



Carrick Windfarm

Environmental Impact Assessment Report Non-Technical Summary

Table of contents

1	Introduction	3
2	Site Selection and Design	7
3	Proposed Development	9
4	Benefits of the Proposed Development	13
5	Consultation	15
6	The EIA	16
7	Landscape and Visual	17
8	Hydrology, Hydrogeology, Geology and Soils	19
9	Ecology and Biodiversity	20
10	Ornithology	22
11	Noise	23
12	Archaeology and Cultural Heritage	24
13	Access, Traffic and Transport	26
14	Socio-economics, Tourism and Recreation	28
15	Other Issues	30
16	Summary	32
17	References	33



Carrick Windfarm

1 Introduction

1. This document provides a Non-Technical Summary (NTS) of the Environmental Impact Assessment Report (EIAR) for the proposed Carrick Windfarm (the Proposed Development). The EIAR forms part of an application by ScottishPower Renewables (UK) Ltd (ScottishPower Renewables), hereafter referred to as 'The Applicant' for consent to construct and operate the Proposed Development. The application will be submitted under Section 36 of the *Electricity Act 1989*.
2. The Proposed Development comprises 13 wind turbines up to 200 metres (m) in height from the ground to blade tip when vertical, associated infrastructure and an Energy Storage Facility¹ of up to 20 megawatts (MW). Each wind turbine would generate around 6.6MW of electricity, giving a combined electricity generating output of around 255.5 GWh/year enough power to supply over 71,421 average UK households.
3. The Proposed Development is located within Carrick Forest in the South Ayrshire Council administrative area. Carrick Forest is a commercial forest which is part of the National Forest Estate and is owned and managed by Forestry and Land Scotland (FLS). The Proposed Development would cover an area of approximately 827 hectares. The nearest settlement to the Proposed Development is Straiton, located approximately 6 kilometres (km) to the north. The location and Site Boundary of the Proposed Development (the Site) is shown in **Figure 1 Site Location Plan**.

¹ Subject to landowner agreement

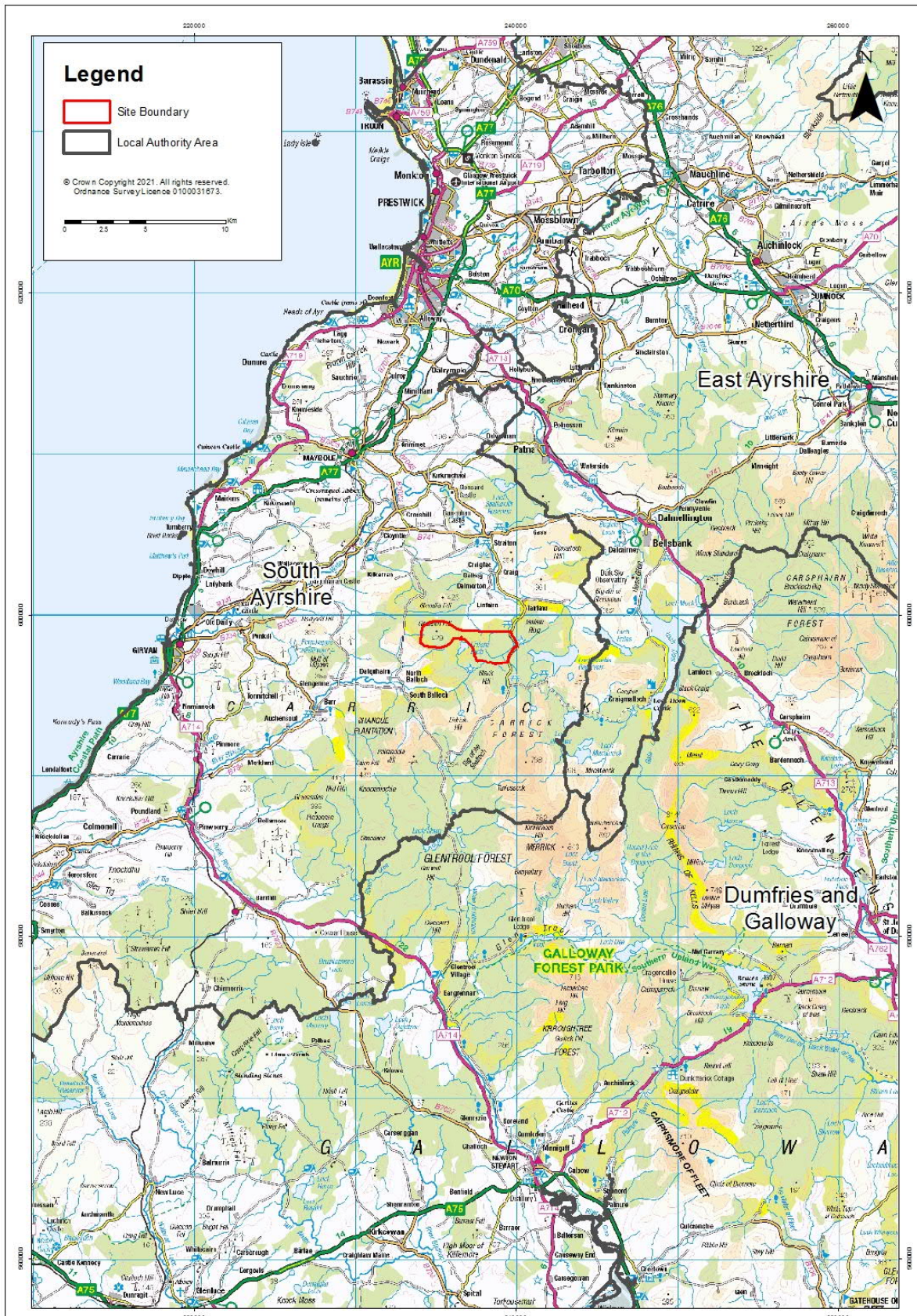


Figure 1 Site Location Plan

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 EIAR submitted with the application.
5. The EIAR 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 EIAR 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 EIAR is structured as follows:
 - NTS;
 - Volume 1: Main Report;
 - Volume 2: Figures;
 - Volume 3: Visualisations; and
 - Volume 4: Appendices.

1.2.1 Availability of the EIAR

8. Hard copies of this NTS are available free of charge from:

Carrick Windfarm Project Team
ScottishPower Renewables
9th Floor ScottishPower House
320 St Vincent Street
Glasgow
G2 5AD

Or via this email address: carrickwindfarm@scottishpower.com

9. A copy of the NTS and EIAR documents is available for download from the Applicant's website at:
www.scottishpowerrenewables.com/carrickwindfarm
10. The Applicant has a duty to undertake statutory publication of the EIAR 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 EIAR should not be placed on public display. The application documents are being made available online via the Energy Consents Unit (ECU) website as normal, and hard copies are being made available to specific statutory consultees.

1.3 Representations to the Application

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

ECU website: www.energyconsents.scot/Register.aspx

Email to the Scottish Government, ECU 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

12. The application for consent for the Proposed Development will be submitted by ScottishPower Renewables (UK) Ltd. The Applicant 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 integrated utility companies and a world leader in wind energy. ScottishPower, the first integrated energy utility in the UK to generate 100% green energy, is already investing a total of £10bn over five years - £6million every working day, to power a greener future for everyone living and working in the UK.
13. 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.
14. ScottishPower Renewables now has over 40 operational windfarm sites producing over 2,800 MW, including Whitelee, the largest onshore windfarm in the UK and offshore windfarm East Anglia ONE.
15. The Applicant 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 the Proposed Development

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 with a target of 'net zero' emissions by 2050.

16. 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 75% of Scotland's overall energy consumption from renewable sources by 2030. As stated in the Scottish Government's Onshore wind - policy statement refresh 2021: consultative draft (October 2021), Scotland has installed 8.4GW of onshore wind and makes a

commitment to develop an additional 8 - 12GW of onshore wind, resulting in a total of 20.4GW installed capacity, by 2030. 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.

17. Scotland's Fourth National Planning Framework (NPF4) draft: consultation (November 2021) sets out the Scottish Governments plan by 2050 and will aim to actively enable renewable energy, supporting repowering of existing windfarms and expansion of the grid.

2 Site Selection and Design

2.1 Site Description

18. The Site is located within Carrick Forest in South Ayrshire, which is a commercial forest, owned and managed by FLS. The Site lies within the north of Galloway Forest Park and partially within the Galloway Dark Sky Park Buffer Zone. The Site is also within the United Nations Educational, Scientific and Cultural Organisation (UNESCO) Galloway and South Ayrshire Biosphere Reserve transition area and buffer zone. A Wild Land Area (WLA) lies approximately 3km to the south east of the Site Boundary. Linfern Loch is located directly to the south of the Site (outwith the Site Boundary) and is owned by a third party. There are several watercourses and small lochs found within the Site, which drain into the River Stinchar and Water of Girvan.
19. Straiton is the nearest settlement to the Site and is located approximately 6km to the north of the Site. There are no residential properties within the Site.
20. There are two core paths which cross the Site, as well as a Scottish Hill Track which passes through the north western and south eastern parts of the Site. The Site would be accessed via two existing forestry access tracks from the C46W public road.

2.2 Site Selection

21. FLS facilitate developers once they have selected an area to generate proposals for consideration and further progression for renewable energy development. The Applicant was awarded the south west Scotland forest estate in 2011 to further explore the potential for renewable energy development, and the Site was included as part of this award.
22. The Site was selected as a suitable location for a windfarm following the consideration of a number of factors including:
 - initial desk-based studies and wind monitoring onsite suggest that there is good wind resource available at the Site to support a renewable energy development;
 - the grid network in the south west of Scotland has been identified by The Applicant as suited to benefit from energy storage through the operation of wind turbines;
 - there are no international or national statutory designations for landscape and nature conservation in, or within proximity of the Site;

- the use of existing forestry access from the public road network enabling good access to the Site, particularly for longer blades which allows consideration of larger wind turbines to make the best use of the expected wind resource;
- options to connect the Proposed Development substation to the existing transmission line which is located within the Site;
- opportunities to use and upgrade the existing forestry track onsite where possible, especially at existing entrances from the C46W public road; and
- no residential properties within 1km of the nearest wind turbines.

2.3 Design Iteration

23. 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 wind turbine type and specification, location, size and scale.

2.4 Environmental Constraints

24. 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.
25. 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.
26. The identification of constraints continued throughout the design process as more detailed surveys and information was collected.
27. There were six iterations to the design of the Proposed Development. Initially, a 17 wind turbine design was proposed, however, through the design process this was reduced to the proposed 13 wind 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

28. The Proposed Development comprises up to 13 wind turbines with a blade tip height of up to 200m, an Energy Storage Facility (i.e. battery) of up to 20 MW and associated infrastructure. Each wind turbine would have an assumed electricity generating capacity of around 6.6MW of electricity, giving a total electricity generating capacity for the Site of around 86MW.
29. In addition to the wind turbines, the Proposed Development would include the following associated proposed infrastructure:
- wind turbine foundations;
 - crane hardstandings and laydown areas;
 - transformer/switchgear housings located adjacent to the wind turbines;
 - access tracks (upgrade of existing or new as required);
 - watercourse crossings (upgrade of existing or new as required);
 - Aircraft Detection Lighting System (ADLS) activated lights fitted to each wind turbine;
 - underground electrical cabling linking the wind turbines to the Proposed Development substation;
 - communication mast(s);
 - LiDAR² compound;
 - closed-circuit television (CCTV) mast(s);
 - Substation Compound;
 - up to four borrow pit search areas to obtain material for construction;
 - two temporary construction compound areas (one to the south of the Site and one to east of the Site); and
 - one SPEN construction compound.
30. The design of the Proposed Development is shown on **Figure 2 Site Layout Plan**.
31. The Proposed Development would also require some forest restructuring works to enable construction and operation of the windfarm. An area of approximately 223.48 hectares of forestry would require to be felled during the construction phase to accommodate the proposed wind turbines and associated proposed infrastructure; some of which would be restocked and there would be a net loss of woodland area as a result. The area of stocked woodland in the study area would decrease by 97.42ha. Of this 97.42ha, 0.74ha is an increase in designed open ground, necessary to accommodate new forestry tracks required for normal forestry operations. The compensatory planting requirement for the proposed development is therefore 96.68ha.. 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. The Applicant 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 Forestry, taking into account any revision to the felling and restocking plans prior to the commencement of operation of the Proposed Development.
32. There is no proposal to limit the lifetime of the Proposed Development.. Therefore, the EIAR considers the effects of the operational phase of the Proposed Development, without limitation to a defined period

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

of time. Should decommissioning of any of the Proposed Development be required, or part thereof, it is considered that the environmental effects of decommissioning would be similar to, or less than, those during construction.

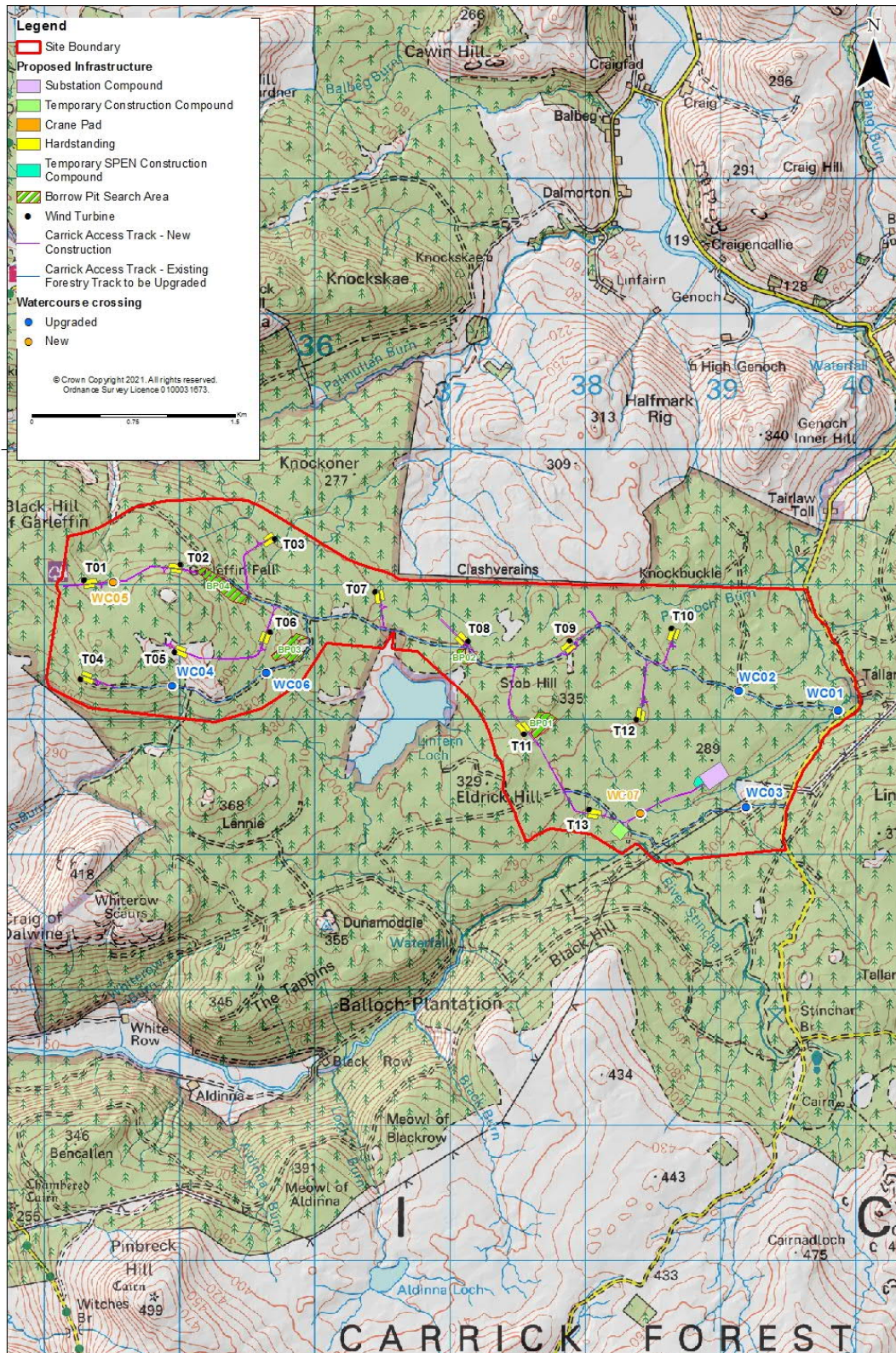


Figure 2 Site Layout Plan

3.2 Construction

3.2.1 Access to Site

33. It is proposed that the wind turbines would be delivered to the King George V Dock in Glasgow. The wind turbines would be moved from the dock to the Site under escort. From the King George V Dock, the wind turbines would be moved west along Kings Inch Drive to the M8, where they would travel east before travelling south along the M74/M6 to the A75 and U52w then on to the A714 where they would travel north and onto the C46W public road before accessing the Site.
34. Permanent access into the Site is proposed from two existing entrances to the Carrick Forest from the C46W public road. Both the access points will be constructed to the appropriate standards required, to facilitate access by both construction vehicles and abnormal loads. Road upgrading works will be required along the C46W in order to accommodate Heavy Good Vehicles (HGV) loads during the construction phase. Until such time as a candidate wind turbine is selected and a detailed route to site assessment is undertaken, the specific upgrades required are not known. However, the Applicant has undertaken an appraisal of potential significant effects based on the wind turbine data and associated information at the time of writing. This Proposed Offsite Access Route Appraisal is included as **Appendix 4.1** of the EIAR.

3.2.2 Access Tracks

35. Approximately 8.8km of existing forestry tracks would be reused and upgraded where required. Approximately 7.4km of new access tracks would be required and have been designed to avoid sensitive environmental receptors. 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.

3.2.3 Borrow Pits

36. To minimise the amount of material needed to be brought onto the Site and any associated environmental impact, borrow pits would be used to source material needed for construction of aspects such as roads, crane hardstandings and foundations. Four borrow pit search areas have been identified which would potentially be sufficient to provide the approximately 143,549 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 the Site, material would be imported from local quarries.

3.2.4 Crane Hardstandings and Laydown Areas

37. To enable the construction of the wind turbines, a crane hardstanding and laydown area at each wind turbine location would be required to accommodate cranes and construction vehicles. This would comprise a crushed stone hardstanding area measuring approximately 94m long by 34m wide. Adjacent to the crane hardstanding would be laydown areas approximately 78m long by 28m 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 Wind Turbine Foundations

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

3.2.6 Substation Compound

39. The Substation Compound would measure approximately 189m by 126m and would comprise a substation, control building and Energy Storage Facility. The Proposed Development Substation Compound would also contain the Transmission Owners (TO) (hereafter referred to as SPEN) substation, which would be designed, built and owned by the electricity grid network operator ScottishPower Energy Networks (SPEN). The control building would connect the Proposed Development to the substation and electricity network and contain the facilities needed to operate and supervise the windfarm once operational. It would be single storey and measure approximately 23m long by 14m wide and 7m high. 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.

3.2.7 Energy Storage Facility

40. The Energy Storage Facility is proposed to be located within the footprint of the Substation Compound and comprise up to four energy storage container units storing up to 20MW of energy storage equipment. The units would cover an area of up to approximately 30m by 30m. The facility would be able to facilitate the import and export of power to the National Grid network, allowing the grid to manage both the supply and demand of power.

3.2.8 Temporary Construction Compounds

41. The main temporary 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. A smaller second temporary construction compound is proposed for similar requirements on a smaller scale. The main temporary construction compound would be located near wind turbine 13 and the Substation Compound on the southernmost access track to the Site, and the smaller compound near the northern Site entrance. On completion of construction works, all the temporary structures within the main temporary construction compound would be removed and the existing hardstanding left in place. The Applicant proposes to convert the smaller temporary construction compound into a permanent car park for recreational users of the Carrick Forest upon completion of construction works.

3.3 Grid Connection

42. The electrical power produced by the wind turbines would be fed back to the Proposed Development Substation Compound via 33kV underground cables. The Proposed Development substation would be located directly beside SPEN's Substation, which is to be designed, built and operated by SPEN. Energy generated by the windfarm would be exported to the Grid by a direct connection from the SPEN Substation in to the existing 275kV ScottishPower overhead line (OHL) which is located within the south eastern edge of the Site.

3.4 Programme

43. The construction period for the Proposed Development is expected to last approximately 22 months (refer to **Table 1**). Normal construction hours would be between 07:00 and 19:00 Monday to Friday and 07:00 to 13:00 on weekends, or as agreed with South Ayrshire Council's Environmental Health Officer. These times have been chosen to minimise potential disturbance to local residents.

Activity	Month																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Site establishment																						
Forest felling																						
Existing forestry track upgrades																						
Construction of new access tracks																						
Wind turbine foundations																						
Crane hardstandings																						
Substation Compound and electrical works																						
Onsite cabling																						
Wind turbine delivery and erection																						
Commissioning and testing																						
Site reinstatement/restoration																						

Table 1 Indicative Construction Programme

3.4.1 Construction Environmental Management

- 44. The contractor undertaking the construction works would be required to adhere to a Construction Environmental Management Plan (CEMP). 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 EIAR and any planning conditions.
- 45. The Applicant would engage an Ecological Clerk of Works, and other specialists as required, during the construction phase to advise on specific environmental issues.

3.5 Operation and Maintenance

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

4 Benefits of the Proposed Development

- 48. The Proposed Development would deliver the following key benefits:

Renewable Energy Generation and Carbon Dioxide Emissions:

- production of around 255.5GWh/year of electricity which equates to the annual power consumed by approximately 71,421 average UK households³ (depending on the actual wind 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 3.5 years of operation; and
- contribute to the UK and Scottish Government renewable energy policies, including the commitment by the Scottish Government to achieve 'net-zero' by 2045.

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;
- recreational enhancement measures:
 - improve the condition of sections of the existing core path located within the Site Boundary.
 - provision of waymarkers or signposts along the existing core path located within the Site Boundary;
 - provision of bins and seating areas within the Site Boundary (locations to be agreed with FLS);
 - provision of information boards along the Old Road through Straiton heritage path within the Site Boundary to inform readers of the heritage of the route and;
 - the potential to retain all or part of the northern temporary construction compound as a car park for visitors to the Carrick Forest.
- 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; and
- The Applicant is committed to working with local stakeholders and consultees to identify additional recreational improvement and enhancement opportunities, where these are within the Site Boundary or if on third party land they will be subject to the approval of landowners.

Construction Employment and Economic Benefits:

- opportunities for suppliers of a wide range of goods and services within South Ayrshire and Scotland as a whole;
- benefits to local businesses, such as accommodation businesses and shops, that supply goods and services to construction workers; up to
- £13.6 million net Gross Value Added of the construction spend would be spent in the local (South Ayrshire) economy during the two years construction period;
- total direct estimated construction spend of up to £113.3 million which would result in an approximately £40.8 million contribution to the Scottish economy during the two years construction period;
- peak construction employment of up to 140 net jobs in South Ayrshire per annum; and
- support for up to 421 net jobs for Scotland as a whole per annum.

Operational Employment and Economic Benefits:

³ Calculated using the most recent statistics from the Department of Business, Energy and Industrial Strategy showing that annual UK average domestic household consumption is 3.861 MWh (0.003861 GWh)..

- the Scottish economy would benefit by up to £1.3 million net Gross Value Added per annum during the operational phase through direct, indirect and multiplier effects, with around £0.9 million net Gross Value Added per annum contribution to the economy of South Ayrshire;
- support for up to 25 net jobs per annum for Scotland as a whole; 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

49. 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.
50. 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 within the EIAR;
 - 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

51. A formal Scoping Opinion was requested from the Scottish Ministers in May 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. The Scottish Ministers issued their Scoping Opinion in October 2020.
52. 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.
53. A Statutory Consultee Meeting was held on 29 September 2020 to provide a forum for members of the project team to introduce themselves to the ECU and consultees and to enable a discussion on the Proposed Development, the changes that had taken place since the Scoping Report was submitted and to identify how consultation had been taken on board in the design and EIA to date.

5.2 Public Consultation

54. 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.
55. However, the Applicant 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.

56. The Applicant has written to the three local Community Councils (Barr, Crosshill, Straiton and Kirkmichael and Dailly) and local councillors to provide updates on the Proposed Development and offer meetings to discuss details of the Proposed Development.
57. Two rounds of public consultation have taken place:
 - firstly, a Public Consultation Leaflet was sent to residents and businesses within 10km of the Site in June 2020. The leaflet introduced the Applicant, described the Proposed Development and set out the need for an EIA; and
 - a second round of consultation subsequently undertaken in October/November 2020. A further Public Consultation Leaflet was sent to the same recipients and provided an update on the Proposed Development design, EIA progress and advertised the online public consultation event. This event was held between 14 October to 4 November 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.
 - Members of the public have also been able to write to the project team or contact them directly by phone throughout 2020, into 2021 and beyond.
58. Further information on consultation is contained in the Pre-Application Consultation Report that is provided alongside the application for consent.

6 The EIA

59. 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.
60. 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

61. 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.
62. The assessment considers the potential for significant landscape and visual effects within an initial 45km radius area, and a detailed assessment within a 30km radius area.
63. On the basis of the potential for significant effects from wind turbine aviation lighting identified during the design and preliminary assessment stages, the Applicant has set out in **Appendix 13.4 Indicative Aviation Lighting Landscape and Visual Impact Mitigation Plan** that no construction would commence until an Aviation Lighting Landscape and Visual Impact Mitigation Plan (ALLVIMP), which includes the use of an aircraft detection lighting system, is approved in consultation with the CAA.. This would mean the lights would only be switched on when an aircraft transits the Site. Given the lights are only required for aircraft flying at night in the vicinity of the Site at altitudes of up to 3000ft above mean sea level, it is anticipated that the lights would be rarely on in this quiet airspace. When they are on, as presented in **Appendix 13.4 Indicative Aviation Lighting Landscape and Visual Impact Mitigation Plan**, the aviation lights would only be on for approximately 1.5 to 3 minutes, resulting in the aviation lights having short duration visual effects of limited frequency. With this mitigation in place it would remove all significant effects on landscape and visual receptors associated with aviation lighting.

7.1 Baseline

64. The Proposed Development is located at the northern edge of the Carrick Hills within an area of forested foothills, between the Water of Girvan and Stinchar Valleys. The landscape has a large scale with landform that comprises of steep-side valleys and gently rounded hills. The highest point on the Site is Garleffin Fell which lies at 430m at within the western section of the Site. Along with the presence of the nearby operational Dersalloch Windfarm and Hadyard Hill Windfarm, the local landscape characteristics are considered suitable for windfarm development.
65. Potential visual receptors include residents in isolated properties to the north and north east of the Site, local settlements, the local road network, users of long distance walking routes, core paths and trails including the Cornish Hill Trail and Straiton Heritage Path, local and national cycle routes and visitors to recreational and tourist destinations such as the Galloway Forest Park and Wild Land Area.

7.2 Assessment

66. 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.
67. 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.
68. The landscape to the south and east of the Site consists of rugged uplands with forestry and lochs which through the landform height would limit the visual effects of the Proposed Development to the south and south east of the Site to within approximately 6km. Beyond 6km, only the highest summits would have

sight of the Proposed Development, and it would be viewed within the wider context of the forested foothills and operational windfarms.

69. To the north east of the Site lies the upper reaches of the Water of Girvan Valley, within 5km of the Proposed Development. The valley sides and outer foothills screen the southern side of the valley and limit the view of the full extents of the Proposed Development from the rest of this area. Due to the close proximity, proposed wind turbines would be seen above and between the foothills in places, introducing wind turbines as a characteristic of views from parts of this landscape.
70. The Stinchar Valley lies immediately to the south and south west of the proposed wind turbines. The foothills to the south of the wind turbines and either side of the upper reaches of the valley prevent any visual influence on the character of the valley bottom immediately south of the proposed wind turbines, and generally limit the influence of the full extent of the Proposed Development on the wider valley area. The main influence on landscape character would be within approximately 5km of the nearest proposed wind turbine where only a limited number of the proposed wind turbines would become a part of views from this landscape.
71. Effects upon landscape character are predicted up to 6km away due to the Proposed Development increasing the presence of wind turbines within the local landscape character type. Beyond 6km, there would be limited visibility of the Proposed Development due to the hills bordering the Site and characteristics such as extensive woodland, hedgerows and trees, as well as enclosure by the landform.
72. Visual effects have been assessed at 24 locations that were selected to represent visibility from a range of receptors and distances, including residents and walkers within the upper Water of Girvan Valley and upper Stinchar Valley. The Proposed Development would be partially visible to the local residents, walkers and road users within these areas when in close proximity. However, the wind turbines have been positioned to reduce visibility. As a result, the majority of the Proposed Development would be screened by the foothills bordering the Site, extensive woodland and the mature trees along the valley bottoms. A Residential Visual Amenity Assessment was undertaken to consider those properties that lie within 2km of the proposed wind turbines and found that whilst significant effects would occur, they would not be overbearing or create an unattractive or unsatisfactory place to live.
73. The assessment considered the potential for effects on the Merrick Wild Land Area. The Proposed Development would have significant effects on the naturalness and remoteness of the Wild Land Area within 3km of its northern boundary. This is considered the least sensitive part of the Wild Land Area due to its close proximity to human activity. The Proposed Development would have no significant effects on the secluded and remote interior areas of the Wild Land Area.
74. The assessment also considered the potential for landscape and visual effects when combined with other planned, operational or consented windfarms within the area. Significant effects were found to arise when the Proposed Development is combined with the proposed Craiginmoddie Windfarm, Knockcronal Windfarm and Clauchrie Windfarm on aspects such as landscape character and users of recreational routes.

7.3 Significance

75. The assessment concluded that there would be no significant landscape or visual effects during construction due to the short duration and that the works would be contained within an active commercial forest.

Significant effects on landscape character and visual amenity would be contained within approximately 5km to 6km from the wind turbines of the Proposed Development. The foothills surrounding the Site and upland landscape to the south and south east of the Site would substantially screen views at further distances in these directions. The Proposed Development would not be frequently seen from the lower settled areas including the Stinchar and Water of Girvan Valleys due to the landform screening.

76. The assessment identified that there would be no significant effects from the Proposed Development on residents at the property of Doughty Farm due to the orientation of the property and enclosure by landform. Significant effects were assessed at Glenalla, Tairlaw Toll Cottage, Tairlaw Toll House and Tallaminnoch where the proposed visible wind turbines would be close and prominent in views from the property and/or curtilage. However, in all cases it is considered that the Residential Amenity Threshold would not be reached.
77. Combined cumulative effects on residential visual amenity have been assessed with the Proposed Development, Craiginmoddie Windfarm and Knockcronal Windfarm. This identified that the level of effect would increase from that assessed for the Proposed Development on its own at Doughty Farm, Glenalla, and Tairlaw Toll Cottage, but for all properties would not reach the Residential Amenity Threshold.

8 Hydrology, Hydrogeology, Geology and Soils

78. 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.
79. The assessment considers potential impacts within the Site, as well as within 1km for groundwater effects and 5km downstream for surface water, private water supplies and impacts upon relevant designated sites.

8.1 Baseline

80. The Site is located relatively equally across the catchments of the Water of Girvan and the River Stinchar. There are several small watercourses which are located within or border the Site. Linfern Loch, owned by a third party, is located directly to the south of the Site. There are several distinct valleys within the Site, featuring a number of relatively small upland watercourses which drain the area.
81. Peat is notable in open areas, such as forestry rides, clearings and in the vicinity of surface water bodies. Peat surveys were undertaken and collected over 1,800 soil and peat depth records.
82. Potential groundwater-dependent terrestrial ecosystems are present within the Site. However, their groundwater dependency is considered low, as surface water and hill runoff are likely to be the dominant soil water factors.
83. There are no nationally designated sites for hydrology or geology features connected within 5km of the Site.

8.2 Assessment

84. 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.
85. Of the measured peat depths, 62.4% were less than 1.00m and 87.0% less than 2.00m. Peat is present within the forestry as well as in open areas, such as forestry rides, clearings and in the vicinity of surface water bodies. Due to the presence of peat, a Peat Landslide Hazard and Risk Assessment has been undertaken and a Soil and Peat Management Plan prepared. Due to the iterative design process, the design has avoided deeper peat locations where more sensitive amorphous catotelmic material is predicted, where practicable.
86. The assessment has identified that there are no impacts anticipated on private water supplies.
87. Watercourse crossings have been minimised as part of the design. However, seven watercourses will be crossed which are mapped on Ordnance Survey 1:50,000 scale and therefore subject to the Scottish Environmental Protection Agency's (SEPA) Controlled Activities Regulations (CAR). There are two new watercourse crossings and five existing crossings to be upgraded.

8.3 Significance

88. The hydrology, peat and ground conditions (e.g. stability) within the Site have influenced the design of the proposed infrastructure layout to avoid and/or minimise potential effects. The layout has, where possible, maintained a minimum distance of 50m 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.
89. 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

90. The ecology and biodiversity assessment considers the potential effects of the Proposed Development on features such as protected species and habitats.
91. In line with relevant guidance, the assessment is based upon various Survey Areas due to the different sensitivities of the ecological features, which dictates the potential for them to be affected by the Proposed Development.
92. A desk study exercise was conducted to determine the statutory and non-statutory designated sites and ancient woodland sites that would be potentially significantly affected by the Proposed Development, as well as to obtain records of legally protected and notable species of conservation concern.

9.1 Baseline

93. Baseline information has been collected from a combination of desk study, consultation and a programme of site surveys.

94. There are no statutory sites designated for nature conservation within the Site. The nearest statutory designated site, Auchalton Site of Special Scientific Interest (SSSI), is over 4km north of the Site, while Merrick Kells Special Area of Conservation (SAC) and SSSI is located 6.7km south east of the Site. However, neither of these designated sites are ecologically or hydrologically connected to the Site and hence they are not within the Proposed Development's Zone of Influence. The Site lies within the non-statutory UNESCO Galloway and Southern Ayrshire Biosphere Reserve while the River Stinchar (Milton to Black Hill) provisional Local Wildlife Site (pLWS) abuts the Site's south western boundary. There are no areas of Ancient Woodland within or immediately adjacent to the Site, the closest being located approximately 400m to the north east.
95. Habitats on the Site broadly consist of dense coniferous plantation woodland and blanket bog. Habitat suitability assessment surveys were undertaken for fish, otter, water vole, red squirrel, pine marten and badger and were followed by dedicated surveys for these species. Dedicated surveys for great crested newt and freshwater pearl mussel were also undertaken. The surveys found that the habitats within the Site support otter, bats, water vole, pine marten, common lizard, Atlantic salmon and brown trout.

9.2 Assessment

96. The habitat surveys undertaken have concluded that the Site predominantly features habitats of no greater than local conservation importance. The design of the Proposed Development has considered the most valuable areas of habitat such as blanket bog and watercourses. An Outline Habitat Management Plan (OHMP) has been prepared and will be delivered as part of the Proposed Development. As well as being designed to offset the loss of bog-type habitat resulting from the construction of the Proposed Development this will also seek to reclaim and restore additional bog habitat from part of the currently afforested site.
97. The design of the Proposed Development has focused on avoiding important habitat for the locally occurring species thereby minimising the potential for their disturbance, displacement, injury or accidental mortality. The assessment of protected and notable species focuses on water voles and bats as these are considered most likely to be potentially affected, either directly or indirectly. Mitigation measures have been proposed to avoid or minimise potential adverse effects on these species/groups. In particular a weather dependant wind turbine curtailment strategy has been developed in light of the recorded bat activity levels at the Site and will be implemented in order to reduce the risk of bat mortalities through collision and barotrauma. All other species are considered unlikely to be present or that significant effects are unlikely once protective measures are implemented. Further protected species surveys including for otter, water vole and pine marten would also be undertaken prior to the commencement of construction works to determine if further mitigation measures or licences are required.

9.3 Significance

98. All residual effects, following mitigation, to Important Ecological Features from construction or operational activities, both in the context of the Proposed Development and in combination with other developments in the wider area are predicted to not be significant..

10 Ornithology

99. The ornithology assessment considers the potential effects of the Proposed Development upon birds.
100. The assessment is based on data gathered from consultation, a desk-based study and a two-year programme of ornithological field surveys.

10.1 Baseline

101. Field surveys have been undertaken including flight activity, black grouse, breeding raptor, breeding bird and winter walkover surveys. The surveys were undertaken between September 2018 and August 2020. A breeding nightjar survey was undertaken between June 2019 – July 2020.
102. The flight activity survey recorded 166 flights from 13 species over and around the Site. Black grouse was recorded on five occasions, with two during the flight activity survey and three during the field survey. Three species were recorded during the breeding raptor survey. A total of 54 species were recorded during the breeding bird survey and 57 species were recorded during the winter walkover survey. The breeding nightjar survey did not record any findings.
103. Two designated sites of ornithological interest have been identified. The nearest is Merrick Kells SSSI, at approximately 6.7km to the south east of the Site. Bogton Loch SSSI is located approximately 9.1km to the north east of the Site.
104. The Site is located within two non-statutory designated sites – the Galloway Forest Park Important Bird Area and River Stinchar (Milton to Black Hill) Provisional Wildlife Site.

10.2 Assessment

105. Based on the surveys undertaken, the Proposed Development has potential to impact several features important to birds. These include the Galloway Forest Park Important Bird Area and species including osprey, goshawk, peregrine, black grouse and crossbill.
106. Potential effects on these features due to habitat loss, disturbance and collision risk were considered for the construction and operation phases of the Proposed Development.
107. Habitat loss, disturbance and displacement of breeding and roosting birds during construction and operation would be minimal due to the implementation of embedded mitigation. This includes the production of a Bird Protection Plan to ensure that all breeding birds are protected during construction and operation of the Proposed Development. In addition, ornithological monitoring is proposed throughout the life cycle of the Proposed Development to monitor effects on sensitive bird species.
108. The assessment found that there is no evidence of connectivity between the Site and the two identified designated sites of ornithological interest. Therefore, the Proposed Development would not have any effect on either site.
109. An assessment of potential cumulative effects on osprey from collision risk was undertaken and found to be minimal on breeding osprey populations and would not result in a significant cumulative effect.

10.3 Significance

110. Overall, the assessment concluded that no significant effects on ornithological receptors would arise as a result of the Proposed Development.

11 Noise

111. The noise assessment considers the potential effects of noise and vibration during construction and operation on nearby receptors, including residential properties.
112. During construction, Site access track upgrade works would be required at an approximate distance of 220m from a noise-sensitive receptor at the closest point. Assessment of construction noise and vibration from access track upgrade was included in the assessment as well as potential vibration from the borrow pit search areas, due to the potential to use blasting to obtain the material.
113. 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 5km.

11.1 Baseline

114. A baseline noise survey has been undertaken at six properties close to the Site. The locations were selected as they are representative of the receptors identified in the assessment.
115. The proposed Craiginmoddie and Knockcronal Windfarms, and operational Dersalloch Windfarm and Hadyard Hill Windfarm were identified as having the potential to cause a cumulative noise impact with the Proposed Development.
116. A total of 19 example sensitive receptors were considered, geographically spread across the local area, including in the vicinity of the Proposed Development and the four identified cumulative developments, to ensure potential cumulative effects were comprehensively addressed. The majority of these receptors were residential.

11.2 Assessment

117. The majority of construction works would be at a sufficient distance from noise and vibration sensitive receptors. The closest works would be as a result of upgrades to existing forestry tracks would be required in close proximity to noise and vibration receptors and an assessment of construction noise and vibration has therefore been undertaken for these works.
118. Construction traffic to the Site would be routed along the C46W, A714, U52W and A75 to the south or B741, B7023, B7045 and C46W to the north, entering the Site from the C46W. Road traffic associated with construction and operation is not expected to generate a high amount of road traffic noise and therefore has been scoped out of the assessment.
119. 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.
120. An assessment of wind turbine noise has been undertaken in accordance with current best practices and national and local planning policy. The assessment has demonstrated that the Proposed Development, both in isolation, and with the proposed Craiginmoddie and Knockcronal Windfarms, could operate within the remaining available (residual) limits (after accounting for noise from existing local operational windfarms). The assessment has also demonstrated how the available noise level limits could be apportioned between the three proposed windfarm developments (Carrick,

Craiginmoddie and Knockcronal), and how such apportioned limits could be used as part of consent conditions to ensure that a significant cumulative noise effect would not arise.

121. Fixed plant items associated with the Proposed Development, including the associated Proposed Development substation and Energy Storage Facility, would be sited at sufficient distance from noise sensitive receptors that a significant effect would not arise.

11.3 Significance

122. Due to the distance from the Site and the nearest receptors, no significant noise or vibration effects are predicted during construction, including access track upgrade works.
123. The operation of the wind turbines would be within the applicable noise limits without need for any mitigation to the Proposed Development. The assessment demonstrates how use of planning conditions stipulating appropriate noise limits for compliance with, would be appropriate to ensure significant effects would not arise from the Proposed Development in practice. The Proposed Development's substation and Energy Storage Facility would be sited at sufficient distance from noise sensitive receptors that a significant effect would not arise. Traffic generation during the operational phase would be extremely low, and is not predicted to result in significant noise effects.
124. Overall, no significant noise or vibration effects are predicted, or in combination with other developments.

12 Archaeology and Cultural Heritage

125. The archaeology and cultural heritage assessment considers the potential effects of the Proposed Development upon heritage assets such as World Heritage Sites, Scheduled Monuments, Listed Buildings, Gardens and Designed Landscapes (GDL), Battlefields, Conservation Areas, buried archaeological remains, other historic buildings, and earthworks.
126. The assessment considers the potential for direct impacts upon heritage assets within the Site. A wider Study Area of 10km is also included to identify heritage assets whose setting is significant enough to be indirectly impacted upon by that Proposed Development.

12.1 Baseline

127. Baseline data has been collected via a combination of desktop work, consultation and a targeted walkover survey. The baseline includes all designated and undesignated heritage assets within the Site Boundary. It also includes all designated heritage assets, and undesignated heritage assets noted as nationally significant within the South Ayrshire Historic Environment Records (HER), out to 10km from the wind turbine locations, that are within the ZTV of the Proposed Development. Regionally significant heritage assets where their landscape setting is considered a key characteristic are also included in the baseline out to 10km from the wind turbine locations.
128. Computer modelling was undertaken to identify the potential visibility of the heritage assets. This found that 62 heritage assets identified within 10km of the wind turbine locations would have no visibility of the Proposed Development and therefore were not included within the assessment.

129. There are seven heritage assets identified within the Site Boundary. All of these heritage assets date from the Post-Medieval period and relate to agricultural practices, including livestock enclosures and field boundaries.
130. A further of 111 heritage assets have been identified within 10km. Of this, the following 20 heritage assets are within 5km of the wind turbine locations:
- two Scheduled Monuments;
 - one Gardens and Designed Landscape;
 - one Ayrshire Designed Landscape;
 - 11 undesignated heritage assets deemed to be of national significance; and
 - five undesignated heritage assets of regional significance.

12.2 Assessment

131. The early identification of heritage assets within the Site Boundary and those within the Study Area most likely to be indirectly impacted upon has enabled potential impacts to be avoided due to changes in design. This includes removal of potential direct impacts on the heritage assets of Bencallen Hill Chambered Cairn, and the Knockinculloch Enclosures, as well as ensuring the sensitive views around Kilkerran Garden and Designed Landscape were not indirectly impacted upon.
132. Within the Site, six heritage assets have been identified as potentially being directly impacted by construction activities such as excavations, vehicle movements, material storage and landscaping. These include Linfairn to Burnside Footpath, Linfern Loch Wall (1) and Linfern Loch Wall (2), Stob Hill Sheep Ree, Stob Hill Walls, and Stinchar Ford Wall. There is also the potential for direct impacts upon currently unknown, buried archaeological remains however the assessment considers the likelihood of this to be low. The CEMP would include measures such as demarcation of heritage assets within 50m of to the works, archaeological recording of any assets to be truncated or removed, and written guidelines outlining the need to avoid damage to heritage assets and arrangements for calling upon professional support if required.
133. All identified heritage assets outside the Site Boundary and within the Study Area are deemed to be of high or medium value as designated heritage assets or undesignated heritage assets of regional or national significance. The assessment included consideration of potential effects upon the setting of these heritage assets once the Proposed Development is operational. This concluded that there would be a likely moderate adverse impact on the Knockinculloch Enclosures Scheduled Monument as the new wind turbines of the Proposed Development would likely introduce considerable changes to the enclosure's surroundings.
134. The assessment of cumulative effects on the setting of heritage assets concluded that there would be an increase in the magnitude of impact on these heritage assets, as a result of the Proposed Development in-combination with the proposed Craiginmoddie and Clauchrie Windfarms.

12.3 Significance

135. The layout of the Proposed Development has been designed as far as possible to avoid direct impacts on the identified heritage assets. Further proposed mitigation during construction would minimise the potential effects so that they are not considered significant. Following mitigation, there is potential for a significant effect on one heritage asset, Knockinculloch Enclosures Scheduled Monument, which would experience impacts on its settings.

136. The introduction of the Proposed Development alongside cumulative schemes would result in an increase in magnitude of impact from Negligible Adverse to Minor Adverse for 12 heritage assets. The cumulative increase in magnitude of impact in all cases would not result in an increase in significance of effect, returning a **Slight Adverse** impact (i.e. not significant in EIA terms).

13 Traffic and Transport

137. The 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.
138. The Site would be directly accessed from up to two upgraded access junctions on the C46W, along the eastern boundary of the Site. Both junctions are currently used to provide access to the Site for timber extraction and other land management works. 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 as follows:
- U52W – between the A75 and A714 at Newton Stewart;
 - A714 – between the A75 and the C46W at Bargrennan;
 - B741 – between the A77 and the B741 at Dailly;
 - B741 – between the B741 at Dailly and B7045 at Straiton;
 - B7023/Dalhowan Street – between the A77 and the B741;
 - B7045 – between the A77 and C46W at Straiton;
 - A714 – between Pinwherry and the C46W at Bargrennan; and
 - C46W/ through to the proposed Site access.
139. Abnormal load movements, associated with the movement of wind turbine components to the Proposed Development, are currently proposed to be transported to the Site via the following route:
- Kings Inch Drive;
 - M8;
 - M74/M6;
 - A75;
 - U52W;
 - A714; and
 - the C46W to the proposed Site access junctions.
140. Depending on the final wind turbine model to be installed and method of transport used, there will likely be a level of offsite upgrade works required on sections of the proposed access route to accommodate the predicted loads. Details of a programme of offsite mitigation works to include (if required) passing places, road widening, verge strengthening, associated works identified (if applicable) and restoration proposals (if applicable) would be undertaken following consent and in full agreement with South Ayrshire Council (as part of the Ayrshire Roads Alliance), Dumfries and Galloway Council and Transport Scotland.

13.1 Baseline

141. 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.

142. Traffic count data for the roads within the Study Area have been obtained from independent traffic surveys undertaken on the agreed study network in 2019 and 2020.
143. There is one core path which crosses the C46W within the South Ayrshire Council area, between the two proposed access junctions and again further north in the vicinity of Straiton. The C46W does not have any pedestrian or cyclist facilities near the Site access junctions. Pedestrian facilities in the vicinity of the proposed Site access junctions are limited. The National Cycle Network Route 7 follows the C46W and forms part of one of the proposed access routes on the B7023 to the north of Crosshill.
144. There are several proposed, consented and operational windfarm developments located within 30km 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

145. 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 (2018 to 2020) on the road network in the vicinity of the Site.
146. The assessment indicates that there are no road capacity issues and that there is sufficient spare capacity within the trunk and local road network.
147. It is proposed that the primary port for delivery of the wind 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 wind turbine components and heavy lift cranes. The predicted worst month in terms of construction movements would be month seven when it is predicted that a total of 4,086 vehicle movements would be generated. This would comprise 2,786 HGV's and 1,300 car/LGV's. In terms of average daily movements, this would equate to 104 HGV's and 48 car/LGV's. The assessment identified that there is potential for temporary increased driver frustration on the C46W due to an increase in turning movements and vehicles associated with the construction of the Proposed Development. Proposed mitigation would include physical measures to design out potential issues, for example the use of on-site concrete batching facilities and on-site borrow pits to reduce the number of construction trips. In addition mitigation measures would include general Good Construction Practices and a Construction Traffic Management Plan which would be agreed with South Ayrshire Council, Dumfries and Galloway Council and Transport Scotland.

13.3 Significance

148. 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.
149. Overall, no significant effects upon access, traffic or transport are anticipated, or in combination with other developments.

14 Socio-economics, Tourism and Recreation

150. 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.
151. Various Study Areas are used in the assessment. The socio-economic assessment considers the potential for effects within the local area of South Ayrshire and also regionally across Scotland. The tourism assessment considers potential effects within 15km while the recreation assessment considers 5km. The assessment of potential cumulative effects considers other windfarm developments within 30km.

14.1 Baseline

152. South Ayrshire has a smaller proportion of working-age population (those aged between 16 and 64) compared to Scotland and the United Kingdom. In 2020, 58.7% of the population were aged between 16 and 64 in South Ayrshire, compared to 63.9% in Scotland. The unemployment rate in South Ayrshire between 2020 and 2021 was 4.9%, which is higher than Scotland at 4.4%.
153. Human health and social work activities are the largest employment industry sector within South Ayrshire. This is followed by wholesale and retail trade, repair of motor vehicles and motorcycles and then manufacturing and accommodation and food service activities.
154. The local tourist attractions include Galloway Forest Park, Galloway and Southern Ayrshire UNESCO Biosphere, Merrick Wild Land Area and the Galloway Dark Sky Park. Other regional and local tourist attractions include country parks, museums, castles and golf courses. The closest tourist attraction and tourist accommodation is located within the Site Boundary and 3.6km west respectively.
155. There are 31 formal and informal recreational routes located within 5km of the Study Area. Of which 12 are located within the Site, including two core paths, one Heritage Path and one National Catalogue of Rights of Way and seven Scottish Hill Tracks.

14.2 Assessment

156. The Proposed Development is estimated to generate up to £113.3 million of construction spend. Of this, up to £13.6 million is expected to benefit the local economy and up to £40.8 million is anticipated to benefit the Scottish economy during the two years construction period.
157. Construction of the Proposed Development is estimated to generate up to 140 jobs in South Ayrshire and 421 in Scotland per annum.
158. The Proposed Development is located within Galloway and Southern Ayrshire UNESCO Biosphere and the Galloway Dark Sky Park. Merrick Wild Land Area, Dalquharran Castle and Blairquhan Castle are also located nearby. There would be limited impacts on access to these receptors during construction of the Proposed Development.
159. During construction, measures would be introduced to limit the generation of noise and dust on the nearby tourism and recreational receptors. Impacts from lighting would also be limited.
160. Temporary diversions may be put in place during construction for walkers accessing Stinchar Falls, Scottish Hill tracks (SKC/HT82/6 and SKC/HT82/7) and Loch Bradan. An Access Management Plan

would be prepared and submitted post consent detailing these temporary local diversions and ensuring that access is maintained throughout the construction period.

161. Construction of the Proposed Development is considered unlikely to discourage tourists from visiting South Ayrshire and the local area. 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.
162. Once operational, the Proposed Development is estimated to generate up to £5.1 million of operation and maintenance spend annually. Of this, it is anticipated that up to £0.9 million net Gross Value Added would benefit the local economy and up to £1.3 million net Gross Value Added would benefit the Scottish economy annually. The operation and maintenance phase of the Proposed Development is predicted to generate up to 25 net jobs within South Ayrshire and 35 net jobs within Scotland.
163. The existing forestry 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 for use by the local community under Scottish Outdoor Access Code.
164. The Applicant 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.
165. The Applicant 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:
 - provision of waymarkers or signposts along the existing core path SA47 located within the Site Boundary;
 - improve the condition of sections of the existing core path SA47 located within the Site Boundary;
 - provision of bins and seating areas within the Site Boundary (locations to be agreed with FLS);
 - provision of information boards along the Old Road through Straiton heritage path within the Site Boundary to inform readers of the heritage of the route;
 - retention of the northern temporary construction compound in whole or part as a permanent car park for recreational users upon completion of the construction works during the operational life of the windfarm for the benefit of recreational users in order to provide a safe parking area for the visitors to Carrick Forest; and
 - The Applicant is committed to working with local stakeholders and consultees to identify additional recreational improvement and enhancement opportunities, where these are within the Site Boundary or if on third party land they will be subject to the approval of landowners.

14.3 Significance

166. 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.

167. The proposed recreational enhancements would provide a recreational benefit during the operation of the Proposed Development, although not significant.
168. Overall, no significant socio economic, tourism or recreation effects are predicted as a result of the Proposed Development.
169. During both construction and operation, there is anticipated to be minor adverse cumulative effects from other windfarm developments (specifically Knockcronal Windfarm and Craiginmoddie Windfarm) due to impact on local amenity for recreational routes, and extended impacts in relation to air quality and noise generation on recreational routes and tourism assets. During operation, there is anticipated to be a Negligible effect on tourism.

15 Other Issues

170. The Other Issues chapter of the EIAR presents the assessments of forestry and land use, aviation and radar, carbon balance, telecommunications and shadow flicker and Cumulative effect interactions.

15.1 Forestry and Land Use

171. The Proposed Development lies entirely within existing commercial forestry plantations owned by FLS. The area contains largely mature commercial conifers with areas of open elevated moorland.
172. 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.
173. Where crop growth rates and current crop height allow, the infrastructure located within woodland areas would be keyholed into the existing crops. Where this is not possible due to the age or stability of the crop, entire coupes are to be felled and the infrastructure would be incorporated into the restocking plan. The size of the keyhole takes into account technical and environmental constraints. The keyhole was calculated based upon a 115m hub height and a 170m rotor diameter and was largely driven by the need for a 50m distance from blade tip to the forest edge to further mitigate any potential impacts on bat populations. The keyhole required for the Proposed Development is therefore a 100m radius around each wind turbine base.
174. The assessment predicts that approximately 223.48 hectares of felling would be required to facilitate construction. Following consideration of restocking, the area of unplanted ground would increase and as a result, it is predicted that there would be a net loss of woodland area of 96.68ha as a result of the construction of the Proposed Development. The Applicant is committed to providing appropriate compensatory planting; the extent, location and composition of which would be agreed with Scottish Forestry.

15.2 Aviation and Radar

175. 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.

176. An aviation assessment identified that the proposed wind turbines would be detectable by aviation radars. Where mitigation is required, this would include blanking out a small area of the radar display for certain wind turbines and using data from another radar unaffected by wind turbines to fill in these blanked areas. Further mitigation may also be available from the replacement Lowther Hill PSR which has an in-built capability that allows for filtering out turbine interference, if this capability can be applied to the Proposed Development.
177. Subject to the agreement of proposed mitigation measures with aviation stakeholders, there are no significant areas of concern predicted for airspace or airspace users.

15.3 Climate and Carbon Balance

178. The Scottish Government uses an assessment of the carbon impact of windfarm development to support the process of determining windfarm developments in Scotland.
179. 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 3.5 years, applying the Grid Mix replacement scenario. It is expected that the carbon savings of the Proposed Development would be substantially greater than the attributable carbon emissions.

15.4 Telecommunications

180. 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.
181. A telecommunications desktop assessment and consultation exercise was 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.
182. It was concluded that the Proposed Development would have no effect on any telecommunication links.

15.5 Shadow Flicker

183. Shadow flicker refers to the flickering effect caused when rotating wind turbine blades periodically cast shadows over nearby properties.
184. The assessment considered a 2.5km Study Area around each of the wind turbine locations and receptors which could be potentially affected were identified.
185. Seven properties were identified within 2.5km of the Proposed Development that may be affected by shadow flicker. Of these seven properties, the assessment found that five properties may experience theoretical shadow flicker with only one property of the five potentially affected in excess of an acceptable level in a theoretical worst case scenario. The theoretical worst case scenario applied factors such as clear skies throughout the year and wind turbines operating constantly throughout the year. A realistic scenario was also modelled including factors such as cloud cover throughout the year and the consideration that the wind turbines would not operate in low-wind conditions/during maintenance.
186. When the realistic scenario is applied to the one affected property, the impact to the property from shadow flicker would be significantly reduced, although with some theoretical exceedance over

acceptable level. However, even the realistic scenario does not take all of the factors into account such as existing screening, and shadow flicker impacts in reality would be lower than modelling results predict.

187. It is recommended that if shadow flicker is found to occur in practice then mitigation such as automated wind turbine shutdown should be implemented to limit the potential impact of shadow flicker.
188. During operation, there is the potential for cumulative theoretical effects on four nearby properties from shadow flicker, when the Proposed Development is considered in-combination with the proposed Craiginmoddie Windfarm and Knockcronal Windfarm. With proposed mitigation, it is anticipated that no potential cumulative effects are likely to occur.

15.6 Cumulative Effect Interactions

189. 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.
190. An assessment has been undertaken to identify potential cumulative effect interactions which concluded that construction phase and operational phase effects are unlikely following mitigation.

16 Summary

191. 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 EIAR. 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 EIAR.
192. Should the Proposed Development receive consent, the Applicant 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.
193. A key consideration for the design and layout of the Proposed Development was the potential landscape and visual effects on receptors. 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 some predicted landscape and visual and cultural heritage effects.
194. All onshore windfarm development is likely to cause some landscape and visual effects. For the Proposed Development, the significant effects on landscape character and visual amenity would be relatively contained to within 6km. The surrounding upland landscape and foothills would help screen

distant views of the Proposed Development from areas such as the Galloway Forest Park and Merrick Wild Land Area.

195. There is potential for the Proposed Development to have a significant adverse effect on one heritage asset, Knockinculloch Enclosures Scheduled Monument, which would experience impacts on its settings, following mitigation measures. Other heritage assets would experience no significant adverse effects following mitigation measures.
196. 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 3.5 years to repay the carbon used through the construction, operation and any decommissioning of the windfarm. Following this period, the Proposed Development would be contributing to the national objectives of reducing greenhouse gas emissions and meeting the Scottish renewable energy targets of 75% by 2030 as the grid connection date is 2026.
197. In addition, the Applicant 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.

17 References

Forestry Commission Scotland (2009). The Scottish Government's Policy on Control of Woodland Removal. Edinburgh.

Scottish Government (2009). Climate Change (Scotland) Act 2009. Available online at: http://www.legislation.gov.uk/asp/2009/12/pdfs/asp_20090012_en.pdf.

Scottish Government (2017). Electricity Works Act (Environmental Impact Assessment) (Scotland) Regulations 2017. Available online at: <https://www.legislation.gov.uk/asp/2009/12/contents>.

Scottish Government (2019a). Climate Change (Emissions Reduction Targets) (Scotland) Act 2019. Available online at: <http://www.legislation.gov.uk/asp/2019/15/enacted>.

UK Government (1989). Electricity Act 1989 (as amended). Available online at: <https://www.legislation.gov.uk/ukpga/1989/29/introduction?view=extent>.

UK Government (2009). The UK Low Carbon Transition Plan, Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228752/9780108508394.pdf.

UK Government (2013). The UK Renewable Energy Roadmap. Available online at: <https://www.gov.uk/government/collections/uk-renewable-energy-roadmap>.

Carrick Windfarm Project Team

ScottishPower Renewables
9th Floor
320 St Vincent Street
Glasgow
G5 5AD

carrickwindfarm@scottishpower.com

