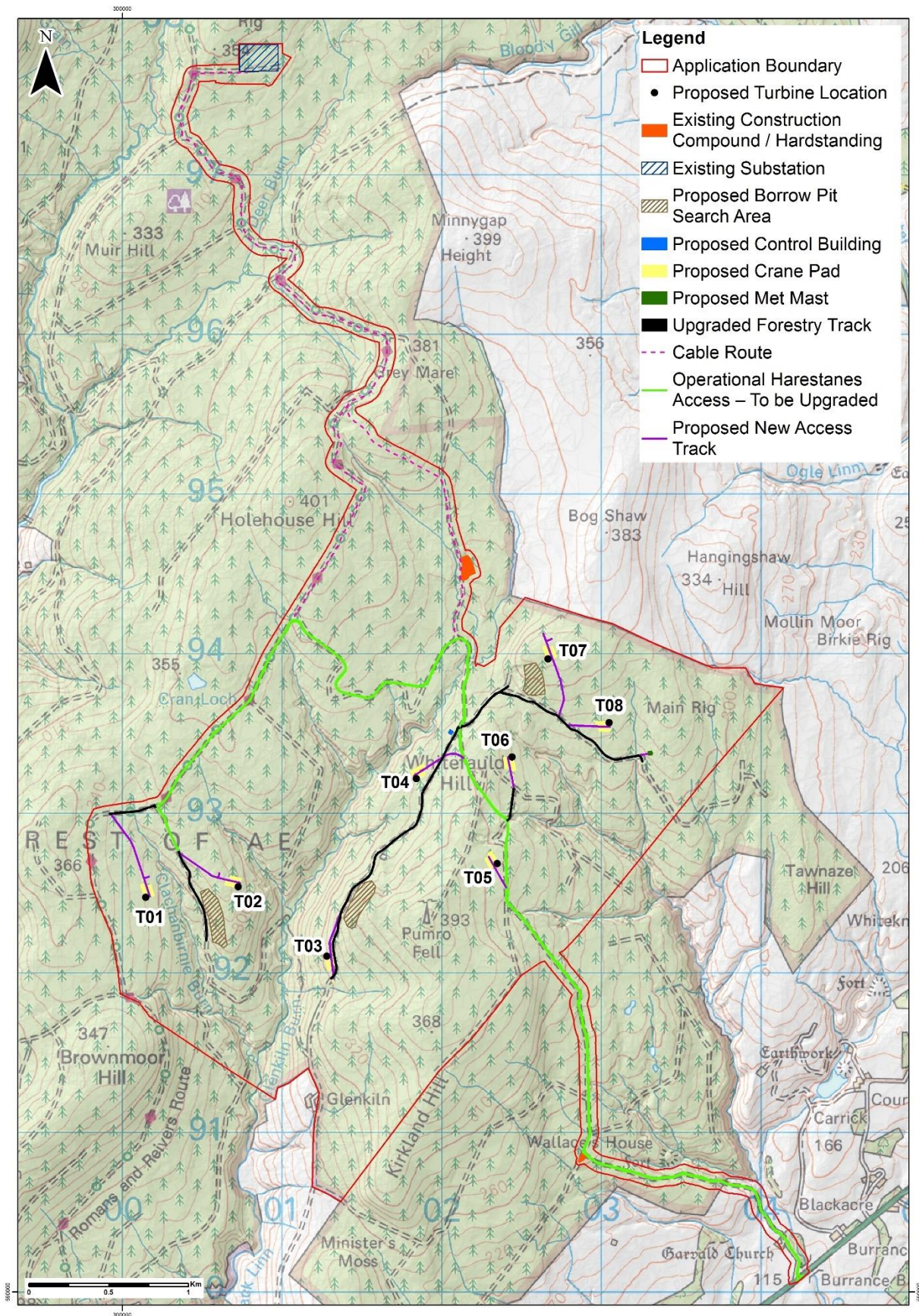


Figure 2: Site Layout Plan

3.2 Construction

3.2.1 Access to Site

35. It is proposed that the turbine components would be delivered to the King George V Dock in Glasgow. The turbines would then be moved from the dock to the Site via the motorway (i.e. M8, M74) and then onto the A75 and finally the A701, before using the existing access for the operational Harestanes Windfarm.

3.2.2 Access Tracks

36. Approximately 12,000 metres of existing tracks would be reused and upgraded where required. The existing site access track is in good condition but there may be small sections which require minor upgrades to accommodate the very large turbine component deliveries. Some new passing places would be required to allow the passage of abnormal loads carrying a longer length blade and turning areas for the long vehicles. Approximately 20 percent of the access tracks would be new tracks; these have been designed to avoid sensitive environmental receptors.

3.2.3 Borrow Pits

37. To minimise the amount of material needed to be brought onto the site, borrow pits would be used to source material needed for construction of aspects such as roads, crane hardstandings and foundations. Three borrow pit search areas have been identified which would potentially be sufficient to provide the approximately 36,220 cubic metres of material required for the construction of the Proposed Development, although this would be subject to testing the suitability of the rock. If insufficient suitable material is available on Site, material would be imported from local quarries.

3.2.4 Crane Hardstandings

38. To enable the construction of the turbines, a crane hardstanding area at each turbine location would be required to accommodate cranes and construction vehicles. This would comprise a crushed stone hardstanding area measuring approximately 94 metres long by 34 metres wide. Adjacent to the crane hardstanding would be laydown areas approximately 78 metres long by 28 metres wide. These areas would also be used for maintenance works. Smaller, crane assembly areas are also proposed adjacent to the access tracks leading to the crane hardstandings.

3.2.5 Turbine Foundations

39. The turbines would have foundations approximately 30 metres in diameter and would be constructed using reinforced concrete. Foundation excavations would be approximately 3.5 metres deep, depending on ground conditions.

3.2.6 Masts

40. To collect data on wind speed and direction, one 105 metre high temporary mast may be erected dependant on the final turbine selected and would record data for several months before turbine erection. The temporary mast may then be decommissioned and removed, or remain in place for a period of up to 2 years following turbine commissioning.
41. For permanent collection of wind data, the temporary mast may be replaced by a permanent mast at the same location or alternatively a LiDAR station would be located adjacent to the control building at ground level.

3.2.7 Control Building

42. A single storey building would be constructed on a concrete base and would measure approximately 23m long x 14m wide and 7m high. The building would contain the facilities needed to operate and supervise the windfarm once operational. The control building would host solar panels on the roof to produce power for the building and likely include rainwater harvesting for the flushing of toilets.

3.2.8 Construction Compound

43. A construction compound would be required as the base for all construction activities and to provide facilities for the day-to-day needs of the construction workforce. Two locations are proposed, which would be using existing hardstanding areas.

3.3 Grid Connection

44. The Proposed Development will connect into the National Grid via the existing operational Harestanes Windfarm substation. The grid capacity is readily available with no significant network infrastructure upgrades required.
45. To enable the Proposed Development to connect to the National Grid a containerised solution will be used to house the necessary electrical equipment. The container will measure approximately 15m x 3.5m, and will be within close proximity of the existing substation compound and yet to be constructed Battery Energy Storage System (BESS).

3.3.1 Programme

46. The construction period for the Proposed Development is expected to last approximately 12 months (refer to **Table 1**). Normal construction hours would be between 07:00 and 19:00 Monday to Friday and 07:00 to 16:00 on weekends, or as agreed with the Dumfries and Galloway Council's Environmental Health Officer. These times have been chosen to minimise potential disturbance.

| Construction Task | Month | | | | | |
|--------------------------------|-------|---|---|---|----|----|
| | 2 | 4 | 6 | 8 | 10 | 12 |
| Mobilisation | | | | | | |
| Forest Felling | | | | | | |
| Access and Site Tracks | | | | | | |
| Foundations | | | | | | |
| Crane Hardstands | | | | | | |
| Onsite Cabling | | | | | | |
| Turbine Delivery | | | | | | |
| Turbine Erection | | | | | | |
| Commissioning and Testing | | | | | | |
| Site Reinstatement/Restoration | | | | | | |

Table 1: Indicative Construction Programme

3.3.2 Construction Environmental Management

47. The contractor undertaking the construction works would be required to adhere to a Construction Environmental Management Plan. The plan shall describe how the contractor would ensure suitable

management of environmental issues and how construction activities would be carried out following the mitigation measures outlined in the EIA Report and any planning conditions.

48. ScottishPower Renewables would engage an Ecological Clerk of Works, and other specialists as required, during the construction phase to advise on specific environmental issues.

3.4 Operation and Maintenance

49. There is no proposal to limit the lifetime of the Proposed Development.
50. The Proposed Development would be maintained throughout its operational life by a service team comprising three to five full time equivalents. Management of the Proposed Development would typically include turbine maintenance, health and safety inspections and civil maintenance of tracks, drainage and buildings. Additionally, technicians may be required to undertake scheduled and unscheduled maintenance throughout the year.

4 Benefits of the Proposed Development

51. The Proposed Development would deliver the following key benefits:

Renewable energy generation and carbon dioxide emissions:

- production of around 121.4GWh of electricity annually which equates to the annual power consumed by approximately 32,550 average UK households⁴ (depending on the actual turbines installed);
- savings in CO₂ emissions due to the replacement of other electricity sources over the lifetime of the proposed Development and displacement of carbon-emitting generation after 2.1 years of operation;
- contribute to the UK and Scottish Government renewable energy policies, including the commitment by the Scottish Government to achieve 'net-zero' by 2045; and
- maximise the use of the existing infrastructure already in place for the operational Harestanes Windfarm.

Community and Environmental benefits:

- the offering of a package of community benefits to local communities that could include the opportunity for community benefit payments, providing a long-term, flexible revenue which could be used to support community projects;
- the opportunity for communities to invest in the operational development;
- electric vehicle charging points in the Ae Forest carpark (subject to agreement);
- recreational enhancement proposals:
 - financial support to facilitate the purchase of E bikes for rental at the recreational centre (subject agreement);

⁴ Calculated using the most recent statistics from the Department of Business, Energy and Industrial Strategy (BEIS) showing that annual UK average domestic household consumption is 3,729kWh

- promotion of new electric bike routes within Forest of Ae (subject to agreement);
 - promotion of family friendly / beginner biking routes or horse-riding routes around the proposed windfarm using existing and upgraded forest tracks;
 - provision of a shelter with tools for bike maintenance and a place to shelter / picnic within the windfarm (subject to agreement);
 - provision of information boards regarding the Proposed Development; and
 - support for the employment of seasonal ranger to assist with the management of core footpaths in the area.
- implementation of a Habitat Management Plan.
 - the Proposed Development would be liable for non-domestic rates, the payment of which would contribute directly to public sector finances.

Construction employment and economic benefits:

- opportunities for suppliers of a wide range of goods and services within Dumfries and Galloway and Scotland as a whole;
- benefits to local businesses, such as accommodation businesses and shops, that supply goods and services to construction workers; approximately £3.1 million net Gross Value Added (GVA) of the construction spend would be spent in the local (Dumfries & Galloway) economy;
- total direct estimated construction spend of £59.4 million which would result in an approximately £21.4 million contribution to the Scottish economy;
- the Scottish economy would be boosted by some £9.2 million net Gross Value Added (GVA);
- peak construction employment of around 52 jobs in Dumfries and Galloway; and
- support for approximately 155 jobs for Scotland as a whole.

Operational employment and economic benefits:

- the Scottish economy would benefit by some £208,285 to £309,068 net GVA during the operational phase through direct, indirect and multiplier effects, with around £160,558 to £267,597 contribution to the economy of Dumfries and Galloway;
- expectation for between three and five new full time employees (engineers and technicians) to be employed locally and further posts would be created elsewhere in Scotland; and
- additional benefits would accrue to the local supply chain as a result of services supplied to the operation of the Proposed Development.

5 Consultation

52. Consultation is an important part of the EIA process and was undertaken with a range of organisations and groups; from government bodies, local trusts, community councils, members of the public and other groups who have an interest in the local area and/or Proposed Development.
53. The purpose of consultation before the submission of the application is to:
- ensure that consultees and other bodies with a particular interest in the proposal are provided with an opportunity to comment at an early stage in the EIA process;
 - obtain information regarding existing environmental site conditions;

- establish key environmental issues and identify potential effects to be considered during the EIA;
- identify those issues which are likely to require more detailed study and those which can be justifiably excluded from further assessment; and
- provide a means of confirming the most appropriate methods of assessment.

5.1 Statutory Consultation

54. A formal Scoping Opinion was requested from the Scottish Ministers in April 2020 through the submission of the EIA Scoping Report. The EIA Scoping Report contained information on the existing environmental conditions of the Site, details of the Proposed Development and the proposed assessment topics and methods. A meeting to discuss the EIA Scoping Report was held in May 2020 and was attended by the Energy Consents Unit, Dumfries and Galloway Council, NatureScot and the Scottish Environment Protection Agency. The Scottish Ministers issued their Scoping Opinion in August 2020.
55. Further consultation has taken place with consultees throughout the EIA process to discuss and agree on the assessment methodologies for specific topics in more detail. A site visit also took place in August 2020 and was attended by members of the project team, Dumfries and Galloway Council's Planning Case Officer and the NatureScot Officer.

5.2 Public Consultation

56. The COVID-19 pandemic and the Scottish Government's restrictions on public gatherings has influenced how public consultation has taken place, as traditional face-to-face events in the community have not been possible.
57. However, ScottishPower Renewables recognises the importance of engaging with the public and therefore has undertaken a programme of public consultation which meets the Scottish Government's temporary guidance during this period.
58. ScottishPower Renewables has written to the seven local Community Councils and local Councillors to provide updates on the project and offer meetings to discuss details of the project. A meeting took place with Ae Community Council in June 2020.
59. Two rounds of public consultation have taken place:
- Firstly, a consultation leaflet was sent to addresses within 10 kilometres of the Site in May 2020. The leaflet introduced ScottishPower Renewables, described the Proposed Development and set out the need for an EIA.
 - A second round of consultation was undertaken in August/September 2020. A further leaflet was sent to the same recipients and provided an update on the project design, EIA progress and advertised the virtual public consultation event. This event was held in September 2020. A dedicated website was made available, which provided public consultation material including information of the proposed design, updates on the environmental assessment findings to date and a feedback form for members of the public to provide comments, or request a direct discussion with the project team.
60. Further information on consultation is contained in the Pre-Application Consultation (PAC) Report that is provided alongside the application for consent.

6 The Environmental Impact Assessment

61. Under the EIA Regulations the Proposed Development is considered to have the potential to result in significant effects to the environment. The EIA considers the effects of the Proposed Development during construction and operation on the following topics:
- landscape and visual (effects on the character of the landscape and views from agreed locations);
 - hydrology, hydrogeology, geology and soils (effects on surface water, groundwater, peat, rocks and soils);
 - ecology and biodiversity (effects on protected habitats, flora and fauna);
 - ornithology (effects on birds and protected bird habitats);
 - noise (effects on local properties from noise and vibration);
 - archaeology and cultural heritage (effects on historic assets and the setting of historic sites);
 - access, traffic and transport (effects from traffic travelling to, and from, the Site);
 - socio-economics, tourism and recreation (effects on the local and national economy, local tourism businesses and recreational facilities); and
 - other issues, such as aviation and radar, telecommunications, forestry, shadow flicker and carbon balance.
62. A summary of the baseline conditions, the proposed mitigation, the resulting residual effects and the cumulative effects for each environmental topic is provided below.

7 Landscape and Visual

63. The Landscape and Visual Impact Assessment considers the potential effects of the Proposed Development on the landscape, how the landscape is perceived and the effects on visual amenity within a defined study area. Effects due to the addition of the Proposed Development to other existing and proposed windfarms in the area are also considered.
64. The assessment considers the potential for significant landscape and visual effects within an initial 45 kilometre radius area, and a detailed assessment within a 30 kilometre radius area.

7.1 Baseline

65. The Proposed Development is located within the south-eastern section of the Forest of Ae, an area of forested foothills landscape which has a large scale, broad undulating plateau-like landform. The Site has several high points, with the highest being Pumro Fell at 393 metres. Along with the presence of the operational Harestanes and nearby Minnygap Windfarms, the local landscape characteristics are considered suitable for windfarm development.
66. Potential visual receptors include residents in isolated properties and local settlements, the local road network, users of long distance walking routes, core paths, mountain bike trails, local and national cycle routes and visitors to recreational/tourist destinations such as Drumlanrig Castle and the 7Stanes mountain bike trail centre.

7.2 Assessment

67. The assessment used various methods including field surveys, map analysis, computer modelling of theoretical views and the production of photomontages which use computer software to illustrate what the Proposed Development would look like onto photographs of the Site.
68. The Proposed Development would lie within an active commercial forestry area. The proposed use of existing infrastructure would minimise the amount of felling and clearance required. The effects of the Proposed Development on the physical landscape are considered to be not significant.
69. Effects upon landscape character are predicted due to the Proposed Development increasing the presence of wind turbines within the local landscape character type. However, the design has positioned the turbines to avoid the exterior of the foothills so that the Proposed Development would be perceived as a natural extension to the operational Harestanes Windfarm.
70. The difference in scale between the turbines of the Proposed Development (200 metres to blade tip) over the operational Harestanes Windfarm turbines (125 metres to blade tip) would provide the main potential for significant effects on landscape character. However, the undulating topography of the Site reduces the contrast in scale from some areas where the operational Harestanes Windfarm turbines are on higher ground than the Proposed Development and they appear at a similar height.
71. Visual effects have been assessed at 21 locations that were selected to represent visibility from a range of receptors and distances. To the south and south east of the Site, the Proposed Development would become a notable feature in views towards the foothills. However, the turbines have been positioned to reduce the prominence of the closest turbines in views from properties at the edge of the Forest of Ae and the considerable amount of woodland, hedgerows and tree cover would limit frequent and open views. Although there are no properties which lie within 2 kilometres of the turbines, Residential Visual Amenity Assessment was undertaken to consider those properties that lie at or just beyond 2 kilometres and found that there would be no significant effects on their visual amenity.
72. The assessment considered the potential for visual effects along key routes, such as the A701, Roman and Reivers, and Annandale Way long distance walking routes, core paths and Regional Cycle Route 10.
73. Although the Site is not subject to landscape designation, there are designated sites nearby. This includes several Regional Scenic Areas and a Wild Land Area. The assessment included consideration of whether the Proposed Development would affect the qualities or characteristics of these areas.
74. As the proposed turbines are above 150 metres in height, they would require lighting to assist detection by aircraft. An assessment has been made on the effects of this lighting on the landscape and visual receptors as this would introduce lighting in an elevated, currently unlit landscape. However, effects are moderated by the close influence of existing lighting associated with nearby settlements and transport links. The upland landscape to the north of the Site also limits the visual influence on the more sensitive darker rural areas further north and north east and to the west and north west.
75. The assessment has also considered the potential for landscape and visual effects when combined with other operational or consented windfarms within the area. The operational Harestanes Windfarm, Minnygap Windfarm and Dalswinton Windfarm are the closest to the Site and key to the assessment. All other operational, consented or application windfarms would be beyond 18km from the Site and after initial consideration were not found to have potential to influence the assessment.

7.3 Significance

76. The assessment concluded that there would be no significant landscape or visual effects during construction due to the brief duration and that the works would be contained within an active commercial forest.
77. Significant adverse landscape effects have been identified for three landscape character types which lie within the Site and immediately surrounding the Site to the south and south east. This is due to an increase in the presence of wind turbines and difference in scale of the proposed turbines when compared with the existing turbines of the operational Harestanes Windfarm resulting in a greater visual influence over the adjacent landscapes. Significant adverse landscape effects from the turbine aviation lighting were also found for these landscape character types, where the Proposed Development would be introducing lights into a unlit area.
78. Significant adverse visual effects are predicted to be contained to residents in the upland fringe area south of the Site and the settled Annandale area within 8 kilometres to the south and south east. The Proposed Development would become a notable feature on the foothills in views from these locations. Significant adverse visual effects are predicted for short sections of the Annandale Way where it is close to the Site within the aforementioned area as the Proposed Development would be a prominent feature in views. For all other key routes, no significant visual effects are predicted. Significant adverse visual effects from the turbine aviation lighting have been assessed for these same areas, in locations where there are no close influences from lighting associated with existing settlements.
79. A lighting mitigation strategy is being proposed that would limit effects from aviation lighting on landscape and visual receptors once implemented.
80. No significant landscape or visual effects are predicted on landscape designated areas, visitor attractions or cumulative effects with other windfarms.

8 Hydrology, Hydrogeology, Geology and Soils

81. The hydrology, hydrogeology, geology and soils assessment considers the potential effects of the Proposed Development upon surface water and groundwater, surface water drainage patterns, groundwater dependent terrestrial ecosystems, private water supplies, soils and peat.
82. The assessment considers potential impacts within the Site, as well as within 1 kilometre for groundwater effects and 5 kilometres downstream for surface water, private water supplies and impacts upon relevant designated sites.

8.1 Baseline

83. The majority of the Site is within the Water of Ae catchment, whilst the north of the Site is located within the River Annan catchment. There are several watercourses which are located within or border the Site, most notably the Water of Ae which runs north-south through the Site. There are several distinct valleys within the Site, featuring a number of relatively small upland watercourses which drain the area.

84. Peat is found in open areas, such as forestry rides, clearings and in the vicinity of surface water bodies. Peat surveys were undertaken and collected over 1,200 soil and peat depth records.
85. The bedrock geology across the Site broadly comprises various forms of sandstone, whereas the more recent superficial geological deposits consist of sandy silty clays, gravel and peat, amongst others.
86. Groundwater-dependent terrestrial ecosystems are present within the Site. However, their dependency on groundwater is considered low, as where they are present they are associated with surface water moving from the surrounding hills downslope.
87. There are no designated sites hydrologically connected within 5 kilometres of the Site.

8.2 Assessment

88. The assessment mainly considers potential construction impacts since once operational the Proposed Development has limited potential for impacts upon this topic. Potential impacts during construction include impacts on private water supplies, pollution incidents, soil erosion and sedimentation of watercourses, construction activities changing surface water flows or groundwater levels and impacts upon peat. Once operational, potential impacts are considered limited to the drainage features of the Proposed Development impacting groundwater levels.
89. Of the measured peat depths, almost 90% were less than 1 metre. Peat was generally located in the central site area, with deeper deposits on the lower ground. Due to the presence of peat, a peat landslide hazard and risk assessment has been undertaken and a soil and peat management plan prepared. The design has ensured that turbine positions have avoided areas of deeper peat.
90. The assessment has identified that there are no private water supplies which are at risk of impacts.
91. Watercourse crossings have been minimised as part of the design. However, 10 watercourse crossings would be required which cross watercourse mapped on OS 1:50,000 scale map and therefore subject to regulatory requirements; none of these are new watercourse crossings; they are all associated with existing tracks, some of which may require upgrade. 23 further locations would require crossing a minor watercourse.

8.3 Significance

92. The hydrology, peat and ground conditions (e.g. stability) within the site have influenced the design of the infrastructure layout to avoid and/or minimise potential effects. The layout has, where possible, maintained a minimum distance of 50 metres from watercourses, avoided deeper areas of peat, minimised the number of watercourse crossings required, ensured appropriate crossing structures are planned and avoided areas of potential peat stability concern.
93. Following the implementation of mitigation measures, no significant effects during construction or operation of the Proposed Development or in combination with other developments are predicted.

9 Ecology and Biodiversity

94. The ecology and biodiversity assessment considers the potential effects of the Proposed Development on features such as protected species and habitats.
95. In line with relevant guidance, the assessment is based upon various study areas due to the different sensitivities of the ecological features, which dictates the potential for them to be affected by the Proposed Development.
96. A desk study exercise was conducted to determine the statutory designated sites, non-statutory designated sites and ancient woodland sites that would be potentially significantly affected by the Proposed Development.

9.1 Baseline

97. Baseline information has been collected from a combination of desk study, consultation and a programme of site surveys. The surveys found that the Site contains habitat suitable for supporting reptiles and amphibians, otter, water vole, red squirrel, pine marten, bats and brown trout.
98. Habitats on Site have been heavily influenced by the commercial forestry operations and broadly consist of coniferous plantation forestry with narrow areas of heath, mire or grassland.
99. There are no statutory sites designated for ecological conservation within the Site. The nearest designated site is Black Loch Site of Special Scientific Interest, which is over 3 kilometres south of the Site and is not connected. Two non-statutory designated have also been identified; a grey squirrel control area which the Site is within, and the transition zone of and the Galloway and Southern Ayrshire Biosphere Reserve which is located 3.2 kilometres west. Three areas of Ancient Woodland were also identified within or directly adjacent to the Site.

9.2 Assessment

100. The habitat surveys undertaken have concluded that the Site predominantly features habitats of no greater than regional importance, which have been heavily modified by the commercial forestry operations. The design of the Proposed Development has considered the most valuable areas of habitat, such as mire communities. A Habitat Management Plan would also be prepared and delivered as part of the Proposed Development, which would detail areas of habitat creation, management and monitoring.
101. The design has focused on avoiding important habitat for the species, minimising the potential for injury and killing, disturbance and displacement. The assessment of effects on protected and notable species focussed on red squirrel, pine marten and bats as these are considered most likely to be potentially directly or indirectly affected. All other species were considered unlikely to be present or that significant effects are unlikely once protective measures are considered. Further species surveys would also be undertaken prior to construction works starting to determine if further measures are required.

9.3 Significance

102. No significant effects on important ecological features are considered likely when the Proposed Development is considered alone, or in combination with other plans and projects, with the incorporation of embedded and additional mitigation.

10 Ornithology

103. The ornithology assessment considers the potential effects of the Proposed Development upon birds.
104. The assessment is based on data gathered from consultation, a desk-based study and a 12-month programme of ornithological field surveys.

10.1 Baseline

105. Various field surveys have been undertaken including flight activity, scarce breeding raptor, lekking black grouse, breeding nightjar and moorland breeding bird surveys. Overall, the survey period spanned September 2019 and August 2020.
106. The flight activity survey recorded 160 flights from 12 species over and around the Site. Two active goshawk nests were identified within approximately 1 kilometre, while the moorland breeding bird survey recorded 14 target species. The lekking black grouse and breeding nightjar surveys did not record any findings.
107. Two designated sites of ornithological interest have been identified. The nearest is Castle Loch Lochmaben Special Protection Area and Ramsar site, at approximately 9 kilometres from the Site. The Upper Solway Flats and Marshes Special Protection Area and Ramsar site is approximately 17 kilometres from the Site.

10.2 Assessment

108. Considering breeding birds, although several bird species were identified as being of conservation concern, most were not considered to be present in significant numbers compared to their respective regional or national populations. For many species, their distribution was out with the Site and the coniferous forestry habitat of the Site was not suitable for such species.
109. The assessment found that there is no evidence of connectivity between the Site the two identified designated sites for the relevant bird species. Therefore, in agreement with NatureScot and the Royal Society for the Protection of Birds, no impacts are predicted and the designated sites have not been assessed further.
110. One notable species that was identified to regularly use the coniferous forestry within the Site is goshawk. No direct loss of nest sites for goshawk is predicted due to the distance of identified nest sites from the Site. Proposed mitigation includes sensitive timing of works, monitoring and the exclusion zones for works around active nest sites during the construction phase.
111. Most species recorded during the flight activity surveys were at a low level and/or distributed out with the Site. The assessment considered the risk of collision of goshawk with the turbines once operational, and predicted mortality rate to be very low in comparison to natural mortality rates.
112. An assessment of potential cumulative effects to goshawk from the operation of the Proposed Development and two other windfarms within 10 kilometres was also undertaken.

10.3 Significance

113. Some adverse effects on goshawk from the Proposed Development regarding displacement, disturbance and barrier effect were identified but all were assessed not significant.

114. The assessment of potential cumulative effects on goshawk with other windfarms concluded that while effects of habitat loss, disturbance, displacement, barrier effect and collision mortality may occur, the effects would not be significant.
115. Overall effects from the Proposed Development on ornithological receptors are not significant.

11 Noise

116. The noise assessment considers the potential effects of noise and vibration during construction and operation on nearby receptors, including residential properties.
117. During construction, no works would be undertaken within 300 metres of noise or vibration receptors. The main source of potential vibration would be from the borrow pit search areas, due to the potential to use blasting to obtain the material. Therefore the construction assessment is based on the area from the borrow pit search areas to the closest sensitive receptors.
118. The assessment of potential operational impacts is based on noise-sensitive receptors which have been selected due to having the greatest potential to be impacted, either from the Proposed Development operating in isolation, or when combined with other windfarms within 5 kilometres.

11.1 Baseline

119. A baseline noise survey has been undertaken at four properties close to the Site. The locations were selected as they are representative of the receptors identified in the assessment.
120. The operational Harestanes Windfarm, Dalswinton Windfarm and Minnygap Windfarm were identified as having the potential to cause a cumulative noise impact with the Proposed Development.
121. The six closest receptors to the operational Harestanes Windfarm were identified, and the two closest receptors to both Dalswinton and Minnygap Windfarms were identified as having the potential to be subject to a cumulative impact with the Proposed Development in combination with other nearby developments.
122. A total of 20 receptors were considered sensitive within the vicinity of the Proposed Development and these three identified cumulative developments and were selected for assessment. The majority of these were residential.

11.2 Assessment

123. Construction works would be sufficiently removed from noise and vibration receptors and have therefore not been included in the assessment. Construction traffic to the Site would be routed along the A701 rather than using other lesser trafficked routes, and then would enter the site via the operational Harestanes Windfarm access road which is at sufficient distance from the closest sensitive receptors. This would be controlled via the Construction Environmental Management Plan.
124. Should blasting be required at the borrow pits, the assessment concluded that they would be at sufficient distance from receptors such that significant vibration or air overpressure effects would not arise. Good practice mitigation measures to reduce potential effects would be employed should such works be necessary.

125. Operational wind turbine noise levels have been found to fall within the noise level limits stated in current best practice and national and local planning policy. The Proposed Development would comply with noise level limits both operating in isolation and simultaneously with other local windfarm developments.

11.3 Significance

126. Due to the distance from the Site and the nearest receptors, no significant noise or vibration effects are predicted during construction.
127. The operation of the turbines would be within the applicable noise limits. No other noise generating items would be introduced as part of the Proposed Development. Traffic generation during the operational phase would be extremely low, and is not predicted to result in significant noise effects.
128. Overall, no significant noise or vibration effects are predicted.

12 Archaeology and Cultural Heritage

129. The archaeology and cultural heritage assessment considers the potential effects of the Proposed Development upon heritage assets such as historic buildings, buried archaeological sites and monuments and designated cultural heritage sites such as conservation areas, amongst others.
130. The assessment considers the potential for direct impacts upon assets within the Site. A wider study area of 10 kilometres is also included to understand the local historical context and to consider the potential for indirect impacts, such as upon the setting of an asset.

12.1 Baseline

131. Baseline data has been collected via a combination of desktop work, consultation and a targeted walkover survey.
132. 12 heritage assets have been identified within the Site, and seven of these have the potential to be directly impacted during construction. The 12 heritage assets include one Listed Building and 11 undesignated assets dating from the Post-Medieval and Modern period.
133. A total of 104 heritage assets have been identified within 10 kilometres. Of this, the following 32 heritage assets are within 5 kilometres of the turbine locations:
- 11 Scheduled Monuments;
 - 13 Listed Buildings (10 Category B, and 3 Category C);
 - 1 Garden and Designed Landscape;
 - 1 Archaeologically Sensitive Area;
 - 2 Non-Inventory Gardens and Designed Landscapes;
 - 3 undesignated heritage assets of regional significance; and
 - 1 undesignated heritage asset deemed to be of national significance.

12.2 Assessment

134. All identified heritage assets are deemed to be of high or medium value as designated heritage assets or undesignated heritage assets of national significance.

135. Computer modelling was undertaken to identify the potential visibility of the heritage assets. This found that 35 of the heritage assets identified within 10 kilometres of the turbine locations would have no visibility of the Proposed Development and therefore was not included within the assessment.
136. The early identification of heritage assets within the Site has enabled potential impacts upon three heritage assets to be avoided. This includes a sheepfold, Donken's Cottage and the memorial to James Ferguson.
137. Within the Site, three heritage assets have been identified as potentially being directly impacted by construction activities such as groundbreaking, vehicle movements, material storage and landscaping. These include Whitefaulds Quarry, Clachanbirnie Wall and Pumro Fell Cairn. There is also the potential for direct impacts upon currently unknown, buried archaeological remains however the assessment considers the likelihood of this to be very low. The construction environmental management plan would include measures such as a 50 metre demarcation of heritage assets near to works, archaeological recording of any assets to be truncated or removed and written guidelines on how to avoid damage to heritage assets.
138. The assessment included consideration of potential effects upon the setting of heritage assets once the Proposed Development is operational. This concluded that there would be no significant adverse effects, with one asset having a slight beneficial effect.

12.3 Significance

139. The layout of the Proposed Development has been designed as far as possible to avoid direct impacts on the identified assets. Further proposed mitigation during construction would minimise the potential effects so that they are not considered significant. Once operational, the Proposed Development is not predicted to significantly affect the setting of local heritage assets either on its own or in combination with other operational or consented windfarms.
140. Therefore overall, no significant effects upon cultural heritage assets are predicted.

13 Access, Traffic and Transport

141. The access, traffic and transport assessment considers the potential effects along the transport routes due to vehicle movements associated with the construction of the Proposed Development. During operation, the only daily vehicle trips accessing the Site would be made by one or two vehicles carrying out routine maintenance. Therefore, an assessment of traffic impacts during the operational phase has been scoped out of this assessment.
142. The Site would be directly accessed from the A701 via the operational Harestanes Windfarm access. At this stage of the project, assumptions have been made relating to the routing of construction traffic, as this would be determined by the contractor appointed for the construction works. As such, the assessment's study area is the A75(T) between the junction with the A76 and the A709, and the A701(T) between the junctions with the A75(T) and the A74(M).

13.1 Baseline

143. Baseline data has been collected via a combination of desktop work, consultation and a site visit to review the potential access routes and identify any constraints.

144. Traffic count and personal injury accident data for roads within the study area have been obtained from the Department for Transport. The most recent data available was for 2019.
145. There are no Core Paths recorded by Dumfries and Galloway Council close to the proposed site access and the A701 does not have any pedestrian or cyclist infrastructure near the site access junction. Pedestrian facilities in the vicinity of the proposed site access are limited. There are no on-road National Cycle Routes on the proposed access routes. Regional Cycle Network Route 10 passes near the A701.
146. There are several proposed, consented and operational windfarm developments located within 30 kilometres of the Site. Any sites that are currently in operation would generate minimal light goods vehicle and/or car movements associated with routine maintenance and it is considered unlikely that any of these would share the same access route as the Proposed Development.

13.2 Assessment

147. Data on road traffic accidents across the study area was reviewed, which showed that there were a limited number of heavy goods vehicle incidents that occurred in the past three years (2017 to 2019) on the road network in the vicinity of the Site.
148. The assessment indicates that there are no road capacity issues and that there is sufficient spare capacity within the trunk and local road network.
149. It is proposed that the primary port for delivery of the turbine components is King George V Dock in Glasgow. Construction traffic requirements are predicted to be limited to staff transport, deliveries and abnormal loads consisting of turbine components and heavy lift cranes. The predicted peak number of construction traffic movements in a month is 116. The assessment identified that there is potential for temporary increased driver frustration on the A701 due to an increase in turning movements. Proposed mitigation would include a Construction Traffic Management Plan which would be agreed with Dumfries and Galloway Council and Transport Scotland.

13.3 Significance

150. Although the construction works would increase the number of vehicles on the local roads, the assessment identified that the road network has sufficient capacity and once the proposed mitigation measures are considered, no significant effects are predicted.
151. Overall, no significant effects upon access, traffic or transport are predicted.

14 Socio-economics, Tourism and Recreation

152. The socio-economic, tourism and recreation assessment considers the potential effects of the Proposed Development on aspects such as employment and economy, recreational assets and tourism facilities.
153. Various study areas are used in the assessment. The socio-economic assessment considers the potential for effects within the local area of Dumfries and Galloway and also regionally across Scotland. The tourism assessment considers potential effects within 15 kilometres while the recreation

assessment considers 5 kilometres. The assessment of potential cumulative effects considers other windfarm developments within 30 kilometres.

14.1 Baseline

154. Dumfries and Galloway has a smaller proportion of working-age population (those aged between 16 and 64) compared to Scotland and Great Britain. In 2019, 58.4% of the population were aged between 16 and 64 in Dumfries and Galloway, compared to 64% in Scotland. The unemployment rate in Dumfries and Galloway between 2019 to 2020 was 2.9%, which is lower than Scotland at 3.3%.
155. Human health and social work activities are the largest employment industry sector within Dumfries and Galloway. This is followed by wholesale and retail trade, repair of motor vehicles and motorcycles and then manufacturing.
156. The local tourist attractions include Ae 7stanes mountain biking with trails located to the west of the Site within the Forest of Ae, golf courses, museums and castles. The closest tourist accommodation located approximately 5.5 kilometres south east of the Site.
157. Local businesses include Adrenalin Uplift which provides paid mountain bike uplift and private bike hire services. Ae Forest Bike Shop and Café is close to the Site and provides mechanical service for bikes and a cafe for visitors and mountain bikers.
158. There are 16 formal and informal recreational routes located within the 5 kilometres; eight of these are located within the Site, including the Romans and Reivers Long Distance Route, 2 Core Paths, 2 Heritage paths and Regional Cycle Route 10.

14.2 Assessment

159. The Proposed Development is estimated to generate approximately £59.4 million of construction spend. Of this, approximately £7.1 million is expected to benefit the local economy and £21.4 million anticipated to benefit the Scottish economy.
160. Construction of the Proposed Development is estimated to generate 52 jobs in Dumfries and Galloway and 155 within Scotland.
161. The Ae 7Stanes car park, Ae Forest Bike Shop and Café and the 7Stanes mountain bike trails are the closest tourist and recreational assets to the Site. Beyond this, Closeburn Castle is the closest tourism asset at just under 8 kilometres. There would be limited impacts upon access to the 7Stanes bike trails and the distance from the works to the assets is unlikely to detract visitors.
162. The construction of the Proposed Development would directly affect Core Path 39 (Ae Forest Large Circular), Romans and Reivers Long Distance Route, Regional Cycle Route 10 and Locharbriggs-Beattock local cycle route. However, an Access Management Plan would be prepared and would ensure that access is maintained throughout the construction period with temporary local diversions implemented where required.
163. Construction of the Proposed Development is considered unlikely to discourage tourists from visiting Dumfries and Galloway and the local area, including Ae. Nearby tourist accommodation would likely be required over the construction phase to accommodate construction workers. Since there are several accommodation lettings in the area, it is not considered that the construction of the Proposed Development would limit accommodation for tourists.

164. Once operational, the Proposed Development is estimated to generate approximately £2.7 million of operation and maintenance spend annually. Of this, it is anticipated that approximately £1.1 million would benefit the local economy and £1.6 million would benefit the Scottish economy. The operation and maintenance phase of the Proposed Development is predicted to generate three to five jobs within Dumfries and Galloway and four to six jobs within Scotland.
165. The existing forest tracks that would be used as an access track for the construction works would be upgraded as part of the Proposed Development and therefore their condition improved.
166. ScottishPower Renewables is committed to offering a package of community benefits to local communities. Discussions would be held with local stakeholders to decide which communities would be appropriate to participate in any community benefits offered. It is expected that any community benefit funds could provide long-term revenue which could be used to support community projects. In addition to the community benefits fund, the local community could also have an opportunity to invest in the Proposed Development through participation in a community investment scheme.
167. Recreational enhancements are also being proposed as detailed in Section 3, which are subject to further development.
168. ScottishPower Renewables are proposing to promote and enhance the recreation value of the Proposed Development by including a range of measures that improves access and recreation features as follows:
 - electric vehicle charging points in the Ae Forest carpark (subject to agreement);
 - financial support to facilitate the purchase of E bikes for rental at the recreational centre (subject to agreement);
 - promotion of new electric bike routes within Forest of Ae (subject to agreement);
 - promotion of family friendly / beginner biking routes or horse-riding routes around the proposed windfarm using existing and upgraded forest tracks;
 - provision of a shelter with tools for bike maintenance and a place to shelter / picnic within the windfarm (subject to agreement);
 - provision of information boards regarding the Proposed Development; and
 - support for the employment of seasonal ranger to assist with the management of core footpaths in the area.

14.3 Significance

169. The construction phase would have a beneficial, although not significant, effect upon the local and regional economy and from employment creation. With the proposed measures of temporary diversions and an Access Management Plan in place, the predicted adverse effects upon recreation and tourism assets during construction would not be significant.
170. The proposed recreational enhancements would provide a recreational benefit during the operation of the Proposed Development, although not significant.
171. Overall, no significant socio economic, tourism or recreation effects are predicted as a result of the Proposed Development, or in combination with other windfarm developments.

15 Other Issues

172. The Other Issues chapter of the EIA Report presents the assessments of forestry and land use, aviation and radar, carbon balance, telecommunications and shadow flicker, Eskdalemuir Seismic Recording Station and Cumulative effect interactions.

15.1 Forestry and Land Use

173. The Proposed Development lies entirely within existing commercial forestry plantations owned by the Scottish Ministers and managed by Forestry and Land Scotland. The area contains largely commercial conifers with areas of mixed broadleaves and open ground. There are also small pockets of ancient/native woodlands.
174. The forestry assessment identifies areas of forest which would have to be removed for the construction and operation of the Proposed Development. It describes the plans for felling, restocking and forest management practices, the process by which these were determined; and the changes to the physical structure of the forest that would occur. It further discusses the issue of forestry waste arising from the Proposed Development.
175. The design adopts a 'key hole' approach to the siting of the turbines into existing crops, which minimises the area of forest which requires felling to an essential 50 metre radius around each turbine; a 10 metre radius around infrastructure; and a 30 metre corridor applied to all roads to be used for turbine delivery and as part of the construction phase. Where this is not possible, felled areas would be included in the restocking plan produced as part of the EIA Report.
176. The assessment predicts that approximately 82.23 hectares of felling would be required to facilitate construction. Following consideration of restocking, a net loss of approximately 61.23 hectares of woodland area is predicted as a result of the construction of the Proposed Development, which would comprise a decrease of conifer woodland by 49.1ha and broadleaf woodland by 12.23ha (including a small area of ancient/native woodland). ScottishPower Renewables is committed to providing appropriate compensatory planting; the extent, location and composition of which would be agreed with Scottish Forestry⁵.

15.2 Aviation and Radar

177. Wind turbines cause an issue for the radars used by civilian and military air traffic control because the characteristics of a moving wind turbine blade are similar to that of an aircraft.
178. An aviation assessment has identified that the turbines of the Proposed Development would be detectable by aviation radars. ScottishPower Renewables are engaging with aviation stakeholders to agree measures to mitigate the effects on the radars, which may include blanking out a small area of the radar display for certain turbines and using data from another radar unaffected by turbines to fill in these blanked areas.
179. Subject to the agreement of proposed mitigation measures with aviation stakeholders, there are no significant areas of concern predicted for airspace or airspace users.

⁵ With regard to ancient woodland compensation, NatureScot would also be consulted.

15.1 Carbon Balance

180. The Scottish Government uses an assessment of the carbon impact of windfarm development to support the process of determining windfarm developments in Scotland.
181. A desktop assessment was undertaken to determine the carbon balance of the Proposed Development. This assessment estimates the carbon associated with the construction, operation and decommissioning of the windfarm and how long it would take for the windfarm to generate enough green electricity to pay back the carbon used. The findings indicate that the Proposed Development would pay back the carbon emissions associated with its construction, operation and decommissioning in 2.1 years when compared to the fossil fuel mix of electricity generation.
182. It is expected that the carbon savings of the Proposed Development would be substantially greater than the attributable carbon emissions.

15.1 Telecommunications

183. Wind Turbines can interfere with fixed radio communications links operated by telecommunication operators. Only those links which travel across the Site and close to the wind turbine locations could be affected.
184. A telecommunications desktop assessment and consultation exercise has been undertaken which identified telecommunication links which cross the Site. These have been taken into consideration during the design of the Proposed Development and impacts have been avoided.

15.2 Shadow Flicker

185. Shadow flicker refers to the flickering effect caused when rotating wind turbine blades periodically cast shadows over nearby properties.
186. The assessment considered a 1.5 kilometre area around each of the wind turbine locations and receptors were identified.
187. Through the design process, turbines which may have caused a shadow flicker impact have been removed and all turbines are further than 1.5 kilometres away from shadow flicker receptors. Therefore, no shadow flicker impacts are predicted.

15.3 Eskdalemuir Seismological Recording Station

188. The Eskdalemuir Seismic Array is one of 170 seismic stations across the globe used to monitor compliance with the Comprehensive Nuclear-Test-Ban Treaty. The UK is bound by the Test-Ban Treaty not to compromise the detection capabilities of the Eskdalemuir station. To safeguard the Array, a seismic noise “budget” has been set. An exclusion zone of 10km has been created around the Array, with wind turbine developments in the 10-50km zone around the Array being subject to an allocation of seismic budget; the nearest Proposed Development turbine to the Array at over 26km.
189. At present, the Ministry of Defence has allocated all remaining seismic budget to developments in operation or in planning. ScottishPower Renewables is a member of the Eskdalemuir Working Group and is working with government and industry representatives to seek to resolve this issue, and is confident that the current work of the Eskdalemuir Working Group will release sufficient budget to allow the Proposed Development to be built.

15.4 Cumulative Effect Interactions

190. The potential for cumulative effects on a receptor due to effects from the Proposed Development in combination with effects from other developments has been covered within the individual topics above. Another type of cumulative effect is where more than one type of effect is experienced by a receptor due to the Proposed Development alone. The combined or synergistic effects on a particular receptor may collectively cause a more significant effect than individually. A theoretical example is the culmination of disturbance from dust, noise, vibration, artificial light, human presence and visual intrusion on sensitive fauna (e.g. certain bat species) adjacent to a construction site.
191. An assessment has been undertaken to identify potential cumulative effect interactions which concluded that construction phase cumulative effects are unlikely.
192. During operation of the Proposed Development, there is the potential for cumulative effects on properties in close proximity to the Site to the west, south and east as they may experience both noise and visual impacts. Individually these impacts are not predicted to be significant.

15.5 Summary

193. Following the implementation of proposed mitigation, it is considered that there would be no likely significant environmental effects as a result of the Proposed Development on any of topics covered in the 'Other Issues' chapter of the EIA Report.

16 Summary

194. Potential environmental effects resulting from the Proposed Development have been considered and addressed throughout the design process. This has enabled potentially significant environmental effects to be minimised and/or avoided. Further measures to prevent or reduce any remaining significant environmental effects are described within each environmental topic's chapter, found in Chapters 5 to 13 of the EIA Report. A summary of all of the mitigation measures committed to as part of the Proposed Development can be found in **Appendix 14.1 Schedule of Commitments** of the EIA Report.
195. Should the Proposed Development receive consent, ScottishPower Renewables would appoint a contractor to undertake the construction works and would oversee operations, ensuring that mitigation measures are implemented and activities carried out in such a manner as to minimise or prevent effects on the environment. The contractor would be supported by specialists such as an Ecological Clerk of Works, where required, to ensure that the mitigation measures are implemented effectively.
196. A key consideration for the design and layout of the Proposed Development was the potential landscape and visual effects on receptors, in particular, how the Proposed Development would appear in relation to the operational Harestanes Windfarm. Provided that the proposed mitigation measures are successfully implemented, the remaining effects related to most environmental topics would not be considered significant. The exception to this are a small number of predicted landscape and visual effects.
197. All onshore windfarm development is likely to cause some landscape and visual effects. For the Proposed Development, which is a small extension to an operational windfarm, the significant effects on landscape character and visual amenity would be relatively contained to the south and south east of the Site.

198. The Proposed Development would provide a wider environmental benefit by allowing the generation of electricity from a renewable energy source, rather than through the use of fossil fuels. The Proposed Development is expected to take around 2.1 years to repay the carbon used through the construction of the windfarm. Following this period, the Proposed Development would be contributing to the national objectives of reducing greenhouse gas emissions and meeting the 'net zero' emissions targets by 2045.
199. In addition, ScottishPower Renewable's commitments to providing community benefits and exploring opportunities to provide enhancements as part of the Proposed Development would ensure that the benefit of the windfarm development is practically realised within the local community.

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