

Knockcronal Wind Farm

Non-Technical Summary

November 2021



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Figure 1 Site Location Plan

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Full size versions of all figures are available in the accompanying EIA Report

Abbreviations

AOD	Above Ordnance Datum
BBS	Breeding Bird Surveys
BNG	British National Grid
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
CTMP	Construction Traffic Management Plan
DEMP	Decommissioning Environmental Management Plan
DWPA	Drinking Water Protection Area
ECow	Ecological Clerk of Works
EIA	Environmental Impact Assessment
FTE	Full Time Equivalent
GHGs	Greenhouse Gases
GVA	Gross Value Added
GDWTE	Groundwater Dependant Terrestrial Ecosystem
Ha	Hectares
HET	Historic Environment Team
HES	Historic Environment Scotland
IBA	Important Bird Area
IEMA	Institute of Environmental Management and Assessment
ITPE	ITPEnergised
km	Kilometre
LCT	Landscape Character Type
LVIA	Landscape and Visual Impact Assessment
m	Metre
MOD	Ministry of Defence
MW	Megawatt
MT	MillionTonnes
NATS	National Air Traffic Services

NCR	National Cycle Route
NOABL	Numerical Objective Analysis Boundary Layer
NS	NatureScot
NSR	Noise Sensitive Receptor
NTS	Non-Technical Summary
NVC	National Vegetation Classification
NWSS	Native Woodland Survey of Scotland
PAC	Pre-Application Consultation Report
PSR	Primary Surveillance Radar
PWS	Private Water Supply
RVAA	Residential Visual Amenity Assessment
SAC	South Ayrshire Council
SM	Scheduled Monuments
SNH	Scottish Natural Heritage
SPA	Special Protection Area
VP	Vantage Point

1 Background

- 1.1 This document is a Non-Technical Summary (NTS) of the Environmental Impact Assessment Report (EIAR) which accompanies an application made by Knockcronal Wind Farm Ltd (the Applicant). Knockcronal Wind Farm Ltd is a wholly owned subsidiary of Statkraft UK Ltd (Statkraft).
- 1.2 The Applicant is applying for a Section 36 (S.36) consent and deemed planning permission, under the terms of the Electricity Act 1989, to construct and operate Knockcronal Wind Farm (hereafter referred to as the “Proposed Development”), located 4.8 km south of Straiton, 11.3 km south-west of Dalmellington and 17.4 km east of Girvan, (distances to the nearest proposed wind turbine), in South Ayrshire.
- 1.3 Renewable energy is a key factor in helping Scotland reach its target of Net Zero by 2045. The Proposed Development would make a meaningful contribution to those national targets for the generation of renewable energy and reduction in greenhouse gas emissions.

2 Purpose of the Proposed Development EIAR

- 2.1 ITP Energised was appointed by the Applicant to assess the environmental impacts of the Proposed Development in accordance with The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
- 2.2 The Environmental Impact Assessment (EIA) process is reported in an Environmental Impact Assessment Report (EIAR), which describes the design iteration process and methods used to assess the beneficial and adverse environmental impacts predicted to result from the construction and operation of the Proposed Development. It also sets out mitigation measures designed to prevent, reduce and, if possible, offset any significant adverse environmental impacts. An assessment of residual effects, those expected to remain following implementation of mitigation measures, is also presented.
- 2.3 The Proposed Development consists of 9 turbines, 6 of up to 200 metres and 3 up to 180 metres to tip height, reduced from the 12 at 200 metres first proposed. The infrastructure required has been designed to minimise the construction footprint by using existing infrastructure where possible. This document is intended to present a summary of the findings of the EIAR in non-technical language.

3 Availability of the Proposed Development EIAR

- 3.1 A hard copy of the EIAR Volumes 1 to 4 is available for £450.00. In addition, all documents are available (as a PDF for screen viewing only) on a USB for free.
- 3.2 Due to COVID-19 pandemic and in-line with The Electricity Works (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020 (Scottish Government, 2020), no physical copies of the EIAR are available for public viewing at the point of submission. However, should this change during the consultation period, the public copies will be made available during opening hours at the following location:

South Ayrshire Council
Wellington Square
Ayr
KA7 1DR
- 3.3 Electronic copies of the EIAR can be accessed at www.knockcronal.co.uk or at <http://www.energyconsents.scot/> as required by The Electricity Works (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020 (Scottish Government, 2020).

4 Representations to the Application

- 4.1 Any representations on the S.36 application should be made directly to the Scottish Government Energy Consents Unit as follows:

Energy Consents Unit

Scottish Government

4th Floor

5 Atlantic Quay

150 Broomielaw

Glasgow

G2 8LU

Email: representations@gov.scot Web: www.energyconsents.scot/Register.aspx

5 Site Location and Description

- 5.1 The Proposed Development site located approximately 4.8 km south of Straiton, 11.3 km south-west of Dalmellington and 17.4 km east of Girvan (distances to the nearest proposed wind turbine), in South Ayrshire. Further detail on the site location can be found in Chapter 1 of the EIAR.
- 5.2 The site comprises a main turbine development area of approximately 540 hectares (ha) of land, consisting of upland moorland in the south and west of the site, and farmland in the north-east. The surrounding land comprises open moorland to the east and north-east, as well as farmland with some scattered individual properties, with National Forest Estate commercial forest plantation to the north-west, west, south and south-east. The location and wider environment of the site is shown on Figure 1 below.
- 5.3 Access to the turbine development area from the public highway is still under consideration with two routes identified and assessed, therefore both are included within the final application boundary. However, only one route to site will be progressed and utilised.

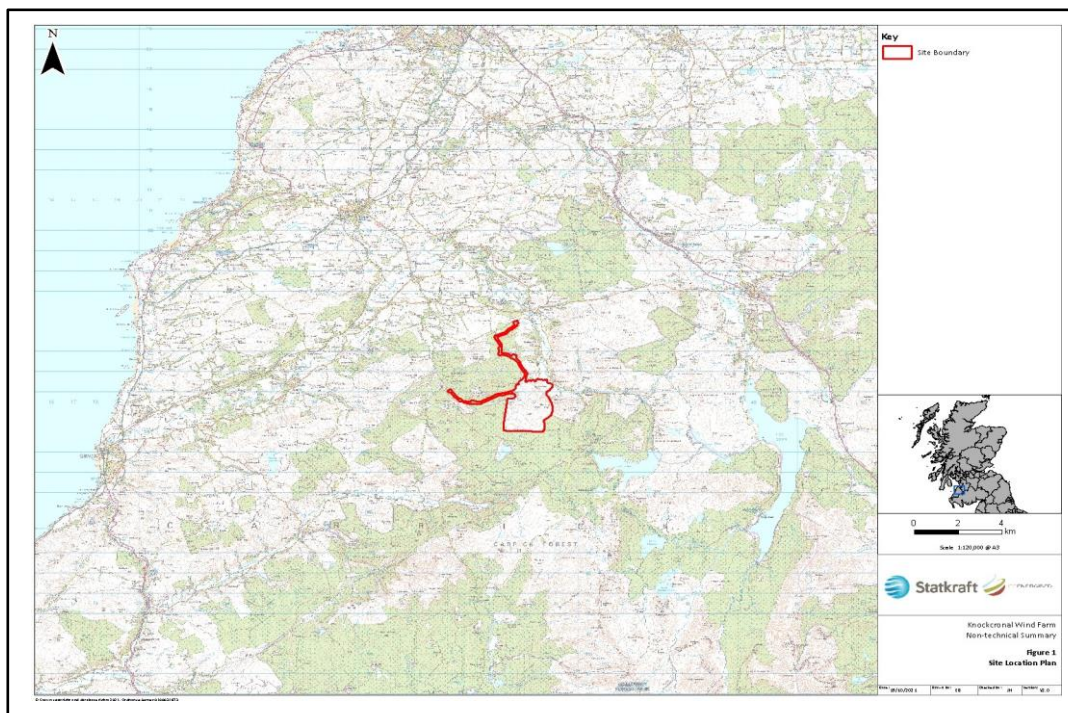


Figure 1 Site Location Plan

6 Site Selection and Design

Site Selection

- 6.1 The Proposed Development site sits within a landscape of operational, consented and in planning wind farm developments, which benefits from a strong wind resource, good access to the A77 trunk road, and proximity to the electricity network for purpose of connecting to the grid. It is therefore considered to be a good site for wind energy development. The Applicant proposes to make use of some existing site infrastructure (forestry tracks) to deliver renewable energy generation.

Design Process

- 6.2 As part of the Environmental Impact Assessment (EIA) process, design iterations were prepared and considered for the turbine locations and on-site infrastructure, including access tracks, construction compound and substation/energy storage locations.
- 6.3 The main landscape and visual design considerations that were applied comprised the following:
- ▶ A balanced group of turbines when seen from settlements and properties in the surrounding landscape;
 - ▶ Consideration of cumulative landscape and visual impacts from the Proposed Development and other wind developments from key views in the surrounding area;
 - ▶ Proximity to and visibility from residential properties and settlements; and
 - ▶ Visibility from Merrick Wild Land Area (WLA);
- 6.4 The following principles were adopted during the design iterations made by the Applicant to ensure that the final design of the Proposed Development was the most suitable for the site:
- ▶ Avoided locating turbines on the highest points of the site to minimise visibility (particularly from Straiton and the Girvan Valley);
 - ▶ Proximity to residential properties;
 - ▶ Limited and minimised impact on peatland where possible;
 - ▶ Accounted for other environment constraints to minimise the impact of the wind farm;
 - ▶ Maximised the potential electricity generation and storage of renewable energy; and
 - ▶ Utilised existing infrastructure (forestry tracks) as far as practicably possible to minimise the footprint of the wind farm.

Alternatives

Turbine Layout and Scale

- 6.5 The Applicant has considered a number of alternative layouts for the Proposed Development (refer to Chapter 2 of the EIAR). The preliminary layouts took account of identified technical and environmental constraints based on both desk studies and field survey work, as well as preliminary wind yield analysis.
- 6.6 Preliminary visualisations were generated for a range of layout options, to assess the suitability of design with respect to views from key viewpoints in the local landscape. The Applicant considered the most appropriate design to maximise renewable energy generation from the site and to reflect the existing topography. In addition, other operational and consented schemes near to the site

were taken into account so the Proposed Development can be considered in keeping within the existing and future landscape in which it would be sited.

- 6.7 During the design iteration process, the design was amended from 12 turbines at 200 m tip height to increase the distance between the turbines and noise receptors, watercourses, and woodland, to minimise and reduce potential ecological impacts.
- 6.8 The final layout consists of nine turbines of varying scales, six turbines with a maximum tip height of 200 m and the three most eastern turbines with a maximum tip height of 180 m. The reduced height of the easternmost turbines was to minimise the visual impact on the Girvan Valley and Straiton.

On-site Infrastructure Layout Iterations

- 6.9 Following the evolution of the turbine layout design, the design of the access tracks, crane hardstanding, construction compounds, substation compound and energy storage compound was undertaken. The on-site infrastructure required has been designed and arranged in such a way as to avoid the on-site environmental constraints where possible.
- 6.10 The site benefits from good access options. Site access will be achieved via the A77, B7023 and connecting roads. Existing forestry access tracks will be used and upgraded (where required) to reach the main body of the Proposed Development site. Two existing forestry tracks have been identified and assessed, however, only one of these routes will be progressed and utilised.
- 6.11 The proposed gatehouse compound has been located at each of the site entrance options (only one will be progressed) with the construction compound located at the centre of the site, near to the first turbine (turbine four). These locations have been selected to efficiently manage construction activities by minimising journey lengths and facilitating the storage of materials and parts at optimal locations.
- 6.12 The proposed substation and energy storage facility locations have been carefully considered and are situated to the south east of the site. The location has been identified to avoid watercourses, areas of deep peat and minimise impacts on sensitive habitats.

Number of Turbines: 9

Dimensions: 6 turbines with maximum height of 200 m to blade tip and 3 turbines with maximum height of 180 m to blade tip

Operational Lifespan: 30 - years¹

Generation Capacity: Approximately 59.4 MW and around 138 GWh per year¹

Community Benefit: £8.9 in total¹

Energy Generated: Provide electricity for the equivalent of approximately 40,500 households

7 The Proposed Development

- 7.1 The Proposed Development will comprise nine turbines in total, six turbines up to 200 m blade tip height and three turbines up to 180 m blade tip height (reduced from 12 up to 200m), with an associated on-site energy storage facility. A number of ancillary development components are also proposed, including: a construction compound; crane hardstandings adjacent to the wind turbines for construction; access tracks; underground cables between turbines; an on-site substation; an energy storage compound; borrow pits (five search areas); and a new permanent meteorological monitoring mast. The Proposed Development layout is shown on Figure 1 below.
- 7.2 The total power generation capacity of the turbines within the Proposed Development would be approximately 59.4 MW with the exact capacity depending on the model and type of turbine selected. It would be expected that the site could generate around 138 GWh per year² (again depending on the turbine selected). The Proposed Development would generate enough electricity to power approximately 40,500 average Scottish household (based on BEIS 2020 average electricity consumption per household in Scotland of 3,393 kWh pa) and displace around 33,000 tonnes of

¹ Based on the assumed use of 6.6 MW turbines over a 30 year operational life.

² Calculated from 59.4 x 8760 (number of hours per year) x 0.2646 (onshore wind load factor).

carbon dioxide annually (1.0 million tonnes over the proposed 30-year lifetime). The Proposed Development would contribute towards international and national targets for the generation of renewable energy and reduction in greenhouse gas emissions, including contributing significantly towards Scotland's target of net zero by 2045 (further information is provided on this in Volume 1, Chapter 3 of the main EIAR and the accompanying Planning Statement).

- 7.3 The electrical power produced by the individual turbines will be fed to an on-site substation and separate energy storage facility via underground cables, both are located to the south-east of the site. They are located here to avoid water courses and sensitive habitats. The substation and control room building will accommodate all the equipment necessary for automatic remote control and monitoring of the Proposed Development, in addition to the electrical switchgear, fault protection and metering equipment required to connect the Proposed Development to the electricity network. The design of the substation building and energy storage facility on-site is relatively flexible and it is often the case that the building is clad to match the local surroundings.
- 7.4 The Proposed Development's connection to the wider electricity network is still under assessment. A connection agreement was submitted to National Grid in September 2021. The routing and design of the grid connection cable(s) between the on-site substation and the point of connection into the electricity grid will be the responsibility of the Network Operator.
- 7.5 To enable the construction of the turbines, a crane hardstanding area at each turbine location will be required to accommodate assembly cranes and construction vehicles. This will comprise a crushed stone hardstanding area measuring approximately 195 m long by 65 m wide but subject to the specifications required by the selected turbine manufacturer and crane operator and following detailed ground investigations prior to construction. They will remain in place during the lifetime of the Proposed Development to facilitate maintenance works.
- 7.6 One lattice tower meteorological monitoring mast will be required to monitor wind speeds for the operational life of the Proposed Development. It is proposed that the mast will measure up to 130 m in height, in keeping with the proposed height of the turbine hubs.
- 7.7 A transport assessment (Volume 1, Chapter 12 and Volume 4, Technical Appendix 12.1 of the EIAR) has been undertaken in support of the S.36 application for the Proposed Development and this provides greater detail on access routes to the site and provides an estimate of vehicle trip generation during construction. The transport assessment includes a review of the proposed construction route, and construction traffic impacts.
- 7.8 Existing on-site access tracks will be retained, re-used and upgraded (as necessary) and areas of new access tracks will be required. The new stretches of access track within the site boundary will be between approximately 5.7 km and 6.2 km in length for the western and northern route respectively. A number of watercourses will be crossed by the new proposed access tracks within the site, new watercourse crossings may therefore be required, or existing crossings may require some localised upgrading.
- 7.9 One construction compound area is proposed as a control centre for all site activities and to provide facilities for the day-to-day needs of the project and the workforce. The construction compound will comprise an area of approximately 50 m long by 100 m wide. The compound will house a temporary portable cabin to be used as the main site office and a portable cabin controlling access to the main site. On completion of construction works, it is proposed that all temporary structures will be removed, and the compound area restored.

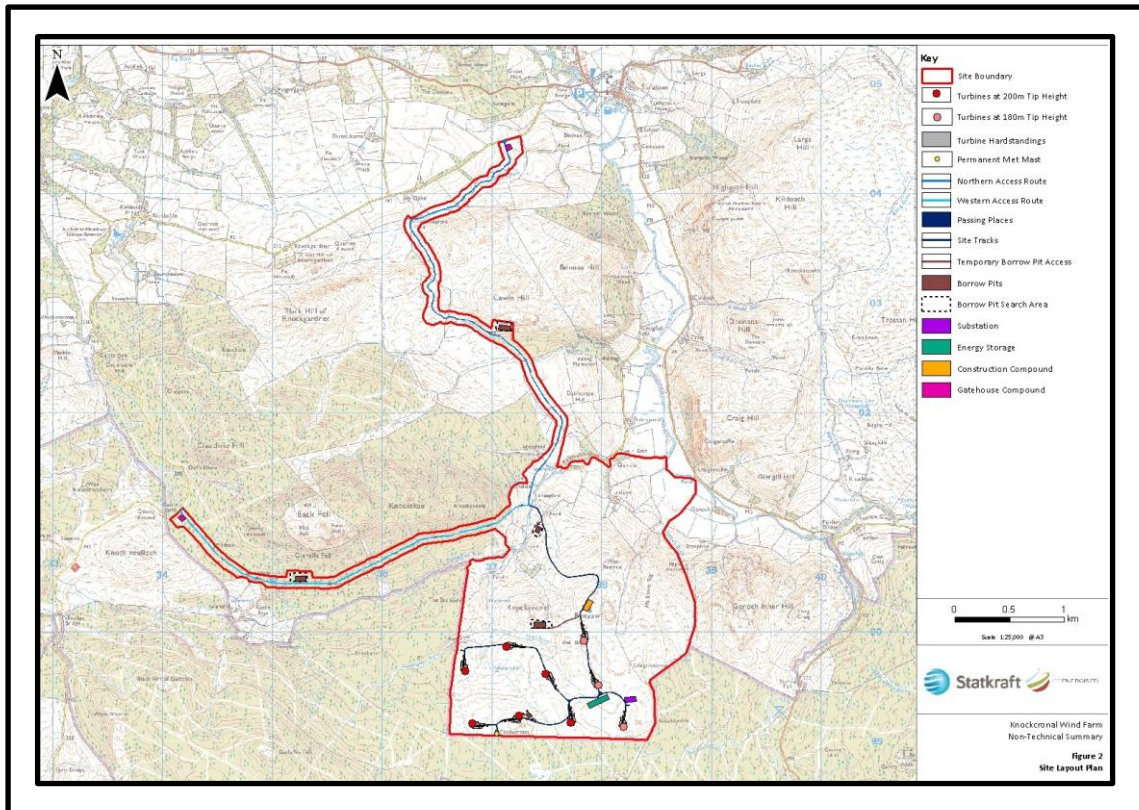


Figure 2: Proposed Development Layout

Forward Strategy & Community Benefits

- 7.10 During the operational period of the Proposed Development, the Applicant proposes to make community benefit contributions in line with Scottish Government best practice guidelines of £5,000 / MW of installed capacity per annum, which means that the project would generate an £8.9 million Community Benefit Contribution (based on a total installed capacity of 59.4 MW) to local communities over its lifetime. The aim of this funding will be to support the delivery of a range of projects in the area over the next 30 years. The provision of community benefit is not material in the planning process.
- 7.11 The Applicant is also committed to exploring the potential for community investment in the Proposed Development, creating the opportunity for local community groups to explore a shared ownership opportunity in the future wind farm.
- 7.12 The Proposed Development represents a significant investment in the region and the Applicant has committed to taking a number of steps to ensure that benefits from the Proposed Development are maximised locally. The Applicant is committed to a local supplier approach that will endeavour to source supplier contracts locally wherever possible, sustaining local businesses and providing employment opportunities for local people.

The on-site construction period for the Proposed Development is expected to be approximately 18 months as shown in **Table 1**.

Table 1 - Indicative Construction Programme

Task	Month Number																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Mobilisation																		
Access & Site Tracks																		
Foundations																		
On-site Cabling																		
Substation Works																		
Substation Construction																		
Crane Hardstanding																		
Turbine Delivery																		
Turbine Erection																		
Commissioning & Testing																		
Site Reinstatement																		

7.13 Normal construction hours will be between 07:00 and 19:00 Monday to Friday and 07:00 to 13:00 on a Saturday, no construction will take place on a Sunday. These times have been chosen to minimise disturbance to local residents. It must, however, be noted that during the turbine erection phase, operations may proceed outwith these times to ensure that lifting processes are completed safely i.e. once a component lift commences it is necessary to complete it.

7.14 The operational lifespan of the Proposed Development would be 30 years, after which it would be appropriately decommissioned. It is expected that decommissioning would take approximately 12 months. If, after the operational lifespan of the Proposed Development has expired there is potential for re-powering the development, this would be subject to a new and separate application.

8 Consultation

Statutory Consultation

8.1 A formal EIA Scoping Opinion was requested from the ECU in December 2020 through the submission of an EIA Scoping Report. The EIA Scoping Report contained details of the site baseline, the Proposed Development, proposed environmental impacts to be assessed in the EIA, and the assessment methodologies that would be used. The ECU consulted with a variety of statutory and non-statutory consultees before providing an EIA Scoping Opinion in March 2021. A summary of

how the Scoping responses have been addressed in the EIAR is presented in an EIA Gatecheck Report that can be found in EIAR Appendix 4.4.

- 8.2 Direct consultation has also been undertaken with specific statutory consultees, to confirm and agree the detailed approach to the technical surveys and assessments on a topic by topic basis.
- 8.3 Further information on the consultation process is given in Volume 1, Chapter 4 of the Proposed Development EIA Report.

Public Consultation

- 8.4 A stand-alone Pre-Application Consultation (PAC) Report has been prepared which gives details of the correspondence, online public consultation, in person drop-in sessions and other discussions which have taken place with the communities closest to the Proposed Development site.
- 8.5 The PAC report also details findings of that work and illustrates the ways in which community engagement has helped to identify potential issues arising from the emerging development proposal, and where appropriate, shape the final proposal which is now the subject of this application.
- 8.6 The Applicant is grateful to residents and local representatives for their input into the pre-application community engagement and for their participation in the discussions and consultation events.

9 Environmental Impact Assessment

- 9.1 The EIA considers the potential effects of the Proposed Development during construction, operation and decommissioning phases. Where appropriate, mitigation measures are proposed. The following topics and associated effects are assessed in the EIA:
- ▶ landscape and visual (assessing character of the landscape and views from agreed locations with NatureScot and SAC);
 - ▶ ecology (protected habitats, flora and fauna, excluding birds);
 - ▶ ornithology (birds and protected bird habitats);
 - ▶ noise and vibration (effects on local properties from noise and vibration arising from the Proposed Development);
 - ▶ cultural heritage (the integrity and setting of historic sites and/or features);
 - ▶ hydrology, hydrogeology and geology (surface water, groundwater, rocks and soils);
 - ▶ traffic and transport (effects from traffic travelling to, and from, the Proposed Development on local roads and receptors);
 - ▶ socio-economics, tourism, and recreation (local and national economy, local tourism businesses, and recreation facilities);
 - ▶ aviation and radar (civil and military aviation facilities and air space);
 - ▶ telecommunications (telecommunications facilities);
 - ▶ shadow flicker (effects caused by the passing of the turbine blades in front of the sun); and
 - ▶ forestry (effects on the commercial forestry operations at the site as a result of the Proposed Development).

- 9.2 Volume 1, Chapter 4 of the EIA Report describes the EIA process in more detail.
- 9.3 For each topic, the existing conditions (the baseline) was identified and the effects of the Proposed Development on these conditions assessed (the potential effects). Potential effects are assessed on a scale of negligible, minor, moderate and major, with effects of moderate or major deemed to be significant in the terms of EIA. Mitigation measures have then been proposed to minimise significant adverse effects where required. Following this, an assessment was undertaken of the effects of the Proposed Development on the existing conditions taking into consideration the proposed mitigation (the residual effects).
- 9.4 In addition to the above, the cumulative effects of the Proposed Development, i.e. effects considered in conjunction with other developments in the local area, primarily other wind farms, were assessed.
- 9.5 A summary of the baseline conditions, the proposed mitigation, the resulting residual effects and the cumulative effects for each topic is provided below. Full details of the EIA for each of the topics are provided in Volume 1, Chapters 6 to 17 of the EIA Report.

Landscape and Visual

- 9.6 The Landscape and Visual Impact Assessment (LVIA) considers the effects of the Proposed Development on landscape character and visual amenity within a study area up to 45 km from the site with a focussed 20 km study area for landscape character and cumulative assessment as agreed with statutory consultees. The assessment has been undertaken in accordance with all relevant published guidance and has involved desk studies and field-based assessments. The approach and scope of the assessment was agreed through scoping and through consultation with NatureScot and SAC.
- 9.7 The baseline for the assessment includes landscape and visual receptors and information relating to cumulative developments in the area. The landscape of the site and study area is described through observations made in the field along with published landscape character assessments and topic specific capacity documents, which also contain landscape characterisation information. Visual receptors include people in settlements, using the local area for recreation, and travelling through the area on roads. As a result of the need for aviation lighting, visual receptors at night are also considered. Representative viewpoints have been selected to assess the range of visual receptors, and these viewpoints were agreed through consultation.
- 9.8 The assessment of landscape and visual effects considers the embedded mitigation achieved through the design process. In particular, the Proposed Development turbine layout has been designed to minimise effects on the Water of Girvan valley landscape by reducing the heights of the three turbines closest to the valley and setting turbines back from the valley sides and away from conspicuous edge of valley hills. In doing so, the Proposed Development has made the best use of the site topography and surrounding hill forms to help to settle the Proposed Development into the landscape. The Proposed Development has a compact layout which for most views appears as a cohesive and consistently spaced grouping of turbines. The Proposed Development would be located on an upland landscape (Foothills with Forest and Wind Farm) which has an overall large scale and upland characteristics considered to be suitable for wind farm development.
- 9.9 Physical landscape effects that would occur during construction are found to be localised and not significant. Significant landscape character effects are assessed to occur within a maximum of 4 km from the nearest turbine of the Proposed Development. Significant visual effects have been identified as occurring out to 9 km although the vast majority of significant visual effects are found to lie within 5 km. In landscape and visual terms, it is considered that there is scope for wind farm development within the large scale upland landscape of the Foothills with Forest and Wind Farm LCT 17c in South Ayrshire.

- 9.10 Significant effects are also predicted for representative night time viewpoints within this localised area as a result of turbine lighting, however, the overall effect of the visible aviation lighting on the Dark Sky Park is considered to be Not Significant. Whilst the Residential Visual Amenity Assessment (RVAA) found that 8 of the 14 properties within 2 km would experience significant visual effects, it concluded that none of these effects have the potential to be overbearing in respect of the visual amenity of residents. The LVIA found that whilst there would be significant visual effects from elevated locations in the northern part of the Merrick WLA, the effects on the wild land qualities of the Merrick Wild Land Area would not be significant.
- 9.11 At greater distances, the effect on the wider landscape and visual resource would not be significant due to the level of screening from intervening landforms such as upland ridgelines and interconnecting hills that contain views of the site from the surrounding landscape and screening by other landscape elements such as shelterbelt and woodland planting within surrounding valleys and large blocks of commercial forestry within the upland itself but also on the valley sides.
- 9.12 In relation to cumulative effects, for the majority of receptors, the Proposed Development only contributes to a small part of the overall spread of development, often with Proposed Development turbines in the same context as the baseline or application scenario turbines.
- 9.13 The closest applications to the Proposed Development are Clauchrie and Craiginmoddie wind farms. There are instances in the application scenario where the Proposed Development would extend the wind farm development further along developed horizons and so increasing visual effects. Therefore, this outcome results in only a slight intensification of effect in the application scenario across receptors. When considering the influence of the Carrick wind farm in the scoping scenario it is important to note the uncertainty of the scoping scenario. Carrick wind farm in its current design would be located immediately to the south and west of the Proposed Development which, for the majority of landscape and visual receptors, results in the Proposed Development having a far lesser degree of change than in other scenarios assessed. This, in turn, results in a reduced effect in the scoping scenario, noting a slight intensification would occur.
- 9.14 Significant effects on the existing landscape character or visual amenity have been found to be localised in nature and wider landscape and visual effects are relatively limited in extent and severity as a result of localised topographical containment.
- 9.15 The compact nature of the layout reduces the effect experienced when viewing the Proposed Development from within the wider landscape context. It is consistently viewed as occupying a small part of a larger upland either as a backdrop to the Ayrshire lowlands to the north or viewed together with the large scale upland hills and plateau that the site is a part of and it is considered in the LVIA that the landscape is capable of accommodating the Proposed Development.

Ornithology

- 9.16 The full assessment of potential effects on birds is provided in Volume 1, Chapter 7 of the Proposed Development EIA Report.
- 9.17 The ornithological assessment is based upon comprehensive baseline data, comprising specifically targeted ornithological field surveys of important and legally protected ornithological features identified during desk study and consultation feedback. A full year of ornithology surveys were carried out between 2019 and 2020.
- 9.18 The results of the desk study and field surveys were used to inform the identification of important ornithological features within and around the site and permanent access roads. The site supports an inconsequential record of those ornithology species considered 'Target Species' for the assessment. Therefore, no ornithological features were scoped into the assessment.

- 9.19 Standard mitigation adopted will include embedded mitigation in scheme design, good practice measures (i.e. production of a breeding bird protection plan (BBPP)), pre-clearance surveys and the appointment of an Ecological Clerk of Works (ECoW) to oversee the implementation of the ornithology mitigation measures, and habitat enhancement opportunities detailed in an outline habitat management plan to be implemented.
- 9.20 Following the application of the standard mitigation, no significant adverse direct and/or indirect effects on ornithological features as a result of the Proposed Development are anticipated.

Ecology

- 9.21 The full assessment of the potential effects on flora and fauna at the site is provided in Volume 1, Chapter 8 of the Proposed Development EIA Report.
- 9.22 The scope of the ecological assessment was determined through a combination of a desk study to identify existing ecological data and ecological field surveys of important and legally protected ecological features within the site.
- 9.23 Ecological field surveys within the site were undertaken within an 18-month survey window between 2019 and 2021. This included detailed National Vegetation Classification surveys, habitat surveys and protected species surveys. The Proposed Development has been designed to minimise impacts on important habitats and protected species to achieve non-significant effects. The ecological features taken forward for further assessment, due to their higher conservation value and potential sensitivity to remaining impacts, were the Galloway and Southern Ayrshire Biosphere Reserve, blanket bog, wet heath, and bats.
- 9.24 During the construction stage of the Proposed Development there would inevitably be some direct and indirect habitat loss due to the construction of new infrastructure. The direct and indirect loss of the qualifying habitats of the Galloway and Southern Ayrshire Biosphere Reserve is considered not significant.
- 9.25 Effects of loss of blanket bog and wet modified bog were assessed. No significant effects were predicted, with the extent of direct and indirect losses not being significant in a regional context.
- 9.26 Potential construction effects on bats were assessed. Overall habitat losses for bats were considered not significant, and disturbance caused by noise, lighting and dust generation during construction would be limited by good practice construction measures and therefore are considered not significant. The impact of bat collision risk mortality due to the Proposed Development is considered not to be significant with embedded mitigation.
- 9.27 Standard mitigation adopted will include embedded mitigation in scheme design, good practice measures, i.e. production of a species protection plan (SPP), pre-clearance surveys, appointment of an ECoW to oversee the implementation of the ecology mitigation measures, and habitat enhancement opportunities detailed in an outline habitat management plan to be implemented. Following the application of the standard mitigation, no significant adverse direct and/or indirect effects on ecological features as a result of the Proposed Development are anticipated.

Geology, Peat, Hydrology and Hydrogeology

- 9.28 The full assessment of the potential effects on important hydrological, hydrogeological, geological and peat features associated with the site is provided in Volume 1, Chapter 9 of the Proposed Development EIA Report.
- 9.29 The assessment is based upon comprehensive baseline data, comprising desk study information, hydrological field surveys, peat depth surveys, peat slide hazard risk assessment surveys, outline peat management plan, watercourse crossing assessment and private water supply assessment of important and legally protected soil and water features and is based on standard EIA guidance.

- 9.30 The Proposed Development area supports the following sensitive receptors: relatively limited areas of peat and Annex 1 habitat blanket bog and wet heath, two areas of low peat slide risk which were not considered to be of significant consequence, protected mammals, otter and water vole, limited optimal fish and invertebrate habitat, a small area within a surface water Drinking Water Protection Area (DWPA), Scottish Water mains pipeline infrastructure and one private water supply catchment potentially connected to the existing western access track. These are all considered to be of Negligible to Minor significance of effect with the exception of the Glenalla Farm PWS, which is assessed as Minor/Moderate (not significant) significance of effect, and a section of the northern access track along the Balbeg Burn, which is assessed as moderate significance of effect due to its high sensitivity and the proximity of the watercourse to the track.
- 9.31 Standard good practice and mitigation measures adopted will include: embedded mitigation in scheme design and good practice measures such as the production of a drainage management plan, a water quality monitoring plan, including the PWS, and appointment of an ECoW to oversee the implementation of the ecological and hydrological mitigation measures. Habitat enhancement opportunities as detailed in an outline habitat management plan will also be implemented. Following the application of the standard good practice guidance and additional mitigation, including water quality monitoring, an emergency response plan and method statements for additional runoff and sediment management for the PWS and Balbeg Burn track sections, no significant adverse direct and/or indirect effects on soil or water features as a result of the Proposed Development are anticipated.
- 9.32 As set out in Chapter 3, two prospective access routes (northern and western) have been identified, although only one route to site will be selected and utilised. Given that it is not certain at this stage which route will be used, the potential effects associated with construction and operation of both options have been assessed together. This results in some aspects such as development footprint area and estimated peat excavation volumes being over-stated, given that numbers reflected in the assessment are based on cumulated figures for both access routes. A qualitative review has identified that the level of impacts and significance of effects would not be materially different depending on which route is selected. Crucially, the assessment has also identified no significant residual effects even when considering both access routes combined. It therefore follows that impacts will if anything be less than has been assessed.

Noise and Vibration

- 9.33 The full assessment of the potential noise and vibration effects from the Proposed Development on local receptors is provided in Volume 1, Chapter 10 of the Proposed Development EIA.
- 9.34 Noise would be emitted by equipment and vehicles used during construction and operation of the Proposed Development. Construction noise has been assessed by a desk-based study of a potential construction programme and by assuming the Proposed Development is constructed using standard and common methods. Noise levels have been calculated for receiver locations closest to the areas of work and compared with guideline values. Construction noise, by its very nature, tends to be temporary and highly variable and therefore much less likely to cause adverse effects. Various mitigation methods have been suggested to reduce the effects of construction noise, the most important of these being suggested restrictions of hours of working.
- 9.35 Operational turbines emit noise from the rotating blades as they pass through the air. This noise can sometimes be described as having a regular ‘swish’. The amount of noise emitted tends to vary depending on the wind speed. When there is little wind the turbine rotors will turn slowly and



- produce lower noise levels than during high winds when the turbine reaches its maximum output and maximum rotational speed. Background noise levels at nearby properties will also change with wind speed, increasing in level as wind speeds rise due to wind in trees and around buildings, etc.
- 9.36 Noise levels from operation of the turbines have been predicted for those locations around the Proposed Development most likely to be affected by noise. Noise surveys for the previous Linfairn Wind Farm application had already sufficiently established existing baseline noise levels at a number of these properties. Noise limits have been derived from data about the existing noise environment following the method stipulated in national planning guidance. Predicted noise levels take full account of the potential combined effect of the wind turbine noise from the Proposed Development along with Dersalloch Wind Farm (operational), Hadyard Hill Wind Farm (operational), Carrick Wind Farm (proposed) and Craiginmoddie Wind Farm (proposed). Other, more distant wind farms were not considered as they do not make an acoustically relevant contribution to cumulative noise levels, as defined in the Institute of Acoustics Good Practice Guidance.
- 9.37 Predicted operational noise levels have been compared to the limit values to demonstrate that turbines of the type and size which would be installed can operate within the limits so derived. It is concluded therefore that operational noise levels from the turbines will be within levels deemed, by national guidance, to be acceptable for developments with turbines, therefore the effects of operational turbine noise are considered not significant in EIA terms.
- 9.38 The Proposed Development would also include a substation and an energy storage facility, which would emit some noise during operation. Based on experience of similar installations and professional judgement, in conjunction with the large separation distances to the nearest receptor locations, the associated levels of operational noise would be negligible and are considered not significant in EIA terms.

Cultural Heritage

- 9.39 The full assessment of the potential effects on cultural heritage is provided in Volume 1, Chapter 11 of the Proposed Development EIA Report.
- 9.40 The baseline assessment has established that there are 34 known heritage assets that lie either within the site or along the proposed access routes. These assets have mostly been avoided by the design of the wind farm layout, and mitigation has been proposed that would address direct effects upon these and upon previously unrecorded cultural heritage assets. Taking account of the current land-use and historic landscape character of the site and its surroundings, the potential for further archaeological discoveries within the site is assessed as being low to moderate.
- 9.41 The assessment has considered the effect of the Proposed Development on the settings of heritage assets in the wider landscape and one impact has been identified as being significant in EIA terms: an effect of moderate significance on the setting of a possible burial cairn, determined by WoSAS to be potentially of national importance and assessed on that basis as being of high sensitivity, but that effect would not lead to any diminishing of the cultural significance of the asset concerned.
- 9.42 Taken in the context of existing operational wind farms in the wider landscape, one additional significant cumulative effect is predicted arising from the Proposed Development in combination with the proposed (in-scoping) Carrick Wind Farm. The predicted effects would occur on the setting of Knockinculloch enclosures. The combined developments would not, however, adversely affect the heritage value or cultural significance of the scheduled monument.

Traffic and Transport

- 9.43 The full assessment of the potential effects on traffic and transport is provided in Volume 1, Chapter 12 of the Proposed Development EIA Report.
- 9.44 There are two potential options by which the Proposed Development may be accessed i.e. the Western Access or the Northern Access. The Western Access would be taken directly from Hill Road to the south of the village of Cloyntie, using an upgraded forestry access junction, and the Northern Access would comprise an upgraded forestry access junction which will be taken from an unclassified road approximately 2 km to the south-west of Straiton.
- 9.45 During the construction phase, transport movements outwith the site will be reduced by use of on-site borrow pits.
- 9.46 The Proposed Development has the potential to affect the surrounding transport network during its construction. The construction traffic would result in a temporary increase in traffic flows on the road network surrounding the Proposed Development.
- 9.47 The assessment of potential effects on the Western Access Route determined that prior to the implementation of mitigation, minor, non-significant effects could be expected along Hill Road due to the increase in total traffic. For the Northern Access Route, it was determined that, prior to the implementation of mitigation, moderate, significant effects could be expected along the unclassified road, approximately 2 km to the south-west of Straiton due to the increase in total traffic, as well as along the B741 due to the increase in HGV traffic.
- 9.48 The maximum traffic effect associated with construction of the Proposed Development is predicted to occur in month eight of the construction programme. During this month, an average of 74 HGV movements is predicted per day and it is estimated that there would be a further 35 car and light van movements per day to transport construction workers to and from the Proposed Development.
- 9.49 Further mitigation measures have been proposed to further improve the operation of the construction phase and to ensure the highest levels of road safety. In addition to standard mitigation measures formulated into a Construction Traffic Management Plan (CTMP), an Abnormal Load Transport Management Plan, and Core Path Management Plan, the Applicant proposes to cover wear and tear on the public road. Additional site measures will also be included in the CTMP to further improve road safety across the Study Area.
- 9.50 The assessment confirms that the effects would be minor in nature and they would be not significant. No long-lasting detrimental transport or access issues are associated with the construction phase of the Proposed Development.
- 9.51 Traffic levels during the operational phase of Proposed Development would be one or two vehicles per week for maintenance purposes. Traffic levels during the decommissioning of the Proposed Development are expected to be lower than during the construction phase as some elements may be left in situ and others broken up onsite.
- 9.52 With the implementation of appropriate mitigation, no significant residual effects are anticipated in respect of traffic and transport issues. The residual effects are all assessed to be slight or insignificant and as they will occur during the construction phase only, they are temporary and reversible.



Socio-Economics and Tourism

- 9.53 The full assessment of the potential effects on socio-economics and tourism is provided in Volume 1, Chapter 13 of the Proposed Development EIAR.
- 9.54 The construction and operation of the Proposed Development will create new jobs, good jobs and green jobs. These could contribute to the retention of young people in the local area, alleviating the demographic pressures from an ageing population and depopulation.
- 9.55 It was estimated that:
- ▶ during the development and construction phase, the Proposed Development could generate up to:
 - £4.4 million GVA and 62 years of employment in South Ayrshire; and
 - £16.4 million GVA and 225 years of employment across Scotland.
 - ▶ during each year of the operational phase, the Proposed Development is expected to generate up to:
 - £0.4 million GVA and support 5 jobs in South Ayrshire; and
 - £0.6 million GVA and 8 jobs in Scotland.
- 9.56 The Proposed Development is set to deliver a wide range of benefits locally, regionally and nationally. Through a community benefit fund, local communities could receive around £297,000 per annum, which they will then be able to invest in local projects. The Applicant is also open to considering shared ownership of the Proposed Development, if local communities are interested. Any profits from such a scheme could then be reinvested locally leading to the generation of additional benefits.
- 9.57 The Proposed Development can bring wider benefits to the local communities. As the Proposed Development will require a good broadband connection to operate, the Applicant has commissioned a broadband feasibility study to understand whether the broadband connection can be improved for the local communities too.
- 9.58 The Proposed Development also provides an opportunity for developing local skills and interest in the onshore wind industry, with the Applicant keen to engage with local schools and colleges (including primary schools in Maybole and Straiton).
- 9.59 There would also be benefits to the public sector from payments of non-domestic rates estimated to be worth £0.4 million each year.
- 9.60 A review of the latest research evidence suggests that there is no evidence of wind farm developments adversely affecting the tourism economy of Scotland. A specific assessment of the potential effect of the Proposed Development on local tourism and recreation assets was undertaken and found that no adverse effects were expected. While no significant negative impacts were found, there may be positive benefits, as the Applicant is considering improving core path signage through information boards, which may lead to the valorisation of these assets.
- 9.61 Overall, there were no significant adverse effects identified.



Aviation and Radar

- 9.62 The full assessment of the potential effects on aviation and radar infrastructure is provided in Volume 1, Chapter 14 of the Proposed Development EIAR.
- 9.63 Consultations were conducted with aviation stakeholders in the area including Glasgow Prestwick Airport (GPA), NATS, NATS En Route Ltd (NERL), the Ministry of Defence (MOD) and the CAA. The consultee criteria for aviation stakeholders is defined in Chapter 4 and is based upon relevant policy and guidance.
- 9.64 Radar modelling was conducted using specialist prediction software (Review Version 5) which uses a comprehensive systems database which incorporates the safeguarding criteria for a wide range of radar and radio navigations systems.
- 9.65 Following the criteria, the only civil licensed radar equipped aerodrome within 30 km is at GPA. The Proposed Development will be in line of sight of both radars at GPA and therefore an area of radar clutter will be generated on the Primary Surveillance Radar (PSR). The Applicant has engaged with GPA to agree a suitable mitigation method.
- 9.66 The closest military ATC radar is at the former RAF West Freugh 52 km to the south-west. Due to intervening terrain, there is no radar line of sight below 1000 m above ground level (AGL). The closest Air Defence radar is located at Brizlee Wood, over 100 km to the east and radar modelling shows that there is no radar line of sight below 1000 m AGL. The Proposed Development is located in an MOD Tactical Training Area. An infra-red lighting layout has been proposed and submitted to the MOD for their approval (detailed in Appendix 14.1).
- 9.67 An assessment was conducted to determine any effect of the Proposed Development on NERL communications, navigation and surveillance infrastructure (CNS). The NERL radar at Lowther Hill will have visibility of all of the turbines except turbine 2 and it is anticipated that negotiations will need to be undertaken in order to agree suitable mitigation.
- 9.68 Subject to appropriate mitigation, there will be no residual effects caused by the Proposed Development, and with the exception of aviation lighting effects (covered in Chapter 6 of the EIAR), there are no other cumulative effects given the turbines' induced effects on radar will have already been mitigated.

Telecommunications

- 9.69 The full assessment of the potential effects on aviation, radar and telecommunication infrastructure is provided in Volume 1, Chapter 14 of the Proposed Development EIAR.
- 9.70 The impact assessment was conducted through consultation with the operators of mobile phone networks and other wireless data networks, and research into the presence of telecommunication links. No links were identified through the consultation process and no effects on telecommunications from the construction, operation or decommissioning of the Proposed Development were identified.
- 9.71 As the Proposed Development is not anticipated to have any effects on telecommunications infrastructure, no mitigation measures were deemed necessary. Assessment of effects to television receptors has been scoped out within the Environmental Impact Assessment (EIA) Scoping Report.
- 9.72 As the Proposed Development will not impact any telecommunication links, the Proposed Development will not have any cumulative effects on telecommunication links with other developments.

Shadow Flicker

- 9.73 The full assessment on the potential effects of shadow flicker is provided in Volume 1, Chapter 16 of the Proposed Development EIAR.
- 9.74 This assessment considers whether the effect known as ‘shadow flicker’ is likely to be caused by the Proposed Development and assesses the potential for impact on sensitive receptors. Shadow flicker is the effect of the sun passing behind the moving rotors of the turbines, casting a flickering shadow through the windows and doors of neighbouring properties. This occurs in certain combinations of geographical position, time of day, time of year and specific weather conditions.
- 9.75 Within the study area for shadow flicker there are two identified residential receptors, Linfairn and Knockskae, with potential to experience shadow flicker effects.
- 9.76 Calculations have shown that the realistic scenario modelling of shadow flicker at both receptors is found to be within the accepted guidelines, with a duration less than 8 hours per year and therefore not significant.
- 9.77 The model does not take into consideration any local screening from vegetation, blinds or curtains, or true window orientation relative to the turbines, which in reality will further reduce the potential time receptors are likely to experience shadow flicker over the course of the year. Additionally, while shadow flicker may potentially occur at this location it is possible that flicker will not be ‘experienced’ at the location due to the time of day during which it may potentially occur. As a result, no mitigation measures are proposed during operation.
- 9.78 There are three developments located within 3 km of the Proposed Development which have a shadow flicker study area that overlaps with, or is within very close proximity to, the Proposed Development’s shadow flicker Study Area. The cumulative assessment indicated that the shadow flicker study area of these three developments (Dersalloch, Craiginmoddie and Carrick wind farms) does cover either of the properties identified as receptors for the Proposed Development. Therefore, the cumulative shadow flicker residual effect across the Study Area is expected to be not significant.
- 9.79 Overall, shadow flicker is expected to be not significant for all receptors during the operational phase of the Proposed Development.

Forestry

- 9.80 The full assessment of the effects on forestry is provided in Volume 4, Appendix 3.2 of the Proposed Development EIA Report. The extent of woodland within the Proposed Development boundary is limited to parts of the two access routes to the site (northern and western). The woodland consists of a mixture of commercial forests and broadleaf woodlands of various ages. There will be a small loss of woodland area from utilising either of the proposed access routes. The extent of woodland loss would depend on the selection of the preferred route and the final route alignment.
- 9.81 The Applicant is committed to providing compensatory planting to mitigate against this woodland loss. The extent, location and composition of such planting will be agreed with Scottish Forestry, taking into account any revision to the felling and restocking plans prior to the commencement of operation.

Carbon Calculator

9.82 A Carbon Balance Assessment, using the Scottish Government's Carbon Calculator for wind farms, was undertaken to estimate the benefit of displacing conventionally generated electricity in the grid. This is in comparison to the predicted direct and indirect emissions of carbon resulting from the construction and operation of the Proposed Development. This includes losses of stored carbon from felled forestry and affected peatland. The Carbon Calculator provides an estimate of the carbon payback time for the Proposed Development.



9.83 The results of the Carbon Calculator for the Proposed Development show that the Proposed Development is estimated to produce annual carbon savings in the region of 36,000 tonnes of CO₂e per year, and lifetime savings of over 1.0 Mt (million tons) of CO₂e through the displacement of grid electricity, based on the current average grid mix.

9.84 The assessment of the carbon losses and gains has estimated an overall loss of just over 100,000 tonnes of CO₂e, mainly due to embodied losses from the manufacture of the turbines and provision of backup power to the grid, which should be minimised through the provision of onsite energy storage. Ecological carbon losses account for only 11% of the total emissions resulting from the Proposed Development construction and operation.

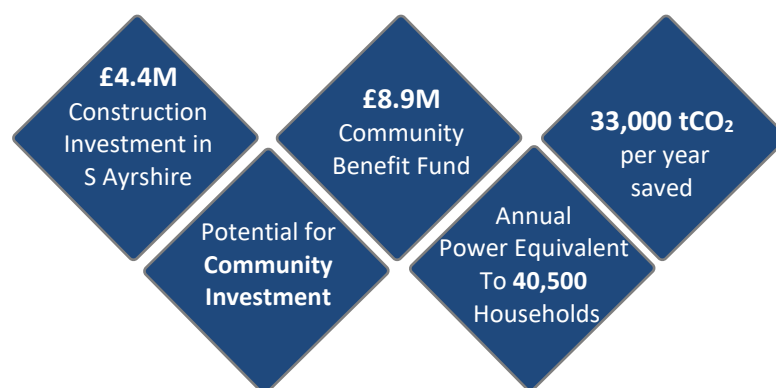
9.85 The carbon payback time of the Proposed Development, using the Scottish Government Carbon Calculator, is estimated at 2.9 years, with a minimum/maximum range of 2.5 to 3.5 years. The carbon intensity of the electricity produced by the Proposed Development is estimated at 0.024 kgCO₂e/kWh. This is below the outcome indicator for the electricity grid intensity of 0.05 kgCO₂e/kWh of the carbon intensity required by the Scottish Government in the Climate Change Plan (2018-2032) and therefore the Proposed Development is evaluated to have an overall beneficial effect on climate change mitigation.

10 Benefits of the Proposed Development

10.1 The principle of wind development in this general location has already been established by the existing wind developments surrounding the site. The addition of the Proposed Development will deliver the following key benefits:

- ▶ The Proposed Development would contribute to the attainment of the UK and Scottish Government policies of encouraging renewable energy developments; and in turn contribute to the achievement of UK and Scottish Government targets for renewable electricity generation. The Proposed Development, with an installed capacity of approximately 59.4 MW, would make a valuable contribution to meeting such targets.
- ▶ The Government has confirmed its long-term commitment to the decarbonisation of electricity generation and the Proposed Development would help advance this policy objective.
- ▶ The Proposed Development would have a total capacity of 59.4 MW, generated by nine ~6.6 MW turbines which together would produce around 138 GWh/year of clean power which would generate enough electricity to supply approximately 40,500 average Scottish households.

- ▶ The Proposed Development is expected to save approximately 33,000 tonnes of carbon dioxide per year, resulting in a total saving of 1.0 million tonnes over the 30-year lifetime, through displacing carbon-emitting generation.
- ▶ Energy generated from renewable sources makes a significant contribution to Scotland and the UK's energy security. The Proposed Development will increase indigenous production of renewable energy in Scotland while reducing the country's reliance on foreign fossil fuels, generating wealth from our own natural resources and improving the country's energy security. This will occur at a time when the country requires to meet the demand for the transition to heat homes and the demand for electricity is set to soar with the move to electric vehicles; it is important that the additional generation capacity to meet that demand comes from renewable sources.
- ▶ Based on an installed capacity of 59.4 MW, the Proposed Development will deliver approximately £297,000 per annum in Community Benefit Funding, equating to £8.9m in total over its 30-year operational life.
- ▶ The Applicant is also committed to exploring the potential for community investment in the Proposed Development, creating the opportunity for local community groups to explore shared ownership of the wind farm.
- ▶ Total development and construction expenditure on the Proposed Development over its 30-year lifetime is estimated at approximately £70.9 million, and each year operations and maintenance expenditure could amount up to £1.5 million. The Applicant is committed to a local supplier approach that will endeavour to source supplier contracts locally wherever possible, sustaining local businesses and providing employment opportunities for local people.
- ▶ The Proposed Development site sits within a landscape of operational, consented and in planning wind farm developments, which benefits from a strong wind resource, strong access to the A77 trunk road and proximity to the electricity network. It is therefore considered to be a suitable site for wind energy development, making use of some existing site infrastructure and recognising the accepted principle of wind energy generation within the local landscape.
- ▶ If approved, the Proposed Development will be capable of rising to the challenge set by the Scottish Government for the onshore wind industry in Scotland to start building wind farms without public subsidy.



11 Conclusion

- 11.1 This Non-Technical Summary of the EIAR provides an overview of the EIA undertaken for the Proposed Development. A schedule of commitments is in Chapter 19 of the EIAR. This details the environmental mitigation measures, summarised above, which the Applicant has committed to implement.
- 11.2 Volume 1, Chapter 19 of the EIAR summarises the potential effects, the mitigation to be implemented and the resulting residual effects. It also provides a summary of the cumulative effects of the Proposed Development in combination with other proposed, consented and operational developments in the local area.
- 11.3 The final layout has been informed by a robust EIA and lengthy design iteration process, considering potential environmental impacts and their effects, physical constraints, and health and safety considerations. The information used to inform the design iteration process included consultation responses, baseline data and the impact assessment undertaken.
- 11.4 Consideration has been given to a range of design issues as well as various environmental, ecological and technical requirements. Predicted environmental effects arising from the Proposed Development have been mitigated as far as possible, if not eliminated during the iterative design process.
- The Proposed Development site is considered an appropriate and viable location for a wind energy project due to:
- ▶ Initial desk-based studies and onsite wind data suggest that there is likely to be sufficient wind resource, and the site is available for wind energy development;
 - ▶ Good access from the B7023 via the A77 and connecting roads;
 - ▶ Potential to use and upgrade much of the existing forestry track on both the northern and western access options;
 - ▶ Potential to source construction material for site infrastructure within the site, reducing offsite traffic, by extending existing borrow pits used previously for forestry access track construction;
 - ▶ Being in close proximity to a viable grid connection point;
 - ▶ Ability to positively contribute to regional and national renewable energy and carbon reduction targets; and
 - ▶ Ability to provide social and economic benefits to the local area.
- 11.5 Overall, the Proposed Development is an appropriately designed, and sensibly located wind farm which accords with and draws support from local and national planning policy.. The Proposed Development has been designed to maximise renewable energy generation from the site, within acceptable environmental limits. The Proposed Development will provide a valuable contribution towards the ambitious national targets for electricity generation from renewable sources.

12 References

A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise, M. Cand, R. Davis, C. Jordan, M. Hayes, R. Perkins, Institute of Acoustics, May 2013.

